The Development of Colored Multi-Layer Transparencies for Coaching Football

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THE DEVELOPMENT OF COLORED MULTI-LAYER TRANSPARENCIES FOR COACHING FOOTBALL

A Thesis
Presented to
the Graduate Faculty
Central Washington State College

In Partial Fulfillment
of the Requirements for the Degree
Master of Education

by
Walter Harvey Arlt
June, 1968
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CHAPTER I
THE PROBLEM AND DEFINITION OF TERMS

I. THE PROBLEM

The purpose of this study was to develop transparencies to more greatly utilize the overhead projector in the instruction and coaching of football. In recent years, coaches have placed greater emphasis on the mental aspects of the game. More meetings off the practice field are being utilized in order that problematic situations can be covered in regard to the players' responsibilities and techniques. The coaches, as well as the players, are devoting greater amounts of time to the preparation of each contest and game plan.

Coaching, to be done properly, requires as much preparation as any other subject, and while most of us don't mind this, we do feel the need for additional time and helpful teaching aids (11:20).

It is believed that football coaches need a new and different media in their programs to bridge the existing gap in visual aids between the chalkboard and the movie projector. Robert Walker, in his book Organization for Successful Football Coaching, stated that "... motion pictures have been supplemented by so many other pieces of equipment that the use solely of a game film seems obsolete" (21:154).

Although the chalkboard is the primary media used for presentation and discussion of football strategy, it
has many disadvantages. Some of these are the following: speed of presentation, use of color, precision of diagrams, and audience size. There is only a given amount of time in which to prepare a game plan each week. Time becomes quite valuable for staff meetings and squad meetings. It is therefore very important to cover a maximum amount of strategical points within these meetings, making speed a desired characteristic. Much valuable time is lost in placing symbols for twenty-two players and their individual movements on the chalkboard for each few points to be discussed, only to have them erased and drawn again.

The use of colors tends to avoid confusion when presenting offensive and defensive diagrams together. When the diagrams are drawn in a single color only, lines tend to intersect, making it difficult to distinguish the offensive moves from the defensive movements.

Past experience has shown that the precision of the diagrams being drawn is affected by the coach's artistic ability and his attitude towards being neat and precise while drawing. Some coaches have this ability while others do not.

There is a limitation of audience size due to the range of vision in which the diagrams can be easily seen. Also, there are times during squad meetings that the audience is unable to see the diagrams on the board because
of the speaker's position as he illustrates. A further disadvantage is that coaches are unable to face the audience while diagramming and speaking.

The second media of primary importance is the motion picture. The use of motion pictures contains valuable information in the instruction of technique and concept. However, they have been limited in use because of cost due to development, technical skill, and the difficulty of changing the content. There are levels of football, such as junior high and high school, where motion pictures are not available. The football programs at these levels have been limited primarily to the use of the chalkboard for teaching strategy and the responsibilities of individual players.

The chalkboard and the movie projector will never be totally replaced, even though new equipment is available, such as closed circuit television and instant video tape replay. It is important that all different types of media be developed to the greatest extent so that each can be utilized in a given situation.

One of the newer and better coaching tools is the overhead projector. When used as a substitute for the blackboard, with prepared transparency materials, it can prove an effective time-saver and teaching aid (11:20).

The development of transparencies for use in the overhead projector is intended to give a new useful media at all
levels of football. It is believed that these transparencies would greatly affect a coach's presentation of theory, philosophy, and strategy to his staff and players.

With advanced planning, that every coach must do anyway, the projector can save a good deal of time. Instead of taking the time to write or diagram on a blackboard, the coach can use transparencies that will illustrate his points far faster and just as accurately (11:20).

As listed by Burtis and LeMay, there are several advantages in the use of overhead projectors: (1) A large image can be projected from a short range. (2) The operator faces the audience while speaking and illustrating. (3) The overhead projector can be used in a lighted room. (4) The viewer has a subjective viewing angle, thus identifying himself with the operator. (5) Flexibility and versatility are offered in presenting information. (6) The user may create his own illustrations. This helps maintain a personalized presentation. (7) The overhead system is one in which homemade materials can be created easily (3:17).

Lee Rocheleau, a team teaching coordinator in the O'Farrell Junior High School, San Diego, California, expressed his views on the advantages of the overhead projector as follows:

One of the overhead projector's assets is its ease of operation. Another is that it preserves the ideas and thoughts of an experienced and capable teacher. Transparencies may be stored and used again and again, either as the whole lesson plan, or as supplemental material. The lasting quality of the material is an
incentive to a teacher to spend more time on it, especially when the presentation is for a large group of students such as a team class (15:205).

In summarizing the values of the overhead projector, an athletic staff expressed their views as follows:

We, the coaching staff, feel that the overhead projector is one of the most valuable aids for our football team. Most of the information has heretofore been presented on the chalkboard, but projection now saves us time and, in our football season, this is an important factor. We must save time and make use of every minute. Transparencies can be saved for future reference, especially during bad weather when it is not possible to work outdoors. As the season progresses we add to our offense and defense. We present different drills by means of transparencies. In short, we highly recommend this important aid for presentation of football material (17:21).

It is believed that many football coaches could benefit greatly from the development of this study. This could improve instruction at all levels and create greater understanding. If this were developed on a commercial basis and be available to all people interested, it could be used in programs from the junior high to the professional level.

With the many advantages previously listed about the overhead projector, it remains the user's responsibility to use it effectively.

The Statement of the Problem

The problem is developing and utilizing visual aid media to be used in conjunction with the overhead projector for coaching the different phases of modern football. This
media must be feasible from the standpoints of cost, time, simplicity, flexibility, and accessibility. It is believed that by using individual colored, multi-layer transparencies in the overhead projector, many of the answers for the solution of this problem could be found. This visual media could be used to teach offensive and defensive concepts in a faster, more motivating, and precise manner.

Importance of the Study

In recent years, new developments in teaching machines have led to improved instruction in many areas of education. The overhead projector has been a respected tool in the classroom for many years, and suddenly has come into prominence. New techniques in transparency-making have increased its usefulness. The use of this machine is largely determined by the programs that have been developed and the knowledge and ability of the instructor. Lee Rocheleau made the following comments:

A teacher is an illustrator, drawing thought pictures for his students. Serving him admirably in his work is the overhead projector--a machine that has taken its place literally at the head of the class (15:205).

William Winston has also commented on the overhead projector:

Give an imaginative teacher an overhead projector and he will explore its possibilities to find more effective teaching techniques. The job becomes more exciting. The result is better education (23:203).
To best utilize this machine, prepared transparencies should be developed for it. In the area of football, this would be primarily offensive and defensive diagrams. A football coach could then use this visual media for the presentation of strategy, philosophy, and player responsibility.

Commercial transparencies are available for use with the overhead projector in many educational areas. There are a few commercial overlays available in football produced by the 3M Company. See Appendix A for illustrations of transparencies produced by this company (19). These have been limited primarily to drills. Transparencies in other areas of football should be developed for better and greater use of this media and the overhead projector.

Robert Walker discusses many of the audio-visual aids that are being used in some programs at the present time.

That technology has moved in on football is proven by the use of such aids as fast films (development in 60 seconds), movie cameras, slide projectors, tape recorders, video tape, television, telautograph devices that transmit handwritten messages instantly, tachiscopes, binoculars, telephones, and even electric computers. It is true that most of these pieces of equipment are only practical and possible in the professional leagues, or in the university or college with a large staff of assistants and a larger budget (21:153).

Although much success has been reached with these types of media, they have some limitations and cannot be used in all
desired situations. Too much time, expense, and technical skill are required for their production and use.

The Scope of the Study

The scope of the study is to initiate the development of colored, multi-layer transparencies for use in teaching football concepts with the overhead projector. The range of this project will start with some basic knowledge and proceed through the following: (1) the elements and procedures in making transparencies, (2) the different types of processes used in the development of transparencies, (3) criteria for the selection of processes, (4) content of the transparencies to be drawn, (5) the procedure and organization necessary for drawing the transparency masters, (6) procedures by which transparencies are produced from the masters, (7) mounting the transparencies in the frames for use in the overhead projector, (8) examples of the finished transparencies, (9) uses of the overhead projector in coaching football, (10) different ways in which the multi-layer transparencies may be projected, and (11) recommendations and summary.

Delimitations

This study was delimited to the following:

1. The development of colored, multi-layer transparencies for use in teaching football concepts.
2. Use of the overhead projector and transparencies in coaching football.

3. The transparency processes which are most feasible for use in football programs.

II. DEFINITIONS OF TERMS USED

Flanker

A back who is split out on the same side as the tight end, usually a pass receiver.

Masters (transparency)

Drawings from which transparencies are produced by machine.

Multi-layer

Individual transparencies mounted in frames placed one on top of the other in any sequence.

Overhead projector

A machine which projects an image onto a screen in back of the speaker. A transparency is placed on the projection stage, and light passes vertically through this transparency and is reflected at an angle onto a screen.

Overlays

Several transparencies mounted on one frame which can be projected in one sequence.
**Polarizing Spinner**

A polarized light source which has a motorized spinner removing portions of the light beam. This gives the effect of motion.

**Slotback**

A back inside the split end.

**Split End**

A player on the end of the line out wide.

**Square Position**

A position for defensive linemen directly in front of the offensive player.

**Tachistoscope**

A machine used to teach rapid identification of objects by flashing images on a screen for a brief period of time.

**Telautograph**

A machine used to transmit diagrams, writings which are produced by hand.

**Transparency**

A picture or diagram through which light rays may pass for projection purposes.
Three Dimensional

A diagram giving the illusion of depth.
CHAPTER II
REVIEW OF LITERATURE

I. RELATED LITERATURE

The review of literature revealed several studies and articles related to the one proposed by the writer. Brief summaries of this literature follow.

An article by Damron in *Scholastic Coach* pertains to "Teaching Defense Recognition by Tachistoscopic Techniques." This work was a dissertation presented to Indiana University. The central idea of this article is the teaching and identification of defensive patterns by offensive players. The principle teaching media consisted of two-by-two-inch slides, a projector, screen, and tachistoscope. Two- and three-dimensional slides were made of defensive patterns in miniature. These slides depicted eight fundamental defenses against the T formation. These defenses were photographed from seven different perspectives corresponding to seven offensive positions, those being ends, tackles, guards, and quarter back.

An experimental training program was set up for 52 high school players who were divided into two groups. Group 1 was assigned to two-dimensional slides, and Group 2 the three-dimensional slides. The training program was designed for 18 days, with 20 minutes a day on each group.
Both Group 1 and Group 2 were tested under identical conditions. Defenses were set up for an actual field test by boys who had not participated in the training program. The percentage of correct responses made by both groups came to approximately 95 per cent. It appears that high school players can be taught to recognize defenses in a very brief period of time with little difficulty, using this type of training (6:22).

Since it was found that this visual media has worked very effectively in training football players, it is believed that transparencies may also produce favorable results.

In "A Study of Overhead Projection with Emphasis on the Use of the Projector and Local Production of Transparencies," Bond discusses the advantages and limitations of overhead projectors. Production of transparencies for use with the overhead projector were discussed in three methods: (1) handmade transparencies, (2) dry-printed transparencies, and (3) photographic transparencies (2:13).

Utilization of the overhead projector in the educational program and the use of transparencies were discussed in areas such as music, English, and sports (2:31).

The study provided the most useful information for the development of colored, multi-layer transparencies. Many of the fundamentals for the present study were obtained from this thesis.
"Colored Visual Aids," by Nitchman, in The Athletic Journal, showed the importance of color in offensive diagrams to minimize mistakes on blocking assignments. Players in line positions were represented by a given color. Ends were indicated in blue, tackles in red, guards in green, and the center in black so that players could easily follow their blocking assignments. These were both mimeographed on paper and drawn on large play cards (14:5).

An article in The Athletic Journal by Zimmerman titled "Slides as a Football Visual Aid," suggested the use of 35mm slides to teach assignment recognition as well as recognition of various types of defenses. Slides were made up, showing the offensive formation and probable defenses that would be used during the season in their conference. These were flashed on a screen to have players determine their assignments. The slides were projected for a period of ten seconds, then turned off. Each player then had to diagram his correct assignment.

These slides were also used to train quarterbacks to understand the basic weaknesses of each defense. The preparation of accurate diagrams was rather time consuming, but well worth the effort (24:14).

One of the more important articles discovered was in Scholastic Coach, titled "The Overhead Projector," by Luntz. This was one of the few articles written on the use of the
overhead projector for coaching football. In this article Luntz explained some of the advantages of the overhead projector, uses of the projector, and the different transparencies with which they have experimented for use in the projector. The ideas presented in this article were elementary and basic. However, some of the same ideas have been experimented with in this study (11:20).

The overhead projector has been used to teach individual techniques in sports. Lew Watts in "Classroom Approach to Batting," illustrated how this may be accomplished. Drawings of key fundamentals were made with India ink and converted into transparencies. Transparencies of six mechanical components of batting were made, including grip, stance, stride, hitting actions, swing, and follow-through. From this article, basic fundamentals of football techniques could be easily developed into similar transparencies for coaching (22:19).

An article by Kautz, "The Overhead Projector at a Track Meet," showed the versatility of the overhead projector. It was used to keep score of the different events in the track meet. Names of competitors, as well as times and distances, were recorded and projected on a large screen at night. The relationship of this article to football correlates well. It shows that names of starting lineups for offense, defense, kick-off, kick-off return, point-after-
touchdown, and other changes of personnel can be recorded and displayed for the benefit of the team (9:23).

Schroeder, in "A Study of Teacher Constructed Audio Visual Aids," summarized and listed the equipment necessary to construct charts and posters needed to make up transparency masters drawn on high quality tracing paper with India ink (16:33).

Kemp, the author of Planning and Producing Audio Visual Materials, gave the complete fundamentals for organizing and developing overhead transparencies. In his book the following information on planning audiovisual materials is discussed: (1) Why you should prepare your own audiovisual materials, (2) Getting started, (3) Kinds of materials, (4) Getting some help, (5) Expanding from the statement of purposes, (6) Mapping the way, (7) Making the pictures, (8) Evaluating and organizing, (9) Completing the project, and (10) Presenting your materials.

Kemp also gave the addresses of all the major companies involved in overhead transparency production and a listing of all published pamphlets which might be helpful in preparing overhead transparencies (10:5).

II. CORRESPONDENCE

Correspondence was made with several companies regarding the development of colored, multi-layer transparencies
for coaching football. Information was obtained concerning the work that individual companies have done in this specialized area, including new recent developments in transparencies.

The 3M Company sent information including a pamphlet on "Creative Teaching," a booklet on "The Story of 3M Business Equipment," a Fall School Catalog, reproductions of transparencies made of football drills in their catalog which are included in Appendix A, and background information on the 3M Visual Products Graphic Systems Group (19).

A catalog showing the latest developments for use in making masters and finished transparencies was received from Arthur Brown & Brothers, Inc. (1).

General Aniline and Film Corporation sent booklets on "Overhead Projection" and the "General Aniline Film Corporation Custom Transparency Production Service for Overhead Projection."

This custom service is staffed with experienced specialists in all phases of overhead projection, specialists who are prepared to assist you in any facet of transparency reproduction for all overhead transparency presentations.

This experience is available to both small and large quantity users in reproducing single sets of transparencies from existing film masters or producing an entire presentation for mass distribution throughout the United States (8).

Information on the Seal "lift" process for making full color and black and white transparencies was received
from Seal, Inc., of Derby, Connecticut. Sample packets of these materials were enclosed. They included Seal Transpara-film and Seal-Lamin. Both of these films are used in the "lift" process for making transparencies. Information on the Seal Presses, "A Guide to Better Mounting," and finished examples of both types of the "lift" process were enclosed in finished transparencies (18).

III. SUMMARY

The review of literature provided valuable information concerning the processes, production, organization, and recent developments in overhead transparencies.

It appears that little work has been done with overhead transparencies in the area of football coaching as compared to other educational areas. A thorough search for information pertaining to this subject was made, and few articles were found.
CHAPTER III
PROCEDURE OF DEVELOPMENT

The procedure of development for the colored, multi-layer transparencies has been both experimental and evolutionary. Since little information was available in this area, the basic plans were made from Kemp's book, Planning and Producing Audio Visual Materials.

I. ELEMENTS TO CONSIDER IN MAKING TRANSPARENCIES

The first items considered in the development of transparencies were listed in Kemp's book in Part 1, Chapter 2, "Getting Started."

Start with an idea and from it develop your purposes in terms of the specific audience with which you plan to use your audiovisual materials (10:5).

Basically, the following items were planned for: age, educational level, present knowledge of the subject, attitude towards the subject, and major characteristics of the audience. It has been found that in order for a media to be developed properly, planning for one major audience group is necessary (10:6).

II. CRITERIA TO BE USED FOR THE SELECTION OF THE BEST PROCESS

It was found there are many transparency processes which could be used in this study. A list of characteristics
was then drawn up to select the best process. The follow
ning is a list of the desired characteristics for the pro-
duction and use of football transparencies: (1) clarity,
(2) longevity, (3) large size, preferably $7\frac{1}{2}$ by $9\frac{1}{2}$ inches
for projection, (4) an assortment of colors which can be
used for various phases of the game, which are permanent
and will not fade out or rub off, (5) simple and accessible
duplication, since time often becomes a necessary factor
during the season when these items are needed, and (6) a
high degree of neatness and precision to give the proper
motivation for the best learning situation.

A list of the factors to be considered in making
transparencies consisted of the following: (1) the type of
masters required to produce the transparencies, (2) the
simplicity in making the masters, (3) the cost of the
masters and the finished transparencies, (4) the time
involved to create the masters, (5) the production time to
make the transparencies, (6) the facilities, equipment, and
technical skill required to produce the masters and trans-
parencies from the beginning to the finish, and (7) the
knowledge, planning, and preparation essential for the com-
pletion of this study. In some cases special assistance
may be required to operate special production machines to
convert the masters into finished transparencies. This
would be true of the Diazo-chrome process, the 3M Thermo-fax
method, or any other process that might be used.
III. TYPES OF TRANSPARENCY PROCESSES

Many processes have been developed for preparing transparencies. They range from very simple hand lettering or drawing to methods requiring special equipment and particular skills. Of these, the most practical and proven techniques are considered here. The methods are grouped as follows:

Making transparencies directly on plastic
- on clear plastic
- on treated or coated acetate
- on frosted (matte) acetate

Making transparencies as reproductions of prepared diagrams
- with the spirit duplicator
- on diazo film

Making transparencies as reproductions of printed illustrations—without size change
- on heat-sensitive film
- on diffusion-transfer (photocopy) film
- on picture-transfer film—Thermofax method
- on picture-transfer film—Seal method

Making transparencies as reproductions of printed illustrations—with size change
- high-contrast subjects
- halftone and continuous-tone subjects

Which method or methods to use? First, consider those most appropriate to your purposes, the subject matter, and the planned use for the transparencies. Your final decision should be based upon accessibility of equipment and materials, on your skills and available time, and certainly not of least importance, on your standards for quality (10:10).

After visiting the Central Washington State College Audio-Visual Production lab, it was found that the Diazo film process is used there. This process best meets the criteria desired in the football transparencies. However, a coach working in the public school system would probably prefer the Thermo-fax method because of the accessibility of equipment.
The primary reason for the selection of Diazo films is their design for the preparation of brilliantly colored transparencies. A wide range of colors is available: red, magenta (dark red), blue, green, orange, black, cyam (light blue), setia (golden brown), violet, yellow, and brown (4).

If the Thermo-fax method is used, the following colors are available: black, red, blue, green, purple, and orange. These colors are for use in the 3M Thermo-fax Secretary Copier (19).

Each process has its own advantages for the user. The process chosen should be based on the developer's skill, the available time, and the standards of quality.

IV. CONTENT OF THE TRANSPARENCIES

The content of the material to be presented in the transparencies was designed to fit the needs of the football program. This may be an ever-changing item, depending on the strategy, philosophy, and responsibilities to be taught. In the beginning, a list of important concepts was made to be presented to the football coaching staff or the players. The following is a breakdown of the offensive ideas: (1) huddles, (2) communications, (3) formations, (4) points of attack, (5) running plays--outside running attack, inside running attack, running lanes, blocking rules, and fundamentals and techniques, (6) passing plays--drop-back passing,
play action passing, sprint-out passing, rollout passing, protection and blocking rules, (7) patterns--quick flare, swing, split, sideline, deep, cross, hook, and man-in-motion, (8) patterns attacking the outside perimeter, (9) patterns attacking in front of the perimeter, and (10) patterns attacking inside the perimeter (13:193).

Defensive concepts were as follows:

1. huddles
2. communications
3. alignments--both line and secondary
4. meeting strength with strength
5. overshift
6. undershift
7. adjustments to offensive sets
8. three-deep secondary
9. four-deep secondary
10. umbrella coverage
11. semi-rotated coverage
12. box coverage
13. inverted coverage
14. monster coverage
15. odd defenses
16. even defenses
17. goal line defenses
18. containing defenses
19. pressure defenses
20. pass coverages--man-to-man, zone, combination zone and man-to-man, and prevent
21. pass rushes--blitz, red dog, and controlled (13:35)

Note cards were made containing the information to be used in each transparency. In order to organize and break down the information to be presented in the transparencies, it was necessary to place these note cards in proper sequence on a picture board.
V. DRAWING THE MASTERS

The drawing of the transparency masters has been both experimental and evolutionary. It was begun with basic ideas from the review of literature and correspondence. Before the actual drawing of the master transparencies was started, there were several factors to be decided. These are as follows: (1) equipment and materials necessary, (2) scale size for offensive and defensive diagrams, (3) the standardization of alignments of the offensive and defensive diagrams for use as multi-layer transparencies, (4) the design of symbols to represent players, (5) type of master paper to be used, (6) type and size of lettering to be used, and (7) the preparation of a worksheet from which to draw all transparency masters.

The following is a list of equipment used for drawing the transparency masters: (1) a Pickett pocket template, No. 1085--this contains various sizes of circles, squares, hexagons, and triangles, (2) a Pickett master ellipse, No. 1265--a template containing various sizes of ellipses, ranging from 1/4" to 5/8" and 15° to 65°, (3) Pickett ink riser, No. 1095, (4) waterproof India ink, (5) Koh-i-noor Rapidograph lettering pens with points 0, 1, 2, and 3, (6) Koh-i-noor Rapido-Guide lettering templates for points 0 and 1, (7) an architect scale, (8) transparent protractor, (9) transparent 12" ruler, (10) transparent 6" ruler, (11) a
transparent 45° triangle, (12) transparent 30°-60° triangle, (13) a small architectural drawing set, (14) razor blades, and (15) paper clips.

After materials and equipment were gathered, the next major problem was to determine the scale for the offensive and defensive diagrams. The first scale selected was 1/8" equals one foot. This was later found to be small when projected on the screen, and caused difficulty when diagramming running plays and blocking rules. The other extreme of 1/4" equals one foot was then used. This was found to be too large for illustration of the various secondary defenses and the offensive pass patterns. A compromise was made between these two scales, which resulted in the use of the scale 3/16" equals 1 foot. (See Figure 1, p. 26) This scale, used to draw all diagrams, proved very successful for illustrating running plays, pass patterns, offensive sets, defensive alignments, and defensive movements. It also projects very well and leaves sufficient room for writing and drawing on the transparencies.

The next item of major importance was to standardize the offensive and defensive diagrams for use as multi-layer transparencies. Considerable experimentation was done to find solutions to the several problems encountered. The final design was set up in the following manner. Most
football formations are made up of seven men on the line of scrimmage with one end being split wide. The center, usually the middle man of the offensive line, was placed 5\(\frac{1}{2}\) inches from the side, and 3\(\frac{1}{2}\) inches from the bottom of the paper. (The paper refers to a sheet of high-quality tracing paper, measuring 8\(\frac{1}{2}\) by 11 inches.) See Figure 1. The split end was placed to the left side of the formation, and the tight end was placed on the right side. Since most teams are right-handed, meaning the split end usually lines up to the left side and the tight end to the right side, the diagrams were drawn this way. After using the transparencies this past fall, it was found that most teams ran more plays to the right than to the left. This caused no major problem with the transparencies, as they can be turned over, causing the split end to be to the right and the tight end to the left, just as a football team flip flops its formations and plays.

Because these particular transparencies may be turned over and around, lettering is not recommended, as it may cause distraction.

In drawing the offensive diagrams, it was found that some teams use both wide receivers to one side of the field. This caused an unusually large vacant space on one side of the drawing when the offensive center was placed as previously mentioned. (See Figure 2, page 28.) However, this
was not of great concern, because to have flexibility in proper alignment of the defensive transparencies, this proved to be the only possible way in which it could be done. After some experimentation, defensive secondaries were placed on separate transparencies. This allowed for individual adjustments to the split ends, slot backs, and flankers of offensive sets. See Figures 3 and 4, pages 30 and 31, for examples of adjustment to split end and flanker. See Figures 5 and 6, pages 32 and 33, for adjustment to a split end and slot back.

The complete defensive adjustments can be made in both the secondary and primary units. An illustration of this is shown in Figures 7, 8, and 9, pages 34, 35, and 36. Figure 7 is a diagram of the stacked I. Figure 8 is a diagram of an overshifted stunting eight-man front, illustrating the adjustment to a split end. An adjustment to the stacked I and a split end by the defensive secondary is shown in Figure 9. Figures 8 and 9 illustrate the complete defensive adjustments and stunt to the offensive formation shown in Figure 7.

The design of the symbols to represent the players in the drawings and transparencies was the next important step to be completed. It is important that these symbols represent a scale in which distances were proportional for both offense and defense. After much experimentation, the
FIG. 3

0

0 0 0

0 0 0

0 0 0
final offensive player symbol became an ellipse of 35 degrees of an 11/32" circle. (See Figure 1, page 26.) This particular symbol can be used for both two- and three-dimensional drawings. Figures 10 and 11, pages 38 and 39, illustrate three-dimensional drawings. These are drawn from templates which can be purchased from most any drafting supplier. The template in reference was a Pickett master ellipse No. 1265.

The defensive symbols selected for use differ to some degree from those normally used to represent defensive players by most football coaches. It is known that most coaches use either v's or x's to represent these players. From the experience gained from Tom Parry, football coach at Central Washington State College, it was found that the upside down vee has many advantages. (See Figure 8, page 35.) The following are some basic reasons why this symbol has been chosen: (1) The inverted v shows the position of the feet rather than the head as the v illustrates. (2) The bottom portion of the upside down v may be closed to form a triangle when the defensive player is square, head up, to the offensive player. This is important when defensive linemen are playing a considerable distance from the line of scrimmage. This works especially well when diagramming on the chalkboard where the precision and the accuracy of the diagrams vary. (3) These symbols work
better when used for three-dimensional drawings of the defensive transparencies. A pickett pocket template No. 1085 has the triangle used for these symbols.

The paper used for drawing the masters was blue Ozalid high quality tracing paper on which India ink could be easily used. The paper was standard size—8½ by 11 inches.

Another factor to be decided was the type and size of lettering for the best projection upon a screen. A 3/16" Koh-I-Noor Rapido-Guide, No. 3031 was found to work best for this purpose. (See Figure 12, page 41.) It was necessary to use a Rapidograph lettering pen No. 3065 with a No. 1 point with this lettering guide. With patience and experience, a professional appearance can be created.

For all transparencies to be in proper alignment for use as a multi-layer unit, it was necessary to draw all the masters from one basic diagram of the offense and defense. A 9 by 11 3/4 inch manila folder, the type used for office filing, was the master drawing folder. The transparency frame used was the green Holson Co., Model OM-2. It is important that this frame be used, since it has prepunched holes at the bottom. These holes fit on the studs of the projector for the purpose of transparency alignment. The frame was placed on the front of the manila folder, then the opening was traced and cut out. When placing the frame
on the folder, it was necessary to observe the frame mounting marks to assure precise, accurate alignment. The left side of the folder was glued together with rubber cement, allowing sufficient room for the insertion of an $8\frac{1}{2}$ by 11 inch sheet of tracing paper.

The offensive and defensive symbols were then drawn on the inside of the manila folder so that any offensive or defensive set could be traced. There were 17 offensive and 23 defensive symbols used to make these drawings. More symbols might be used if necessary. This folder method worked very well for making up the basic offensive and defensive sets. When the masters were completed, the alignment of the offensive and defensive diagrams was perfect.

After completing the master drawing folder, drawing of the masters was begun. It was necessary to use India ink for the Diazo process to make good clear transparencies. This ink smears easily and takes some time to dry; however, a Pickett ink riser No. 1095 was used to solve this problem. This ink riser prevented smearing while drawing the offensive and defensive symbols from the templates. Using the Pickett drawing materials and the Koh-I-Noor Radiograph inking pens, very few problems were encountered in drawing the masters. Patience and neatness are important if a professional appearance is to be obtained. There was a temptation to draw some lines illustrating the moves of
various players by free hand. The fact that they were drawn by free hand was very evident when the transparencies were enlarged many times by projection on a screen. It is highly recommended that a mechanical aid be used for all drawing on the masters.

Experimentation has been done with three-dimensional drawings of offense and defense to give depth to player movement. (See Figures 10 and 11, pages 38 and 39.) These drawings, in comparison with two-dimensional drawings, present a different look and have been found to give a better concept of depth when illustrating plays. The drawing of these masters is more difficult and requires considerable more time for completion. One distinct disadvantage was that these transparencies may only be projected as if the viewer were behind the offense. They may be turned over to illustrate left and right formations, but they cannot be turned around. The two-dimensional drawings can be turned both over and around. When turned around, they can be viewed defensively. This is important when speaking to defensive personnel while explaining moves and responsibilities. It is rather difficult to explain and illustrate defensive responsibilities when the drawings are presented from an offensive point of view. Therefore, it is recommended that three-dimensional drawings be used only for offensive concepts.
Symbols used for offensive and defensive illustrations are optional, and may be varied. If lettering is desired, circles and squares may be used. (See Figure 12, page 41.) Again, it should be emphasized that permanent lettering on transparencies definitely limits their use. Therefore, it is recommended that no lettering be placed on transparencies which may be projected from more than one position. If it is necessary to use lettering, a water soluble pencil works very well. The marking projects well, and may be removed easily with a damp cloth.

Masters were now ready to be drawn from the list of items previously noted on cards. Offensive and defensive concepts may be expanded. These cards were then mounted on a large picture board in order that sequence could be easily checked before the masters were drawn. The original idea of this study was to develop these transparencies around personal theories and philosophies. This past fall it was found necessary to draw the offensive sets of other teams to select our defenses to be used against them. The defensive transparencies became more important to our program than the offensive ones. This may not be true, however, in every football program.
VI. PRODUCTION OF THE TRANSPARENCIES

Before production of the transparencies was started, a to-do list was made. This included the following: (1) Check the masters for mistakes and smudges. (2) Organize the masters into color groups for machine production. (3) Recheck the masters to see that they are placed in the proper color group. (4) Process the masters and color film into permanent transparencies. (5) Group the finished transparencies by colors as they are received from the processing machine. (6) File the masters in order that they may be easily found for further duplication. (7) Mount the transparencies on the frames.

Technical assistance may be required for production of the transparencies. When using the Diazo film production process, it is recommended that machine operation be handled by an experienced person. Much time and expense can be saved by the availability of technical assistance and special equipment.

The two basic colors used in the development of colored transparencies were green and magenta (dark red). Green was used to illustrate the offense, and magenta, the defense. The reason for the selection of these colors was the association of green with "go" and red with "stop." Red was first used to illustrate the defense, but was later replaced by
magenta which projected more brilliantly. Other colors were used intermittently to illustrate pass patterns and blocking rules. The selection of colors is optional and can be changed by using the color film desired. It is recommended that dark colors be used rather than light colors, as they project much better. When projected, they present an interesting contrast, and may be used in a lighted room.

VII. MOUNTING THE TRANSPARENCIES ON FRAMES

Mounting the transparencies on the frames requires a certain degree of precision. Since they are used as individual overlays placed over each other, it is necessary to have proper alignment of the offensive and defensive diagrams.

A mounting board was built for convenience in aligning the transparencies while taping them to the frames. This was a piece of 1/8 x 12 x 16 inch masonite. A 10 x 10 inch transparency frame was centered on this board. The holes which fit over the studs on the projector to maintain proper alignment were then marked. Two 5/32 inch holes were drilled through the board into which two 3/16 x 1/2 inch stove bolts were inserted from the back side. These bolts make their own threads and do not require nuts to hold them tightly in place. They extended 3/8 inch above the surface of the board, and represented the studs on the Portascribe
over head projector. This projector is manufactured by the Charles Beseler Company. In order to hold the frames in place, they were slipped over these studs while the transparencies were mounted to them.

The surface of the masonite board was sprayed white, then, using India ink, offensive and defensive symbols were drawn on. Symbols were drawn in the same manner as they were drawn on the master drawing folder, with one exception. The tight end and split end were drawn on opposite sides as were on the master drawing folder, since the transparencies are mounted upside down for convenience in taping.

The transparencies were then aligned with the symbols on the mounting board. To hold the transparency in place, each corner was taped with masking tape, then all edges were taped securely to the frame. It is recommended that the transparencies be mounted by the person who drew the masters, since he has a better understanding of ways in which the transparencies fit together. When mounting defensive transparencies, one must understand the adjustments to split ends, flankers, and backfield sets.

Individual coaches may also use the mounting board for preparation of meetings, lectures, and individual work on plays and defenses. When individual players have difficulty understanding their responsibilities, the mounting board may be used, rather than the overhead projector.
Once the transparencies are mounted, they may be labeled and filed into a cabinet for future use. It is suggested that the transparencies be labeled on both sides of the frame, since they may be projected from either side. Filing them into offensive and defensive categories enables them to be located more easily, as the file grows quite rapidly.
CHAPTER IV
RESULTS

The use of the overhead projector and transparencies can be of great value in any football program. There are many ways in which the flexibility of this machine may be capitalized upon. Since there are many phases in the game of football which require teaching using some type of visual media, it is necessary to organize the presentation in the most effective manner. The following is a list of the various phases of football in which the overhead projector and transparencies may be used: (1) offensive sets, (2) offensive terminology, (3) blocking rules, (4) pass patterns, (5) pass protection, (6) identification of defensive sets, (7) stances and techniques, (8) offensive personnel, (9) defensive alignments, (10) defensive communication, (11) pass defense responsibility, (12) types of pass coverage, (13) defensive stunts--red dogs and blitzes, (14) identification of offensive sets, (15) defensive personnel, (16) presentation of scouting reports--including personnel and plays, and (17) the kicking game.

There are many other ways in which the overhead projector and transparencies may be used.

The overhead projector can also be used advantageously at halftime. Coaches can point out adjustments that the players will have to make for the second half. With the basic diagrams already
prepared, you don't have to take time putting these things on the blackboard. You can draw right over the top of the transparencies (11:47).

Timing and movement can also be illustrated by moving colored plastic shapes on the projection stage.

Colored plastic shapes and symbols placed on the projection stage can portray players in football, baseball, and basketball (7:11).

Intricate team plays, as in football, can be learned and understood by groups using cut out visuals representing player positions on field or court (3:84).

To further illustrate the advantages of a fast, accurate presentation which is motivational, an article by Tex Maule in \textit{Sports Illustrated} gives an idea of the value of colored diagrams. These diagrams can easily be made into transparencies for coaching pass defensive coverages. The following are examples of Man-to-man, Zone, Free Safety, and Blitz:

\begin{center}
\textbf{Man-to-man}
\end{center}

Favorite coverage for pro defenses is man-to-man which means just what it says but makes for long afternoons for the corner backs. They must, on pass plays, take the spread end or the flanker back man for man on each play; the diagram at the right indicates some of the multiplicity of routes open to the end and flanker. Corner backs (black triangles) go with them, white lines indicate offensive patterns, blue lines defensive coverage. Blue oval is area middle linebacker may cover in some situations; one safety (red triangle, top right) may help deep; other safety (red triangle, center right) has responsibility for end on his side, cannot help corner back on coverage of flanker (12:34).
The zone defenses

Now rarely used by the pros because it is less effective than a man-to-man, the zone is less demanding on players, is therefore a favorite college defense. In simplest form (green ovals), linebackers usually are responsible for flat areas, with corner backs taking slightly deeper areas on wings and safeties protecting against deep passes. More sophisticated 4-4-3 zone (blue ovals) shifts backs to strong side (left here). Weak-side linebacker takes short zone on his side, corner back now has deep responsibility, middle linebacker responsibility for hooking area. On strong side, corner back covers the flat, safety covers corner deep. The other safety has deep area over the center to protect. Corner and safety sometimes swap zones (yellow ovals) in defensive stunting (12:36).

Help from free safety

The usual form of man-to-man coverage leaves one of the safety men free to roam. This is the weak-side safety—the safety on the side where there is a spread end and no flanker back. The strong side is the side with a tight end and a flanker back. It is the responsibility of the strong-side safety to pick up the tight end after the end has penetrated the secondary. Thus the strong-side safety is in no position to assist his corner back in taking the flanker back, should the flanker go deep. The weak-side safety, with no specific man to cover, may pick up the spread end deep or help cover the flanker if the flanker should break to the center. The strong-side linebacker, after trying to force tight end to the outside, can cover flaring back or drop into hook-pass area (12:38).

Total blitz

The all-out red dog sends all three linebackers (red triangles) in after the quarterback, their object being to dump the passer before he can unload the pass. This blitz means that the quarterback will, of necessity, be throwing quickly, and the corner backs (black triangles) must cover their men closely. No deep pass is possible; the linebackers will smother the quarterback if he should try to wait long enough to throw deep. Customary riposte by quarterback is quick pass over middle to tight end, in area vacated by middle linebacker. This pattern is shown by white line slanting from end toward
upper right of picture. Safety (blue triangle, center right) plays close to cover tight end (12:39).

These quotations give an idea of the uses of color and symbols in illustrating diagrammed pictures. Basic types of coverages may be presented by the use of the overhead projector and prepared transparencies.

It is believed the uses of the overhead projector and these transparencies result in teaching football concepts in a faster, more motivating, and precise manner.

Well-prepared transparencies offer step-by-step learning with the use of overlays or by partial disclosure which projects only one section of a transparency at a time. Clear, uncluttered, easy-to-remember diagrams appear in vivid colors (20:2).

Because of the accelerated approach to teaching, today's student is faced with more demands on his ability to cope with the classroom situation than ever before. He must assimilate a vast amount of material with a minimum of time and effort. The presentation of the teaching material plays a significant role in determining whether or not the student will better understand what he is taught. Interest must be created and sustained. Imagination must be stimulated. Motivation must be triggered. It follows that the role of the teacher carries a proportionate increase in responsibility for continuous improvement in the preparation and presentation of subject material.

The overhead projector provides a competent, brilliant, easily-used medium for meeting the requirements of both teacher and student. Used throughout the school year, the transparencies can be used as an introductory technique, as well as a continuing aid and a review process. Visual presentation gives sequence and added meaning; the students' ability for recall is enhanced (8).

The results of these finished transparencies have been most satisfactory. They have great flexibility when
discussing and illustrating philosophy, strategy, and responsibility. When used this past fall, the transparencies have shown great potential as a teaching media in the football program.
CHAPTER V
SUMMARY AND RECOMMENDATIONS

I. SUMMARY

The purpose of this study was to develop colored, multi-layer transparencies to more greatly utilize the overhead projector in the instruction and coaching of football. Through the review of literature, information was obtained concerning processes, production, and organization for the development of the transparencies. This information was very helpful in solving the problems encountered in this study.

This study began with some basic ideas and knowledge of developing the transparencies, then progressed through the drawing, processing, mounting, and projection of these transparencies. Before the drawing of the masters was begun, a list of offensive and defensive concepts to be presented in the transparencies was made.

Much experimentation was necessary in the drawing of the transparency masters to obtain the best results. A 3/16 inch equals 1 foot scale was selected for maximum flexibility of the offensive and defensive diagrams. This permits illustration of both running and passing plays for satisfactory projection. The selection of player symbols and colors to be used also required experimentation.
Diagrams were standardized by use of a master drawing folder. This was done for proper alignment of the transparencies when used in multi-layer units.

To obtain the best results in machine production of the transparencies, a list of necessary procedures to be considered was presented.

Since mounting the transparencies requires precision, procedures followed in building a mounting board and mounting the transparencies were discussed.

Uses of the finished transparencies and the overhead projector for coaching football were discussed.

Ways in which basic defenses may be diagrammed using color and various symbols to represent players were described. This will increase motivation, speed of presentation, and result in better retention of football concepts.

II. RECOMMENDATIONS

Since this was a developmental study which required considerable experimentation, much experience and knowledge of the latest developments in the audio visual field has been gained. This has led the researcher to make the following recommendations for further study:

1. A study of this type may be done in other sports such as basketball, baseball, track, and soccer.
2. A study of the value of a polarizing spinner which
creates the effect of motion on the screen may be made. This method uses specially treated transparencies in conjunction with motorized rotation of the spinner (5).

3. Colored acetate stick-on sheets and rub-on letters may be used in these types of transparencies (5).

4. The recent development by the Tecnifax Corporation, which is called Texray Color Separation, may be investigated for use in coaching transparencies. This process enables many colors to be developed on one transparency at one time.

5. The Tecnifax Pin Registration system, using three-pin alignment for the drawing, production, and mounting of overlays, may be investigated to simplify and improve present methods used in this study.

6. The possibility of commercial development of football coaching transparencies may be investigated.

7. A study may be made evaluating the use of transparencies vs. the lecture method to recognize significant differences in retention and motivation.

Conscientious coaches should seriously consider the implications of this study for use in their coaching situations. Basic knowledge and ideas have been presented for coaches who wish to develop their own transparencies.
Further study may be made in this area, as new developments are created daily.
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WINNING FOOTBALL DRILLS
By George H. Allen
Head Football Coach, Los Angeles Rams

INSTRUCTIONAL UNIT
Printed Originals
Cat. No. 2190

INSTRUCTIONS
Listed are line-up behind offensive plays and defense formations. All players are to maintain their proper positions and execute their assigned roles. Remember to keep the line in motion as you go up to the line. No. 2 pulls out and then moves toward No. 3 as they go past each other.

INSTRUCTIONS
A. Pop-up line against tackle and No. 2, ready to react to any contact. B. Pop-up line with guard, No. 2, and tackle ready to react to any contact. C. Pop-up line with center, No. 2, and tackle ready to react to any contact.

INSTRUCTIONS
A. Line-up to line up with a carrier and react to any contact. B. Line-up to line up with a carrier and react to any contact. C. Line-up to line up with a carrier and react to any contact.

INSTRUCTIONS
A. Pop-up line with ball handler behind center and the line of scrimmage. B. Pop-up line with No. 1, who gives ball to No. 2. C. Pop-up line with No. 2, who gives ball to No. 3. D. Pop-up line with No. 3, who gives ball to No. 4.

INSTRUCTIONS
A. Line-up to line up with a carrier and react to any contact. B. Line-up to line up with a carrier and react to any contact. C. Line-up to line up with a carrier and react to any contact.

INSTRUCTIONS
A. Place 10 men in a line on each side of field, with two men in each group. B. Place 2 men in each group. C. Place 2 men in each group. D. Place 2 men in each group.

INSTRUCTIONS
A. Place 10 men in a line on each side of field, with two men in each group. B. Place 2 men in each group. C. Place 2 men in each group. D. Place 2 men in each group.

INSTRUCTIONS
A. Place the center at center, with two men in each group. B. Place 2 men in each group. C. Place 2 men in each group. D. Place 2 men in each group.

INSTRUCTIONS
A. Place the center at center, with two men in each group. B. Place 2 men in each group. C. Place 2 men in each group. D. Place 2 men in each group.

INSTRUCTIONS
A. Place 10 men in a line on each side of field, with two men in each group. B. Place 2 men in each group. C. Place 2 men in each group. D. Place 2 men in each group.