

*BEHAVIORAL INTERVENTIONS TO IMPROVE PERFORMANCE
IN COLLEGIATE FOOTBALL*

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Using a multitreatment withdrawal design, this study evaluated the differential effects of publicly posted plus verbal feedback, goal setting plus verbal feedback, and publicly posted feedback, verbal feedback, and goal setting together on the performance of 3 collegiate football players in practice scrimmages. Also assessed was whether the changes in practice behavior generalized to games. The dependent variables were performances on three wide receiver skills. The results show that public posting with verbal feedback, goal setting, and public posting with verbal feedback and goal setting were effective in improving player performance to a 90% criterion level during practice, and these changes generalized to game performance.

DESCRIPTORS: coaching interventions, sports

Two commonplace interventions in sports are feedback and goal setting (Martin, Thompson, & Regehr, 2004). Feedback occurs when an individual (e.g., self-charting), others (e.g., peers and coaches), or equipment (e.g., heart-rate monitor, photoelectric beam) provide information about some aspect of performance (Lee, Nyity, & McGill, 1993). Goal setting occurs when a performance standard is established by the athlete or by a coach (Locke & Latham, 1990).

Reviews of feedback (Alvero, Bucklin, & Austin, 2001; Balacazar, Hopkins, & Suarez, 1986) and goal setting (Locke & Latham, 1990) conclude that there is considerable variability in the efficacy of each when used alone. These same reviews note that there are stronger effects when feedback and goal setting are combined with other strategies. Feedback appears to be most effective (a) when it is presented both publicly and privately, rather than publicly or

privately; (b) when it is tied to comparison of an individual's previous performance rather than to another person's performance; and (c) when it is compared to a standard (Alvero et al.). Goal setting is strengthened when (a) the goals are made public, and (b) the goals emphasize short-term immediate outcomes (Locke & Latham).

To date, there has been no direct comparison of these components reported in sport settings. The purpose of this investigation was twofold: first, to examine the relative effects of three interventions (i.e., goal setting plus verbal feedback; public posting plus verbal feedback; and goal setting, public posting, and verbal feedback together) on the practice performance of collegiate football players, and second, to determine the extent to which these effects show generality to game settings.

METHOD

Participants and Setting

The participants were three wide receivers of a National Association of Intercollegiate Athletics Division 2 football team at a 4-year liberal

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arts college in the midwest. At the beginning of the season, the team was ranked third of the seven teams in their conference. The wide receivers' coach selected players that he rated as frequently demonstrating poor execution of wide receiver skills during practice and game play. Dave, Alex, and Mike consistently played in games throughout the season, but were not classified as starters at the beginning of the season (i.e., did not start play every game). Practice sessions were held 3 days per week for 2 hr per day. During that time, approximately 45 min were spent on the skills analyzed in this study. The practice sessions were conducted on the college football field. Games against other teams in the same division were held weekly.

Data Collection

Three dependent variables were measured. First, the percentage of correct blocks was used to determine whether the wide receiver blocked effectively. A block was defined as correct (i.e., effective) if the wide receiver checked the progress of a defending player using legal techniques (e.g., not holding or pushing the defender's back). Second, the percentage of correct routes run was used to determine whether the wide receiver ran a predetermined path during an offensive play. The route run by the player was compared to the coach's playbook to determine if it was correctly performed. The playbook described set routes to be performed by the wide receiver contingent on the defense used by the defending team. Thus, the route was defined as correct if the wide receiver ran the route as described in the playbook for the correct defense. Third, the percentage of correct releases from the line of scrimmage was used to determine whether the wide receiver released freely from the line of scrimmage. If the receiver avoided contact initiated by a defender and began running the predetermined route, the release was coded as correct or free. Because of variability in the number of opportunities that were afforded the different players during practice and games

sessions, the first 10 releases, blocks, and routes performed by each player were recorded for analysis. Data were collected by videotape. Each performance of a release, block, or a route was coded as either correct or incorrect, and the number of correct of trials performed was converted to a percentage.

Experimental Design and Procedure

An ABACABC multitreatment withdrawal design was used to assess the effectiveness of the interventions.

Baseline. During baseline the players met with the coach, reviewed expectations for each skill, and then proceeded to practice. While practicing, players received verbal feedback and error correction from the coach.

Public posting plus verbal feedback. In this condition, players were first informed of their mean percentage correct performance for each skill during the previous baseline session and how the percentage was calculated. They were informed that the results of the coming day's practice and each successive practice would be posted on a daily performance chart. The chart was located on the door leading to the locker room. Data were posted on the chart prior to the next practice session. During practice sessions, players continued to receive feedback and error correction from the coach. The chart was removed at the end of this condition.

Goal setting plus verbal feedback. The condition began with the lead investigator reviewing the mean percentage correct performance for each skill during the previous baseline session. Because the dependent variables were skills that the coaches expected these players to have in their repertoire (as opposed to learning new skills), there was an expectation that players would meet a 90% correct performance in practice scrimmage. Previous studies in similar settings have shown that 90% correct performance is a reasonable expectation (Ward & Carnes, 2002; Ward, Smith, & Sharpe, 1997). Prior to each session, the investigator met with each player individually and informed him of

his performance during the previous session. He also reminded each player of the 90% criterion expectation and either encouraged him to meet it or congratulated him on having met the criterion in the previous session. During practice sessions, players continued to receive feedback and error correction from the coach.

Public posting plus verbal feedback plus goal setting. This condition combined the procedures of the two previous interventions. The chart was reintroduced, and the expectation of meeting or exceeding the 90% criterion was discussed individually prior to each practice session. As before, during practice sessions players continued to receive feedback and error correction from the coach.

The team coaches were not informed of the nature of the conditions and baselines, or when they would be phased into the practice schedule. Coaches did see the chart during public posting plus verbal feedback. They did not have access to the performance data at any other time. To control for variance in feedback, we randomly tracked six sessions to see if coaches spent more time with players in one condition or another. There were minor deviations from condition to condition, but most often these had to do with nontarget behavior issues (e.g., learning a new play, injuries); they occurred in a similar manner across all players.

Interobserver Agreement

An independent observer recorded each player's performance of releases, blocks, and routes to determine the reliability of the observational data. The observer, an experienced football coach, was not directly involved with the study's implementation or coaching the wide receivers. The reliability observer had been trained prior to the start of the study using direct observation and video recordings. He met or exceeded a criterion of 95% agreement with the primary investigator on three 45-min videotapes.

Interobserver agreement was distributed equally across phases and assessed during 50% of practice sessions and 67% of games using point-by-point agreement. Percentage agreement was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100%. The mean agreement was 96%. The means and ranges were, for releases, 97% (range, 92% to 100%); for blocks, 95% (range, 93% to 100%); and for routes, 97% (range, 90% to 100%).

Social Validity

Following the conclusion of the study, each of the participants and the head coach were asked to complete an open-ended questionnaire. Feedback was sought from the players to allow researchers (a) to assess the acceptability of the three interventions and their effects, (b) to detect other effects not discernible from the data (including undesired effects), and (c) to adjust the procedures in future studies. The questionnaire was completed anonymously.

RESULTS AND DISCUSSION

Figures 1 through 3 show the percentage of correct performances in practices and games for the three dependent variables for each player. The data are remarkably similar among the players across skills. During baseline, performances ranged between 50% and 80% correct, except for Dave's release performance for Day 10, which was 90%. Correct performance during games ranged between 60% and 80%. During public posting plus verbal feedback, correct performance ranged between 80% and 100%, and correct performance during games ranged between 90% and 100%. Baseline levels were recovered for all behaviors during practices and games.

Performances were better during goal setting plus verbal feedback than during public posting with verbal feedback for at least one of the dependent measures of each participant, and the

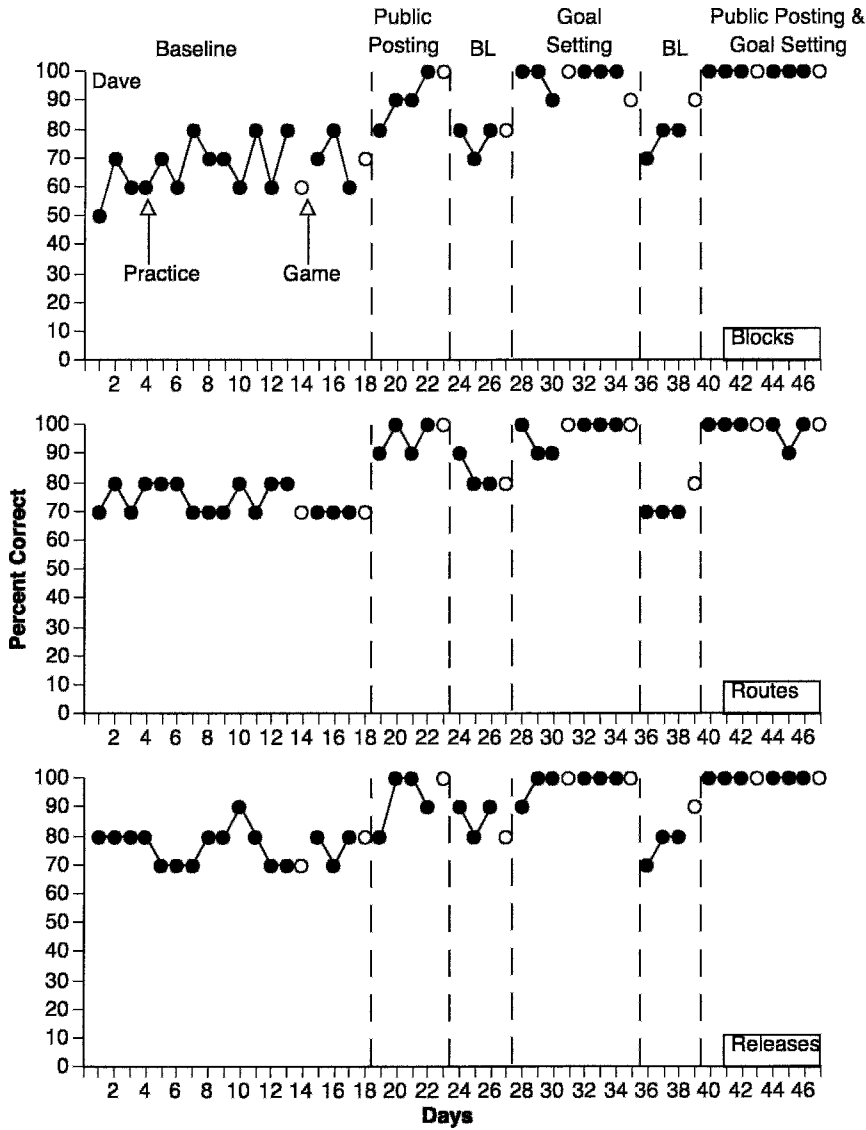


Figure 1. The percentages of blocks, routes, and releases during practice and game sessions for Dave.

results were similar for the two conditions on the other dependent measures. Baseline levels were recovered for all behaviors during practices; however, the game data remained at least 10% higher than baseline levels. During the combined phase levels, all practice performances were consistently between 90% and 100% correct and all game performances were 100% correct.

It is not possible to draw conclusions about the relative effectiveness of the treatments, in

part because all participants had high initial baselines and because the order of treatment introduction was the same across all conditions. There was also some evidence for an improving trend during public posting plus verbal feedback for some of the data paths. The findings do show, however, that each treatment was better than baseline, and this finding supports the use of goal setting and public posting with verbal feedback in sport. The social validation

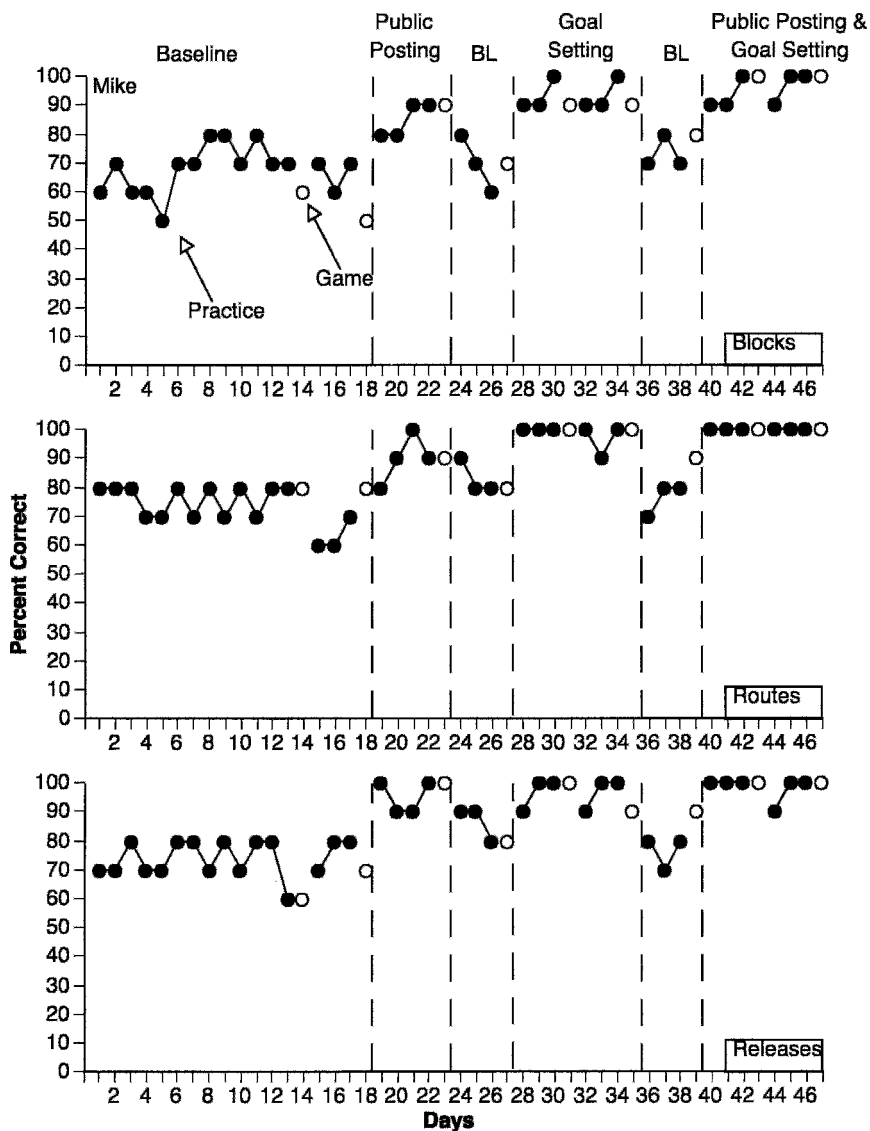


Figure 2. The percentages of blocks, routes, and releases during practice and game sessions for Mike.

questionnaires indicated that players and coaches preferred the combined intervention to the other two interventions and to baseline. Players reported that individual goal setting was the least preferred intervention because of the absence of visual feedback. A second contribution of this study to the literature is the demonstration of generalization from practice settings to game settings. The strength of this transfer serves to validate not only the in-

tervention procedures but also the effects of the intervention.

A third contribution of this study is that dependent measures were defined in terms of outcomes rather than topography alone. The topography of the performance was determined either by comparing it to the playbook (e.g., running a pattern in response in a specific offense or defense) or according to the legal rules of play (e.g., tackling). In addition, the

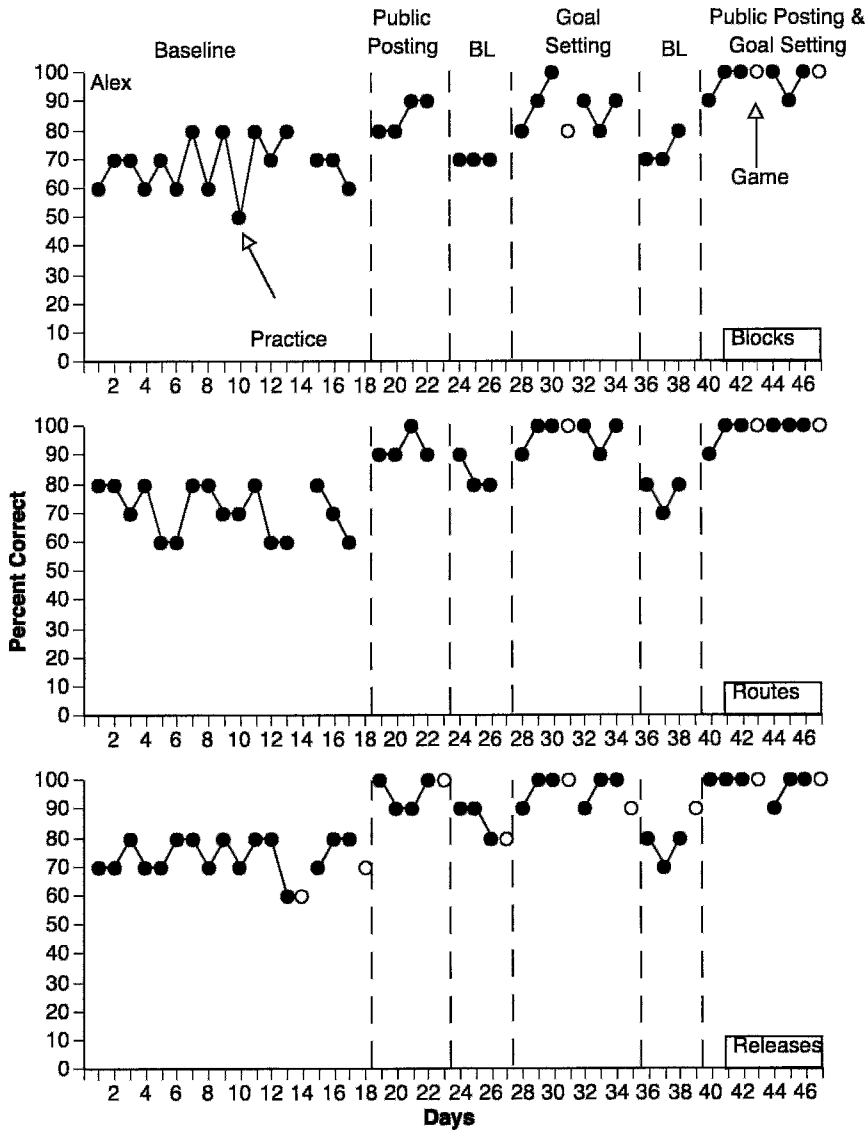


Figure 3. The percentages of blocks, routes, and releases during practice and game sessions for Alex.

successful outcome of the performance was included in the definition. In sporting contexts, both outcomes and topography are important. However, the outcome is also a function of the play selection by the coach or quarterback and performances of the other team. Thus, care must be taken to define the outcome in terms of the initial success.

The specific behavioral processes that operated in this study are unclear. Some authors

have suggested that publicly posted feedback may have multiple functions (e.g., discriminative, reinforcing, and punishing) relative to the particular context (Alvero et al., 2001; Duncan & Bruwelheide, 1986; Van Houten, 1980). Given the immediacy of the change between the interventions and baseline, the results are unlikely to be explained in terms of learning. It seems more likely that the results were influenced by motivational factors. In particu-

lar, we hypothesize that these are demonstrations of motivating operations (Laraway, Snyckerski, Michael, & Poling, 2003). However, more tightly controlled research will be necessary to test this hypothesis.

The problem addressed in this study of assuring consistent high-quality performances over the course of a season is a common challenge to coaches and athletes. Although the gains reported in this and similar studies (e.g., Ward & Carnes, 2002; Ward et al., 1997) are small relative to baseline measures of 70% to 80% correct, the consequences of performing at levels below the treatment criterion of 90% include missing an opportunity to start on the team or to receive scholarships for student athletes.

REFERENCES

- Alvero, A., Bucklin, B., & Austin, J. (2001). An objective review of the effectiveness and essential characteristics of performance feedback in organizational settings (1985–1998). *Journal of Organizational Behavior Management*, 21, 3–30.
- Balcazar, F., Hopkins, B., & Suarez, Y. (1986). A critical objective review of performance feedback. *Journal of Organizational Behavior Management*, 7, 65–89.
- Duncan, P., & Bruwelheide, L. (1986). Feedback: Use and possible behavior functions. *Journal of Organizational Behavior Management*, 7, 91–114.
- Laraway, S., Snyckerski, S., Michael, J., & Poling, A. (2003). Motivating operations and terms to describe them: Some further refinements. *Journal of Applied Behavior Analysis*, 36, 407–414.
- Lee, A., Nyity, C., & McGill, R. (1993). Instructional effects of teacher feedback in physical education. *Journal of Teaching in Physical Education*, 3, 228–243.
- Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice Hall.
- Martin, G., Thompson, K., & Regehr, K. (2004). Studies using single-subject designs in sport psychology: 30 years of research. *The Behavior Analyst*, 27, 263–280.
- Van Houten, R. (1980). *Learning through feedback: A systematic approach for improving academic performance*. New York: Human Sciences Press.
- Ward, P., & Carnes, M. (2002). Effects of posting self-set goals on collegiate football players' skill execution during practices and games. *Journal of Applied Behavior Analysis*, 35, 1–12.
- Ward, P., Smith, S., & Sharpe, T. (1997). The effects of accountability on task accomplishment in collegiate football. *Journal of Teaching in Physical Education*, 17, 40–51.

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