

January 01, 2010

Improving baseball-pitching through form training: use of video modeling, clicker training, and verbal feedback

Julius Bonner
Northeastern University

Recommended Citation

Bonner, Julius, "Improving baseball-pitching through form training: use of video modeling, clicker training, and verbal feedback" (2010). *Applied Behavioral Analysis Master's Theses*. Paper 35. <http://hdl.handle.net/2047/d20000637>

This work is available open access, hosted by Northeastern University.

Improving Baseball-Pitching Through Form Training: Use of Video Modeling, Clicker
Training, and Verbal Feedback

A Thesis Presented

by

Julius Bonner

The Department of Counseling and Applied Educational Psychology

In partial fulfillment of the requirements

for the degree of

Master of Science

in the field of

Applied Behavior Analysis

Northeastern University

Boston, MA

June 2010

NORTHEASTERN UNIVERSITY

Bouvé College of Health Sciences Graduate School

Thesis Title: Improving Baseball-Pitching Through Form Training: Use of Video Modeling,
Clicker Training, and Verbal Feedback

Author: Julius Bonner

Department: Counseling and Applied Educational Psychology

Approved for Thesis Requirements of Master of Science Degree

(Dr. Karen Gould, Ph.D)

(Peter Dekreon, M.S., BCBA)

(Heather Reynolds, M.S., BCBA)

Improving Baseball-Pitching Through Form Training: Use of Video Modeling, Clicker
Training, and Verbal Feedback

by

Julius Bonner

M.S., Northeastern University

Submitted In partial fulfillment of the requirements for the degree of
Master of Science in Applied Behavior Analysis
in the Bouvé College of Health Sciences Graduate School
of Northeastern University, June 2010

Acknowledgements

Karen E. Gould, Ph.D

Peter Dekreon, M.S., BCBA

Heather Reynolds, M.S., BCBA

Abstract

The effects of instructional form training, clicker training, and verbal feedback on pitching form and strike percentage was evaluated for 2 middle school teenage boys who were participating on a middle school baseball team. Participants showed an increase in strike percentage and in correct pitching form compared to baseline. During treatment conditions, both participants reached criterion to move to the next step within 12 sessions. The results suggest that form training paired with clicker training and verbal feedback can be an effective strategy to improve pitching accuracy.

Limited behavioral research exists regarding improving sports performance. In what seems to be an overlooked area, some very interesting behavioral research has been conducted attempting to improve individuals' athletic abilities. Of the many methods that can be used to increase the athlete's performance the two of the most commonly employed are feedback and goal setting. Smith & Ward (2006) used feedback and goal setting to strengthen the performance of collegiate football players. While the study reported an almost immediate improvement in skills for all participants; the greatest results were shown when feedback and goal setting were conducted together. "There are advantages to combining public posting and goal setting as a package intervention. Goal setting provides an explicit criterion (as opposed to "do your best"), and public posting is a method that makes the performances public and also provides feedback to performers" (Brobst & Ward, 2002).

Research employing feedback and shaping to improve an individual's form has also resulted in some interesting findings. Form training is a procedure in which an experimenter manipulates the physical aspects of the participant's performance in various ways in order to improve the execution of a desired activity. Kladopoulos & McComas (2001) implemented a form training procedure that examined proper head and feet positioning during foul shooting in three female college basketball players. "The results suggest that form training provided a direct method for the specification and individualized feedback related to proper form necessary for accurate foul shooting" (Kladopolos & McComas 2001).

Shaping has also been used to improve an athlete's performance. In shaping, the experimenter uses differential reinforcement to produce a series of gradually changing response classes to improve a behavior. Scott, Scott, and Goldwater (1997) improved pole vaulting using a shaping and prompting. A photoelectric beam alerted the athlete to proper form and assisted

the athlete in technical development of vaulting and corresponding height cleared. “The procedure proved to be effective with the vaulter obtaining a 90% level at all heights except the last height” (Scott, Scott, & Goldwater 1997).

Behavioral coaching is another method used to improve sports performances. In this procedure, feedback is combined with other methods to achieve greater results. Kladopoulos and McComas (2004) used behavioral coaching to improve the foul-shooting performance of women college basketball players. The participants received praise for proper form during foul-shooting practice. The results showed that all of the participants improved their form and the percentage of shots made during the intervention. Although most studies focused on the improvement of performance for athletes in a single sport, Allison & Ayllon (1980), examined use of a behavioral coaching package to facilitate skill acquisition in three separate sports (football, gymnastics, and tennis). The behavioral coaching package resulted in an immediate increase in the correct execution of complex skills in the three different sports. Also, it was reported that neither the sex nor the age of the participants appeared to affect the results differentially.

Behavioral momentum, which has a slightly metaphoric connotation to it, is yet another method used to increase the performance of athletes. “The momentum metaphor may also be useful in behavior analysis because it captures two general and separable aspects of behavior: (a) the rate of response (velocity) and (b) the persistence of that rate when responding is challenged in some way (mass)” (Mace et al. 1992). The Mace and colleagues study examined the correlation between college basketball teams' performance after an adverse event when preventing their scoring rate was high versus low. Additionally, they examined whether the effect carried over through or time-out periods. The study found that the greater the adverse event the greater likelihood of a favorable response to that adversity would occur, and also that

calling a time-out early in an opponent's scoring streak may avoid the opponent's accumulation of several "unanswered" points.

Clicker training has also been used in the sports setting. In clicker training, a audible stimulus, a click, is provided following a desirable response. Allen (1998) examined using clickers to reduce disruptive outbursts during athletic performance in the context a habit-reversal procedure. The study included two phases. First, a clicker was activated when early signs of an outburst appeared; additionally a deep breathing procedure and a motivation program were implemented in which the participant received praise and points for observable use of the competing responses during matches. Following the match, the points could be cashed in for new stereo compact discs. In the first phase, the participant displayed a small decrease in outbursts. However, in the second phase in which additional consequences were provided an immediate elimination of outbursts occurred.

However, while some studies have shown skills improvement during training, not all experiments have assessed generalization to game or other relevant contexts. Osborne, K., Rudrud, E., & Zezoney, F. (1990) used unmarked and marked balls (marked balls had 1/4-in. and 1/8-in. orange stripes to indicate a curveballs) to examine the effects of a visual cue on hitting the curveball. The results of the study suggested that with the visual cues present the participants hit a greater percentage of marked than unmarked balls. However, generalization to games settings was not assessed. Conversely, Smith & Ward (2006) evaluated generalization of practice sessions to in-game performance, and showed very high performance of skills during game situations. Similarly, Harding, Wacker, Berg, Rick and Lee (2004), promoted response variability and stimulus generalization in martial arts training. Each participant displayed an increase in different techniques both within session and cumulatively across conditions (sparring

and drill conditions) when reinforcement was provided for the performance of different techniques and the repetition of techniques was placed on extinction (Harding et al. 2004).

The purpose of the current study was twofold: firstly, to improve the percent of strikes thrown by two middle school boys by implementing pitching form training using feedback, video modeling and clicker training and secondly to determine the generality of any effects to game settings.

Method

Participants

Two participants, both typically developing 13 year-old males, took part in the study. They were chosen for the experiment because of their lack of experience with the pitcher position on their baseball team. The target behavior for both participants was correct pitching form and the percentage of strikes thrown.

Settings

The sessions took place on either an outdoor middle school baseball field, or an indoor sporting center. The measurements of the two fields were the same; the distance of the pitching mound to home plate was 48 feet. Sessions consisted of 20 trials, one to two sessions were conducted per day. During all practice sessions, only the participant, the catcher (who was another team member), the assistant coach, and the experimenter were present. No batter or umpire were there during any of the practice sessions. However, during game session there were both an umpire and a batter present.

Materials

Materials included a video tape, television, and clickers. The video tape, titled Baseball Made Easy Pitching Fundamentals DVD by Pete Caliendo was ordered from www.hittingworld.com. Standard baseball equipment was also used; i.e. baseball, mitts, etc.. Baseline sessions were held on an outdoor field with little to no outside influences present other than a slight breeze and a few spectators. All other sessions took place in an indoor sporting center. Only a few spectators were present, but no weather conditions existed to effect the participants' performance. Sheets of rice paper were given to both participants to take home after the training of the first step in the pitching form.

Response Measurement

Pitching form was defined as a four-step procedure that consisted of a leg lift, balance point, stride and release, and follow through. The leg lift was defined as the participant lifting his lead leg, while the balance point was defined as the participant balancing on the rear leg. In the stride and release, the participant was to move the lead leg forward, plant the leg in front of him, and begin to deliver the pitch to the plate. Finally, the follow through was defined as the participant bringing his arm towards the plate and releasing the baseball. Correct pitching form was converted into a percentage by dividing the total number of correct form responses (all four steps) by the total number of pitches.

Strike percentage was calculated by divided the number of strikes by the total number of pitches. A strike was defined as any pitch over home plate and between approximately 10 inches to 44 inches above the plate. A trained graduate student and the assistant coach of the baseball team collected data using a pen and paper with columns for strikes and pitching form. The data on the behaviors were taken using a frequency count measurement.

Interobserver Agreement

Interobserver Agreement (IOA) was assessed by having second observer simultaneously but independently record data with the first observer. Both observers stood behind the pitching mound during all sessions except game settings were both observers stood behind an umpire. IOA was assessed during 100% of sessions with a range of 88.9%-100%. Procedural Integrity was taken during 45% of sessions and ranged from 90%-100%.

Design and Procedure

A multiple baseline across participants design was used to evaluate the effects of independent variables (videotaped form training, clicker training, and feedback) on the strike percentage and on the percentage of correct form.

Baseline. Baseline was taken during practice and game settings for both strike percentage and pitching form. Each baseline session consisted of 20 pitches (trials). There was no interaction with the participants other than to stop when the pitch count reached 20 and no batter or umpire was present during practice sessions.

Form Training. The form training consisted of video modeling, and clicker training paired with verbal feedback. One participant was trained at a time. Before each session, the participant viewed a 4-min video tape twice. The tape correctly displayed the four steps of good pitching form defined above. After watching the video, the participant was then introduced to the clicker and informed that he would hear the click after each correctly executed pitching form. These instructions were only delivered during the first session. Clicker training began immediately after the video was viewed. One pitching step was trained at a time, when the participant met the criterion of four consecutive sessions at 100% correct form, the next step was trained. As in baseline, each session consisted of 20 trails with one to three sessions conducted

per day. After each session, the head coach gave corrective feedback as needed. After the first step was trained, a procedure was introduced to improve the participant's balance. In this procedure, the participant was given rice paper to take home and was instructed to practice balancing on the paper without ripping it. The rice paper procedure is sometimes used in martial arts to instill balance, a skill necessary to perform Step 2.

Follow up. Follow-up data were taken approximately one week after the end of the treatment phase and was collected identical to the baseline conditions. Also, data were taken during game settings to assess generalization.

Social Validity. At the conclusion of the study, the participants and coaches completed a questionnaire to assess acceptability of the procedures. The questionnaires included six questions to which the respondents indicated perceptions on a 5-point Likert-type scale.

Results

Figure 1 displays the results during baseline, treatment, and follow up conditions. In baseline, Participant 1 averaged 30.2% correct strikes and 26% correct pitching form during practice. His performance was slightly better in the game setting where he averaged 35% and 30% correct strikes and pitching form, respectively. During treatment, Participant 1 required 11 sessions to master the first step. However, he mastered the subsequent steps in less time, requiring only 6 sessions to meet criterion for the fourth and final step. In the follow up, Participant 1 averaged 61.25% correct strikes- 98.75% correct pitching form during practice; he average 67.5% correct strikes and 100% correct pitching form in game settings.

During baseline, Participant 2 averaged 46.5% and 25.3%, correct strikes and pitching form, respectively, during practice settings. In game settings, he averaged 40% and 30% for

correct strikes and pitching form. In the treatment condition, Participant 2 required 10 sessions to meet criterion for Step 1; however, he required only 7 sessions to meet criterion for Step 4. During the follow up condition, his correct strikes and pitching form increased to 66.25% and 97.5%, respectively, during practice; these performances increased to 70%, and 97.5% during game settings.

The social validation questionnaire indicated that both participants reported that they would be better able to move on to the next level which was making the high school baseball team. Overall, the participants and coaches were satisfied with the improvement in strike percentage and pitching form. Additionally, both participants reported that they had become more stable and more accurate pitchers.

Discussion

The results of the current study demonstrated that video-modeled form training paired with clicker training and verbal feedback improved both pitching form and strike percentage. The study also demonstrates generalization from practice to game settings.

A limitation of the study is that the strike zone is somewhat subjective. The definition of a strike is empirical, the recording of a strike is open for debate. Strikes were measured with the naked eye, which might not be very accurate or reliable. The use of a sensor to detect passage of the ball through the strike zone would have been helpful. Also during game settings the strike zones were more variable with the addition of an umpire and a batter. For each batter, there was a slightly different strike zone. This difference was affected by the size of the batter and the stance he took, which either would expand or reduce the zone. This difference could have influenced the game data. Future research may want to explore the inclusion of the presence of a batter in practice sessions also.

Another limitation of the study is that it relied heavily on what is known in baseball as “pitching from the stretch”. When the pitcher pitches "from the stretch", he (or she) stands with his pitching hand facing towards second base and his back towards either first or third base, depending, which hand is being used to pitch the ball. No data were taken on the participants' using a full wind-up, and future research should explore treatment affects when pitching from the windup as well as pitching from the stretch.

It is also important to note that the affect of the rice paper training on the training of Step 2 was not evaluated. The variable was not isolated, and it is not even known if the participants actually used the rice paper.

Finally, it should be pointed out that the intervention was a treatment package that including the video modeling of pitching form, clicker training, and verbal feedback. The relative influence of each of these components was not assessed. It is possible that any one of the variables alone might have produced the similarly desirable results. Future research should address this issue.

References

- Allen, D., K. (1998). The use of an enhanced simplified habit-reversal procedure to reduce disruptive outbursts during athletic performance. *Journal of Applied Behavior Analysis, 31*, 489-492.
- Allison, M., & Ayllon, T. (1980). Behavioral coaching in the development of skills in football, gymnastics, and tennis. *Journal of Applied Behavior Analysis, 13*, 297-314.
- Anderson, G., & Kirkpatrick A., M. (2002). Variable effects of behavioral Treatment package on the performance of inline roller speed skaters. *Journal of Applied Behavior Analysis, 35*, 195-198.
- Brobst, B., & Ward, P. (2002). Effects of public posting, goal setting, and oral feedback on Skills of female soccer players. *Journal of Applied Behavior Analysis, 35*, 247-257.
- Harding, W. J., Wacker, P. D., Berg, K. W., Rick, G., & Lee, E., J. (2004). Promoting Response variability and stimulus generalization in martial arts training. *Journal of Applied Behavior Analysis, 37*, 185-195.
- Kaldopoulos, N. S., & McComas, J. J. (2001). The effects of form training on foul-shooting performance in members of a women's college basketball team. *Journal of Applied Behavior Analysis, 34*, 329-332.
- 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, R., McComas, J. J., & Jawor, J. (2002). The effects of differential and lag reinforcement Schedules on varied verbal responding by individuals with autism. *Journal of Applied Behavior Analysis, 35*, 391-402
- Mace, C. F., Lalli, S. J., Shea, C. M., & Nevin, A. J. (1992). Behavioral momentum in college basketball. *Journal of Applied Behavior Analysis, 25*, 657-663.
- Osborne, K., Rudrud, E., & Zezoney, F. (1990). Improved curveball hitting through the enhancement of visual cues. *Journal of Applied Behavior Analysis, 23*, 371-377.
- Reed, D. D., Critchfield, S. T., & Martens, K. B. (2006). The generalized matching law in elite sport competition: football play calling as operant choice. *Journal of Applied Behavior Analysis, 39*, 281-297.
- Scott, D., Scott M. L., & Goldwater, B. (1997). A performance improvement program for an

international-level track and field athlete. *Journal of Applied Behavior Analysis*, 30, 573-575.

Smith, L. S., & Ward, P. (2006) Behavioral interventions to improve performance in collegiate football. *Journal of Applied Behavior Analysis*, 39, 385-391.

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.

Appendix A

	Disagree			Agree	
1. Were any of the training procedures problematic to you?	1	2	3	4	5
2. Do you feel that the training procedure was helpful?	1	2	3	4	5
3. Do you feel that the training procedure was done acceptably?	1	2	3	4	5
4. Do you feel that the training procedure was successful?	1	2	3	4	5
5. Do you think that the training procedure will be helpful to you in the future?	1	2	3	4	5
6. Do you feel that the training procedure helped your current skill level?	1	2	3	4	5

Figure Captions

Figure 1. Is a combination of baseline, treatment, and follow up. It is in a multiple baseline design across participants. Baseline was a no interaction condition. Treatment combined video modeling, clicker training, and verbal feedback. The follow up condition is identical to baseline.

