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Do Safety Observers Perform More Safely as a Result of Conducting Observations?

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DO SAFETY OBSERVERS PERFORM MORE SAFELY AS A RESULT OF CONDUCTING OBSERVATIONS?

by

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Alicia M. Alvero

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Behavior-based safety (BBS) is an effective approach to improving safety within organizations, and has been implemented across a wide variety of settings. The two major components of BBS are the observation process and the delivery of feedback. Literature on feedback is abundant, but experimentation and scientific evidence on effects of the observation process are nonexistent. Typically, supervisors or employees involved in BBS implementations conduct observations of other employees' behavior, but the effects of conducting observations on an observer's safety performance is not known. The present study was a first attempt at assessing these effects. A multiple baseline counterbalanced across two sets of office behaviors was conducted in a laboratory setting, and the results are promising. Substantial improvements in safety performance occurred after participants conducted observations on a video of a confederate's performance. The possible behavioral functions responsible for this change, and the implications of these findings for applied settings are discussed in detail. Future research regarding this topic is strongly recommended to further assess the effects of conducting observations on the safety performance of observers.

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INTRODUCTION

The prevention of accidents and injuries would both clearly benefit the people of our country and strengthen our nation's economy. In 1996 alone, 3.8 million workers were disabled on the job (U.S. Bureau of Labor Statistics, 1999). This rate of disabling injuries costs us nearly $21 billion per year (National Safety Council, 1997). This substantial national expense has contributed to high workers' compensation premium payments, which totaled $57.1 billion in 1995 (U.S. Bureau of Labor Statistics, 1999), and these expenses were based solely on on-the-job injuries. When the cost of on- and off-the-job deaths and injuries that occurred in 1996 were combined, costs totaled $121 billion (National Safety Council, 1997). This total was the result of 43,900 deaths and 10,200,000 disabling injuries, and the estimated costs were $26,000 per disabling injury and $790,000 per fatality (National Safety Council, 1997). The number of workdays lost to these injuries and deaths significantly contributes to these substantial sums. Some 245 million workdays are lost to injuries each year, 10 times more than the average number of days lost each year in labor strikes. If improved working conditions cut lost time by one day per worker per year, as much as $15 billion could be added to our nation's economy (Witt, 1980).

Organizations often employ specific approaches in attempts to improve safety, increase employee comfort, and decrease injury rates. For example, ergonomics is an approach that takes account of people in the way objects and machinery are designed and organized (Wilson, 1995). The first step ergonomists take to improve safety involves the measurement of a variety of physical, physiological, biophysical and environmental factors involved in completing the work in question (Radwin, Beebe, Webster, & Yen, 1996). Data for these factors are often collected using electronic or mechanical instruments (Radwin et al., 1996). These data help ergonomists determine the most comfortable positions and proper conditions for activities such as typing, lifting, walking, and reading. After observing, measuring, and collecting data, products are designed and specific work conditions are redefined to improve employee comfort and safety (Wilson, 1995). In short, the main focus of ergonomics is to increase the health, safety, comfort, and satisfaction of employees in order to decrease absenteeism and labor turnover and increase employee productivity within the organization.

Behavior-based safety (BBS) is another approach to improving safety within organizations. This approach utilizes behavior analysis principles in the field of occupational safety. Behavior-based safety processes have proven to be extremely effective over the years (e.g., Komaki, Barwick, & Scott, 1978; Reber, Wallin, & Duhon, 1993; Sulzer-Azaroff, Loafman, Merante, & Hlavacek, 1990). Studies have also shown that behavior-based safety (BBS) processes are effective at reducing costs related to injuries (Fox, Hopkins, & Anger, 1987; Reber et al., 1993). The distinguishing feature between BBS processes and more traditional safety approaches is that BBS processes focus on what people do rather than what they feel or think. More traditional safety approaches, such as ergonomics, redefine work conditions in an attempt to change employee comfort and their attitudes and safety practices (Wilson, 1995). Rather than focusing on conditions alone, the behavioral approach identifies the critical behaviors, often termed "at-risk" behaviors, which occur before an injury. The BBS approach aims to decrease the number of at-risk behaviors and increase the number of safe behaviors within an organization in order to decrease injuries (McSween, 1995).

The behavioral approach to occupational safety has proven to be effective across various settings and populations (e.g., increasing safety belt use of restaurant patrons, Austin, Alvero, & Olson, 1998; increasing safety of roofing crews, Austin, Kessler, Riccobono & Bailey, 1996; increasing safety of public transportation employees, described in Krause, 1997; increasing safety of industrial workers, Sulzer-Azaroff & de Santamaria, 1980; increasing safety of office personnel, McCann & Sulzer-Azaroff, 1996). A representative study in this area improved worker safety in two departments, wrapping and make-up, of a food manufacturing plant (Komaki et al., 1978). An ABA reversal design was used to evaluate the effects of the intervention within each department. During baseline, safety levels averaged 70% in the wrapping department and 78% in the make-up department. During the intervention phase, safety percentages increased to 96% in wrapping and 99.3% in make-up, but declined during the reversal phase to 71% and 72%, respectively. Another representative study was implemented in an industrial plant across three departments (Sulzer-Azaroff et al., 1990). The approximate safety averages for each department before implementation were as follows: Department 1: 70%, Department

2: 73% and Department 3: 68%. After the introduction of the intervention phase, and with the use of changing criterion goals, safety percentages ultimately increased to averages of 90%, 100% and 99%, respectively.

Extensive scientific examination, such as the research mentioned above, has resulted in the identification of the principal components of an effective behavior-based safety process (Komaki, 1986; Komaki, Heinzmann, & Lawson, 1980; Sulzer-Azaroff & Fellner, 1984). These important features normally include: assessment and identification of performance targets, development and implementation of a behavioral observation process, review of observation data, and implementation of a behavioral feedback process. The assessment involves a detailed review of an organization's injury records, first-aid logs, interviews with employees, and a review of any other records that may provide useful data concerning previous safety efforts. From this information, performance targets, or at-risk behaviors, are identified and compiled into a checklist.

The next step in the behavioral safety process involves developing an observation process and training employees to conduct safety observations using the checklist. When conducting observations, observers approach other employees and observe their performance. The observed employee's performance is scored on the checklist and the observer delivers verbal feedback about the performance observed. The data from the checklists are then converted into safety percentages and these percentages are reviewed by either supervisors or employees, graphed and posted in a prominent place (Krause, 1997). It is imperative that the data be continuously reviewed in order to ensure that safety percentages are increasing, or remaining at high stable rates. Any low percentages or downward trends may indicate that problem solving is necessary or that part of the safety process is not being implemented properly and should be reviewed. Therefore, the review procedure helps the safety process stay on track (Krause, 1997).

The data that are reviewed should also be reported to the employees in the form of graphical or verbal feedback so that they are informed of how everyone in the workplace is performing. It is important that workers receive both individual-level (verbal) and group-level (graphic) feedback. This allows each employee to know how safely he or she is performing as well as how safely his or her peers are performing.

Although the majority of writings in BBS appear to use the components described above, there is limited research on the efficacy of any one component alone. Of this research, the majority is dedicated to the effectiveness of feedback as an independent variable (see Alvero, Bucklin, & Austin, in press; and Balcazar, Hopkins, & Suarez, 1985, for a review of the feedback literature), but there are other independent variables in the safety process that have been less adequately studied. One of these is the observation process itself. This is an especially important variable at present because consultants have recently called for employee-driven safety programs (Krause, 1997; McSween, 1995), representing a drift from the earlier researcher-driven programs (for an example of these, see Komaki et al., 1978).

In the BBS research literature, either researchers or supervisors normally conduct observations. However, in the recommended employee-driven programs, most or all employees are trained to perform observer tasks. This means that the employees who conduct the observations are the same employees that should engage in the safety target behaviors on the checklist when they are, in turn, observed. Since most research describes programs implemented and evaluated by researchers (and not employees), questions focused on observers in the system have not been widely studied. One such question is, "Are there reactive effects when employees conduct observations?" or, in other words, "Do observers perform more safely as a result of conducting observations?"

Although anecdotal evidence suggests observing is an important independent variable responsible for behavior change, my literature search found no research explicitly testing this hypothesis. Despite this, studies do exist that can be considered analogous to such an observer effect. That is, data from self-monitoring, modeling, and self-modeling studies seem to support the claim that there may be an effect on observer performance as a result of conducting observations.

Self-Monitoring

Self-monitoring is a useful technique in applied settings for both assessment and intervention purposes (Nelson, Boykin, & Hayes, 1982). When self-monitoring, the participant notes and records the occurrences of his or her own target behaviors (Nelson et al., 1982). This method of self-recording often serves as an effective intervention for increasing the frequency of desirable behaviors (e.g., Johnson & White, 1971; Lam, Cole, Shapiro, & Bambara, 1994) and decreasing the frequency of undesirable behaviors (e.g., Abrams & Wilson, 1979; Romanczyk, 1974). Wood, Murdock, Cronin, Dawson and Kirby (1998) evaluated the effects of self-monitoring on the on-task behaviors of four at-risk middle school students across several academic settings. The primary dependent variable was the percentage of time each student was engaged in on-task behavior. During baseline, student 1 averaged less than 40% of time on-task across all three settings; students 2, 3 and 4 each averaged 30%. With the introduction of the self-monitoring condition, there was an increase in the time on-task: students 1 and 3 averaged 80% and students 2 and 4 engaged in on-task behavior approximately 70% of the time across all three academic settings.

Self-monitoring techniques have also have been used to improve safety in an office environment. McCann and Sulzer-Azaroff (1996) decreased the risk of carpal tunnel syndrome (CTS) during keyboard entry tasks through a combination of training, self-monitoring, feedback, goal-setting, and reinforcement. Secretaries were first trained to self-monitor either their posture or hand-wrist positions. The second phase involved goal-setting (GS), feedback (FB), reinforcement (R+) and the continuation of self-monitoring. GS, FB and R+ were presented at the beginning of each session based on data scored from the previous sessions. Reinforcement was provided for progress and attainment of goals, and FB was based on safe performance and accuracy of self-recording. The group that self-monitored their posture performance showed a rapid increase in correct posture during the self-monitoring phase. When FB, GS, and R+ were added to self-monitoring, the near-perfect level of performance continued. Although this group did not monitor their hand-wrist performance, there were significant improvements noted on this behavior. The data for the group that self-monitored hand-wrist position showed moderate improvement initially, but it was not until FB, GS and R+ were added that performance accelerated sharply. It is interesting to note that posture performance also increased although it was not the targeted behavior for this group. In other words, substantial improvements occurred on the variables that were not specifically targeted. Probe data were also collected to determine the degree to which learned behaviors generalized from the laboratory setting to the natural work setting. These data indicated a close correlation between performance in the work setting and in the laboratory.

The effectiveness of self-monitoring as an independent variable has been referred to as a reactive effect, that is, the very act of self-recording causes the behavior to change in frequency (Nelson et al., 1982). There are three widely accepted views explaining such reactivity. Kanfer (1970; Kanfer & Gaelick-Buys, 1991) proposed a three-stage model of self-regulation. The first stage is self-monitoring, the second is self-evaluation and the third involves self-consequation. This theory suggests that favorable self-evaluation produces positive self-consequation, which then leads to an increase in behavior, whereas unfavorable self-evaluation leads to opposite results. Therefore, reactivity occurs when people observe their own behavior and self-deliver consequences.

The second view that explains this reactive effect was proposed by Rachlin (1974). The first stage of this view also starts with self-monitoring of the target behavior. The person may or may not then engage in self-administered consequences contingent on the occurrences of the target behavior. According to Rachlin, the self-recording response, the self-administered consequences, or a combination of the response and consequences, serve as cues to "remind" the person of the external environmental consequences that actually control response frequency.

Hayes and Nelson (Nelson & Hayes, 1981) suggested a modified version of Rachlin's model. Hayes and Nelson (1983, p. 184) stated:

> The entire self-monitoring procedure (instructions, recording devices, self-monitoring behaviors, and so on), rather than only the self-monitoring per se, cues likely environmental consequences for the response. No special distinction is drawn between self-monitoring, monitoring by others, or other types of cues – any manipulation that makes more obvious the likely environmental consequences of the behavior can be reactive.

In other words, the self-monitoring process seems to prompt behavior change that is ultimately controlled by external consequences (Nelson et al., 1982). There is one primary distinction among the three different views mentioned above. Kanfer and Rachlin emphasize behavioral antecedents (the self-monitored behavior) as initiators of reactivity, while Nelson and Hayes suggest that the triggering stimulus is not solely the self-monitoring response itself, but rather, the entire self-recording procedure (Nelson & Hayes, 1981). Furthermore, the view of Nelson and Hayes suggests that observing the behavior of others can produce reactivity through the same mechanisms as self-monitoring.

Modeling

In BBS, safety observers monitor, or measure, the behavior of others. This feature is somewhat analogous to that of modeling procedures. Studies have shown the effects of observing a model's behavior on the observer's performance. For instance, Rice and Grusec (1975) demonstrated that children who saw a model donate half of their winnings from a game to poor children were more likely to do the same than those who had not been exposed to the model's behavior. Much of Bandura's (1973, 1976, 1978) work has dealt with the effects of observing aggressive behaviors. His findings suggest that children who observe others engage in aggressive behavior are more likely to perform those same responses than children not exposed to such observations. The outcomes of such studies indicate the strong influence that witnessing a behavior has on an observer's performance. Although these studies were conducted with children, the results suggest the possibility that persons who observe others engage in safe behaviors are more likely to employ those safe behaviors than those not engaged in such observations. Despite this implication, my review did not find research that explicitly tested such a hypothesis in the area of behavioral safety.

Self-Modeling

Self-modeling is defined as the positive change in behavior that results from viewing oneself on edited videotapes that depict only exemplary behavior (Possell, Kehle, Mcloughlin, & Bray, 1999). Although safety observers in a behavioral safety process observe both correct and incorrect behaviors, the effectiveness of the self-modeling procedure suggests that observing correct performance is a powerful and effective tool. Approximately 150 studies exist in print that examine the use of self-modeling (mostly in the video medium) in a variety of applications (e.g., rehabilitation, sports, communication, etc.) and with a wide range of ages (toddler to elderly) (Dorwick, 1999). Hartley, Bray, and Kehle (1998) conducted a study to investigate the effects of self-modeling as an intervention to increase individual participatory behavior in the classroom using a multiple-baseline across three participants. Three second-grade students viewed edited videotapes of themselves successfully volunteering to participate in class by raising their hands. Students were not told specifically what they were to look for when viewing the tapes. During baseline, the three students had a mean participation rate ranging between 8% and 24%. During intervention, the mean participation rate for the participants ranged between 28% and 60%. The success of self-modeling techniques has led some researchers to "argue for the recognition of learning from the observation of one's own successful or adaptive behavior (or images of it) as a mechanism in its own right" (Dorwick, 1999). Self-modeling combines the techniques of two effective procedures: self-monitoring and modeling. This suggests additional support of the hypothesis that measuring another person's safety performance may increase the safety performance of the observer.

Purpose

Using the principles of applied behavior analysis, the field of behavior-based safety has demonstrated behavior change in a variety of settings and with a variety of safety-related target behaviors. It seems clear that one reason for this success is the use of safety-related behavioral feedback in BBS. Another potential independent variable involved in the effects of employee-driven BBS processes is the impact of conducting observations on the behavior of the observer. The extensive research on the reactive effects of recording one's own behavior combined with the impact of modeling the observed behavior of others suggests that conducting observations on the behavior of others may contribute to behavior change in BBS processes. This study is concerned with the effectiveness of the observation process in BBS. Previous research has shown that persons will react to the mere presence of observers (Kirmeyer, 1985), but in a BBS process, is the behavior of the observers affected by conducting observations? The purpose of the proposed study is to determine if the process of conducting observations has an effect on the observer's safety performance.

METHOD

Participants

Participants were eight undergraduate students (n=7 female; n=1 male) at Western Michigan University in Kalamazoo, Michigan. Participants were asked if they knew any information concerning the purpose of the study to ensure that none of the participants had more information about the study than the others. No participants were eliminated as a result of this criterion. All participants were 18 years old or older. Students were compensated $5.00 an hour for their participation throughout the study.

Setting and Materials

The study took place in a research lab located on the university campus. The lab consisted of two observation rooms equipped with video cameras and one video monitoring and recording room. These rooms were furnished with the following: a model AFCCD video camera mounted in the upper right-hand corner of the room, two chairs and a table. For the purpose of this study a Compaq Presario CDS 524 computer, telephone (cordless FF90XXX Southwestern Bell Freedom Phone) and a cardboard box (8"x11""''x11"; 0.20 lb.) were added to each room. The video monitoring and recording room was equipped with two 17" Phillips color televisions, two Panasonic AG 1320 4 Head VCRs and two remote controls to control the video cameras in the observation rooms.

The information sheets (see Appendices A and B) used during the first intervention phase contain a list of target behaviors and definitions of how to perform them safely. Four checklists were used to collect safety data on the target behaviors. One checklist (see Appendix C) was used by the researcher to collect data on each participant's performance during each session of all phases of the study. The participants used one of several checklists (see Appendices D, E, and F) to collect data when conducting observations during the second intervention phase. Participants viewed a 5-minute video of an experimental confederate performing tasks similar to those the participant performed during the study. Videotapes were used to record the behavior of all participants during all sessions throughout the study.

Definition of Dependent Variables

All dependent variables, except lifting, were defined in terms of the percentage of intervals in which they occurred. Percentage occurrence was calculated by adding the number of intervals in which each safe behavior was observed, dividing it by the total number of observation intervals and multiplying by 100%. Safe lifting frequency was counted and reported as a percentage of total number of lifts.

The target behaviors and their definitions were as follows:

1. Lifting/Putting Down – (a) back straight – natural upright position

throughout the lift, back is not parallel to the floor, no twisting, (b) knees bent – slight bend at the knees (120° angle is recommended).

2. Typing – (a) wrist position – in line with elbows, not bent, (b) neck position – aligned with the back, eyes should be level with the screen and document.

3. Sitting – (a) back upright - upright, parallel to the back of the chair (not leaning against it), (b) shoulders aligned with back – shoulders in line with the back, not slouched forward, (c) both feet on the floor – both feet should be flat on the floors (ball of foot and heel should touch floor).

4. Phone Use – neck position – neck should be aligned with the back.

Government ergonomic reports were reviewed in order to determine which office behaviors to target (Office of Health & Safety – Safety Manual, 1998; OSHA Ergonomics Report DT931018, 1998). The above-listed behaviors were consistently mentioned in the documents reviewed. These government documents also served as the source for the definition of each target behavior.

Measurement of Dependent Variables

Each session was videotaped and scored at a later time by an undergraduate researcher who was blind to conditions and goals of the experiment. The coder used a checklist containing definitions for all of the target behaviors and how to perform them safely (see Appendix C). A momentary time sampling procedure was used for data collection. Every 30 seconds, data were collected for behavior occurring at that moment, with the exception of lifting. Because lifting occurred so quickly, in less than 30-second intervals, the chances were very high that it would not be detected using the time sampling procedure. Therefore, data were collected for every lift, regardless of when it occurred. A behavior was scored as being safe when it satisfied the definition listed on the checklist.

Interobserver Agreement

The researcher also coded 40% of all sessions, independent of the undergraduate coder. An agreement was defined any occurrence in which both the researcher and coder scored the same mark (safe or unsafe) for a behavior. Interobserver agreement between the researcher and the coder was calculated as follows: the number of occurrences divided by the number of occurrences plus nonoccurrences multiplied by 100%.

Independent Variables

Two independent variables were presented, each during a different phase after baseline (phase 1). At the start of the information phase (phase 2), participants were told the purpose of the study was "to observe individual safety behaviors in an office environment" (see Appendix G). They were presented with written information (see Appendices A and B) listing the target behaviors and definitions of how to perform them safely. This written information was provided at the start of each session during the information phase. During the third phase, participants conducted observations. In this phase, participants were asked to observe a video of an experimental confederate performing office behaviors and collect data on that person's safety performance using a safety checklist (see Appendices D, E, and F).

Procedures

Duration

Each session lasted approximately 30 minutes. Participants were allowed to complete a maximum of 2 sessions per day (with a break of a minimum of 2 hours between sessions). The estimated duration of participation was 36 sessions over 5 to 8 weeks per participant. Actual participation was 27 to 32 sessions over 4 to 6 weeks.

Participant Recruitment

An attempt was made to select all of the required participants from an existing "participant pool" list. A list had been compiled of undergraduate students who offered to assist in research studies. These students had either approached their instructors or the Society for Performance Management (a university student organization) and shown interest in participating. None of these students were available to participate in the study, therefore, the student investigator made an announcement (see Appendix H) at various undergraduate psychology courses until enough participants had volunteered.

Baseline

Before the start of the study, participants were randomly assigned to one of two groups. At the start of each baseline session, all participants were handed a list of instructions (see Appendix I) and were asked by either the graduate researcher or the undergraduate research assistant to perform the tasks described in the instructions. The researchers followed a script (see Appendix J) when delivering the instructions to each participant to ensure the consistency of the instructional set. The tasks included were: (a) typing a few paragraphs using a word processor on a computer; (b) dialing a phone number and leaving a brief message on the answering machine; and (c) picking up a card board box (8"x11"x11"; 0.20 lb.) containing 5 pieces of paper, and placing it onto a chair, removing a specific piece of paper and placing the box back down onto the ground.

Each task was repeated a minimum of 4 times, thus trying to simulate the work a person might perform in an office. Participants were asked to perform the tasks for 15 minutes. Then, either the graduate researcher or the undergraduate assistant knocked on the door to signal the end of the session. Therefore, each baseline session lasted exactly 15 minutes. Participants remained in this phase until performance stabilized. During all sessions, participants were constantly monitored in the control room by a researcher via video monitoring.

Intervention 1: Information Phase

During the first session of the information phase, participants were informed about the nature of the study. Participants in groups A and B were given a handout (Appendix A and B, respectively) containing definitions for four of the eight target behaviors and how to perform them safely. Group A received information on one set of four behaviors (back straight and knees bent when lifting, neck and wrist position while typing) and group B received information on the other four behaviors (back, shoulder and feet position when sitting, and neck alignment when using the phone). Either the graduate researcher or the undergraduate research assistant informed the participant of the purpose of the study, and again, the researchers followed a script (see Appendix G) to ensure that each participant was given the same instructions. Participants were given the definition handout (Appendix A or B) at the start of each session within this phase. They were required to review this information for five minutes before they were handed the list of tasks to perform. The remainder of the session followed the same procedures as those during baseline. Participants remained in this phase until performance stabilized. The purpose of this intervention phase was to eliminate demand characteristics that are often displayed by participants taking part in a lab study (Kazdin, 1992).

Intervention 2: Observation Phase

At the start of each session during the observation phase, participants were asked to observe a 5-minute video of an experimental confederate performing tasks similar to those the participant performed during each session. The experimental confederate performed both safe and unsafe behaviors on some videos, whereas other videos were made up of all safe or all unsafe behaviors. Participants were then asked to collect data on the confederate's safety performance using one of two checklists (see Appendices D and E). Participants scored the video using an event recording procedure. They scored a behavior as safe or unsafe immediately after observing the occurrence of the behavior. Members of group A and B received a checklist (see Appendices D and E, respectively) containing the same four target behaviors they were given during the information phase. The checklist given to group A contained the behaviors involved with lifting and typing (back and knee position, neck and wrist position), and the list given to group B contained the behaviors involved with sitting and using the phone (back, shoulder and feet position, and neck position). The exact instructions that were given to the participants were read from a script (see Appendix K). Each checklist was comprised of four of the eight target behaviors and definitions of how to perform them safely. Participants conducted observations while they watched the 5-minute video. They were then given the list of instructions of tasks to perform and the remainder of the session procedures mirrored those during the previous phases. Participants scored a different 5-minute video before every session during the observation phase. After performance stabilized on the first four behaviors, the remaining four target behaviors were targeted by adding them to the checklist (see Appendix F). Therefore, participants were asked to collect data for all eight target behaviors during the last portion of the observation phase. The same instructions were read to each participant when the other four behaviors were added onto the checklist (see Appendix L). Participants remained in this phase until performance stabilized.

Integrity of the Independent Variables

Scripts were developed and used for all of the verbal instructions that were given to the participants by the researchers. This ensured that all participants were exposed to the same instructional set. The researcher collected the safety checklists used by the participants during the observation phase. This provided verification that participants conducted observations during the session. The videos shown to the participants were kept in a specific order to ensure that all participants were exposed to the same video sequence.

Experimental Design

A within-subjects, ABC design was used with a multiple baseline design counterbalanced across behaviors during the observation phase (C). Every participant was exposed to each of the three phases of the experiment: baseline, information phase and observation phase. However, participants were exposed to the information phase only for the first four behaviors they were to observe. The observation phase was first implemented on four of the eight target behaviors. After performance on the first four behaviors stabilized, the remaining four target behaviors were exposed to the observation phase. Every participant served as his/her own control.

Stability Criteria

Data were considered stable if data points for three consecutive sessions fell within 18 percentage points of each other and were not trending upwards. Participants remained in each phase for a minimum of five sessions and a maximum of nine sessions. A maximum length for each phase was established in case the data were too variable and the stability criteria were not reached. Of the eight participants and 64 behaviors, three participants and four behaviors did not meet the stability criteria.

Informed Consent Process

The consent process occurred at the start of each participant's initial session. Either the graduate or undergraduate research assistant read a script (see Appendix M) and went over the consent form (see Appendix N) with each participant. Participation in this study was not begun until the participant read and signed the consent form.

Exit Interviews and Debriefing

At the end of the last session, participants were asked a series of questions (see Appendix O) concerning the experiment, and then they were given an explanation about the nature of the experiment (see Appendix P). The questions and explanation were read to each participant by the experimenter. The purpose of debriefing each participant was two-fold: (a) to obtain as much information as possible about why the participants performed as they did, and (b) to insure that all participants understood the nature of the study and to answer any of their questions regarding their participation. It was hoped that this information would help in determining the behavioral principles responsible for changes that occurred in safety performance.

Human Subjects Protection

This project was approved by the Human Subjects Institutional Review Board (see Appendix Q).

RESULTS

Participant 1A

Figure 1 displays the safety performance of participant 1A (the letter “A” represents the group assignment where group A was first exposed to the first four

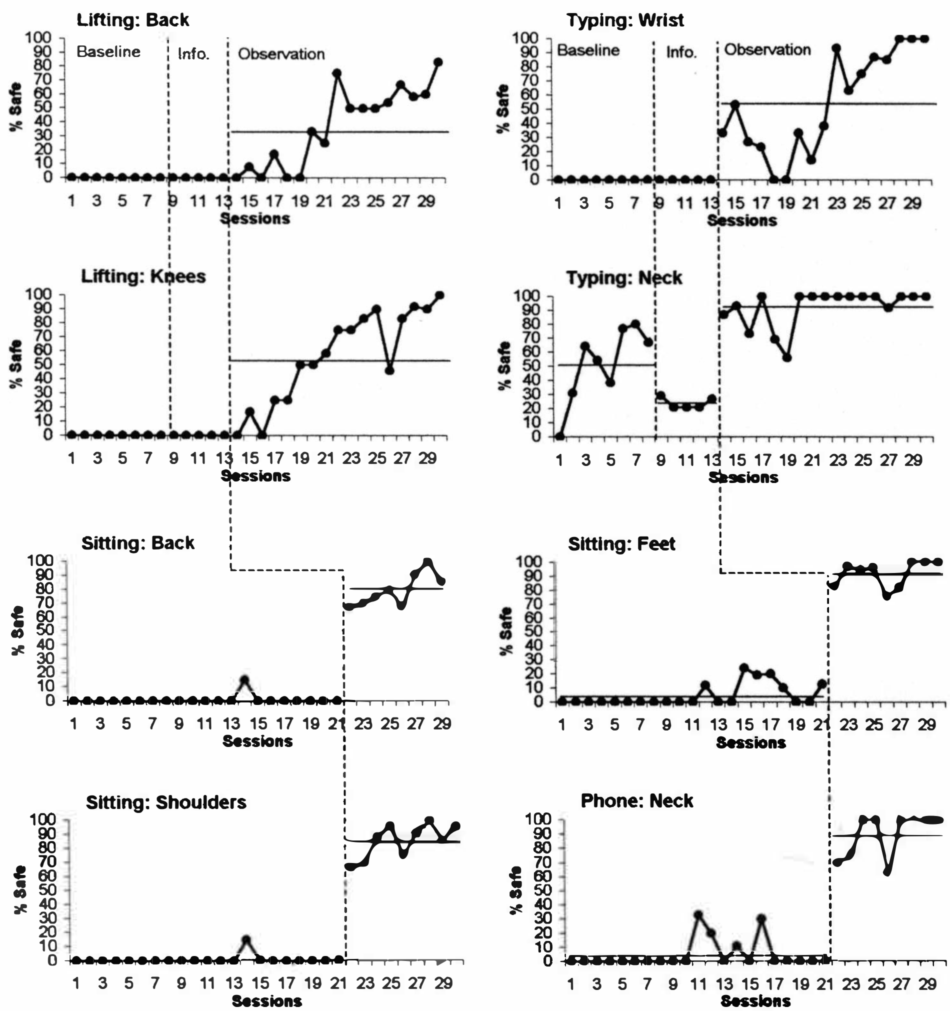


Figure 1. Data for Participant 1A. For Lifting Behavior, the Figure Represents Safe Lifting Behaviors as a Percentage of Total Lifting Opportunities. For the Remaining Behaviors, the Figure Represents the Number of Intervals in Which Safe Behavior was Observed as a Percentage of the Intervals Scored.

behaviors and group B was first exposed to the second four behaviors) during the course of the experiment. Back position during lifts averaged 0% safe during baseline and the information phase and increased to a mean of 37.1% (SD: 28.6; range: 0% to 83%) safe in the observation phase. Correct knee bends during lifts did not occur until the observation phase, averaging 56.4% (SD: 33.2; range: 0% to 100%). Wrist position during typing averaged 0% during baseline and the information phase, and increased to an average of 54.4% (SD: 36; range 0% to 100%) in the observation phase. Levels of safety for neck position during typing tasks fluctuated across phases. Performance averaged 51.4% (SD: 27; range 0% to 80%) in baseline, then decreased to 23.8% (SD: 3.9; range 21% to 29%) during the information phase and increased to a mean of 92.4% (SD: 13.5; range: 56% to 100%) in the observation phase. Performance for the second set of target behaviors was as follows: (1) back position while sitting averaged 1% (SD: 3.27; range: 0% to 15%) safe during baseline and 80.1% (SD: 11.2; range: 67% to 100%) in the observation phase; (2) shoulder position also averaged 1% (SD: 3.27; range 0% to 15%) in baseline and increased to a mean of 85.6% (SD: 11.9; range 67% to 100%) safe during the observation intervention; (3) feet position averaged 4.7% (SD: 8.04; range 0% to 24%) and 92% (SD: 9.18; range 76% to 100%) safe during baseline and intervention, respectively; and (4) mean safety levels for neck position during phone use were 4.5% (SD: 10.2; range 0% to 33%) for baseline and 89.8% (SD: 15.6; range 63% to 100%) for the observation phase.

Participant 2A

Average safety levels for participant 2A back position during lifts were 0%, 4.3% (SD: 6.71; range 0% to 13%) and 81.2% (SD: 22.6; range: 25% to 100%) across all three phases, respectively, as shown in Figure 2. Knee bends during lifts averaged 0% in baseline, 75.7% (SD: 26.3; range 33% to 100%) for the information

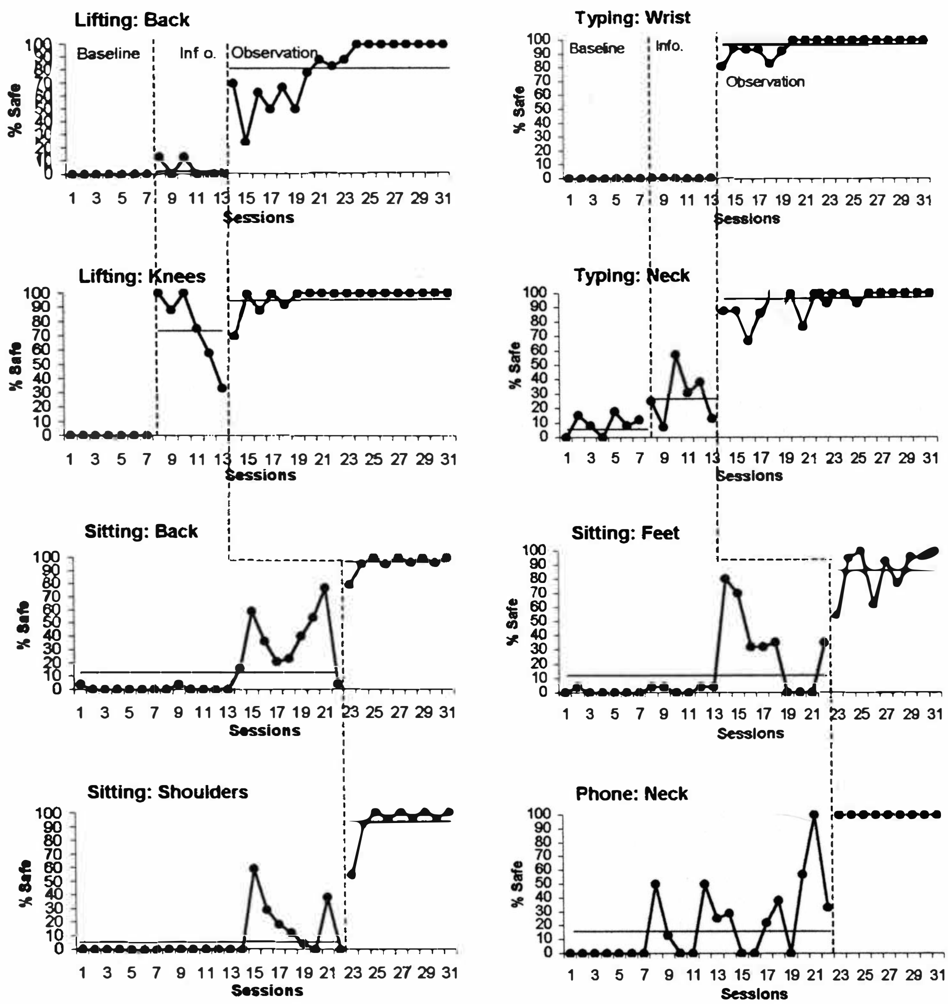


Figure 2. Data for Participant 2A. For Lifting Behavior, the Figure Represents Safe Lifting Behaviors as a Percentage of Total Lifting Opportunities. For the Remaining Behaviors, the Figure Represents the Number of Intervals in Which Safe Behavior was Observed as a Percentage of the Intervals Scored.

phase, and increased to 97.2% (SD: 7.55; range 70% to 100%) in the observation phase. Improvements in safety can be seen in wrist position during typing as safety performance increased from an average of 0%, in both baseline and information, to 96.4% (SD: 6.04; range 81% to 100%) during the observation phase. Participant 2A averaged 8.7% (SD: 6.95, range 0% to 18%) safe for neck position during typing tasks in the baseline phase, 28.5% (SD: 18; range 7% to 57%) and 94% (SD: 9.55; range: 67% to 100%) during the information and observation phases, respectively. Back position averaged 15.4% (SD: 23.2; range 0% to 77%) safe for baseline and 95.7% (SD: 6.55; range 79% to 100%) for performance during the observation phase. Correct shoulder position averaged 7.3% (SD: 15.6; range: 0% to 59%) and 92.4% (SD: 14.7; range: 54% to 100%) during the baseline and observation phases, respectively. The mean for safe feet position during baseline was 13.8% (SD: 23.6; range 0% to 80%) and 85.9% (SD: 17.3; range: 54% to 100%) during the observation phase. Correct neck position during phone usage tasks was extremely variable during baseline and averaged 19% (SD: 26.7; range 0% to 100%), but all variability was eliminated during the observation phase, and performance averaged 100%.

Participant 3A

Figure 3 shows participant 3A's safety performance. Safe back position during lifts averaged 0% in baseline, 2.2% (SD: 5.31; range: 0% to 13%) in the information phase and 42.3% (SD: 21.2; range 8% to 75%) in the observation phase. Knee position also averaged 0% in baseline, but rose to 46% (SD: 17; range: 25% to

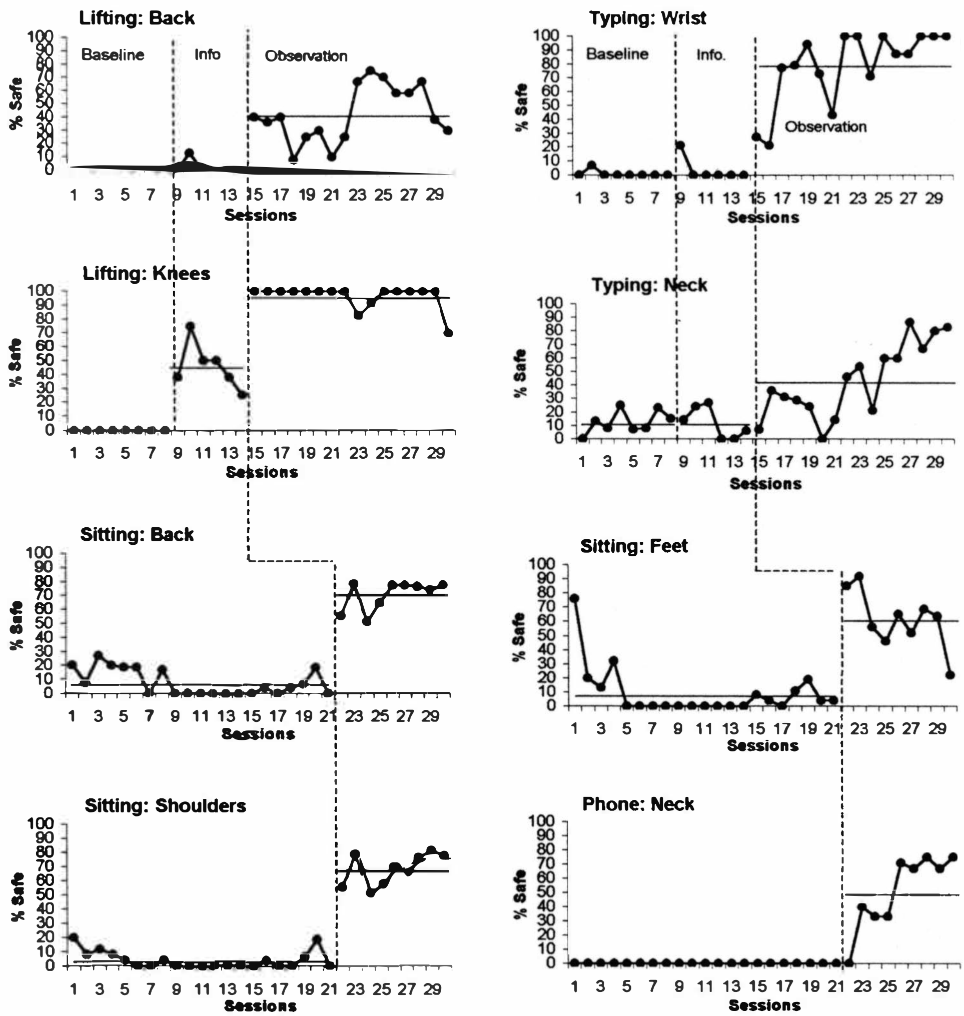


Figure 3. Data for Participant 3A. For Lifting Behavior, the Figure Represents Safe Lifting Behaviors as a Percentage of Total Lifting Opportunities. For the Remaining Behaviors, the Figure Represents the Number of Intervals in Which Safe Behavior was Observed as a Percentage of the Intervals Scored.

75%) in the information phase and 96.6% (SD: 8.42; range 70% to 100%) in the observation phase. Typing wrist position averaged 0.1% (SD: 2.47; range 0% to 7%), 3.5% (SD: 8.57; range: 0% to 21%) and 78.7% (SD: 26.4; range: 21% to 100%) safe in each phase, respectively. This participant's neck position averaged 12.4% (SD: 8.45; range: 0% to 25%) safe during baseline and 11.8% (SD: 11.8; range: 0%

to 27%) during the information phase. Mean safe performance then increased to 43.7% (SD 27.6; range: 0% to 87%) during the observation phase. While sitting, correct back position averaged 7.81% (SD: 9.39; range: 0% to 27%) and 70.9% (SD: 10.5; range: 52% to 79%) during baseline and observation phases, respectively. Shoulder position rose from 4.1% (SD: 6.24; range: 0% to 20%) to 68.8% (SD: 11.2; range 52% to 82%), and correct feet position increased from 9.1% (SD: 17.6; range: 0% to 76%) to 61.2% (SD: 20.8; range: 22% to 92%). Neck position during phone usage was unsafe during all of baseline, averaging 0%, and increased to 51.2% (SD: 26.1; range 0% to 75%) during the observation phase.

Participant 4A

Performance for participant 4A is shown in Figure 4. Back position during lifts averaged 0% during the baseline and information phases, and increased to a mean of 31.7% (SD: 33; range: 0% to 83%) in the observation phase. Knee position was unsafe throughout all of baseline, averaging 0%. Mean performance slightly increased to 5.8% (SD: 13.3; range: 0% to 38%) in the information phase, and then increased to an average of 89.2% (SD: 24; range: 27% to 100%) in the observation phase. Wrist position was unsafe during all typing tasks in the baseline (M= 0%) and information (M= 0%) phases, but the mean increased to 48.4% (SD: 47.7; range 0% to 100%) in the observation phase. Average safe neck performance was 31.4% (SD: 2.19; range 29% to 33%), 42.8%, (SD: 28.5; range: 13% to 77%) and 94.7% (SD: 7.82; range 79% to 100%) across all three phases, respectively. While sitting,

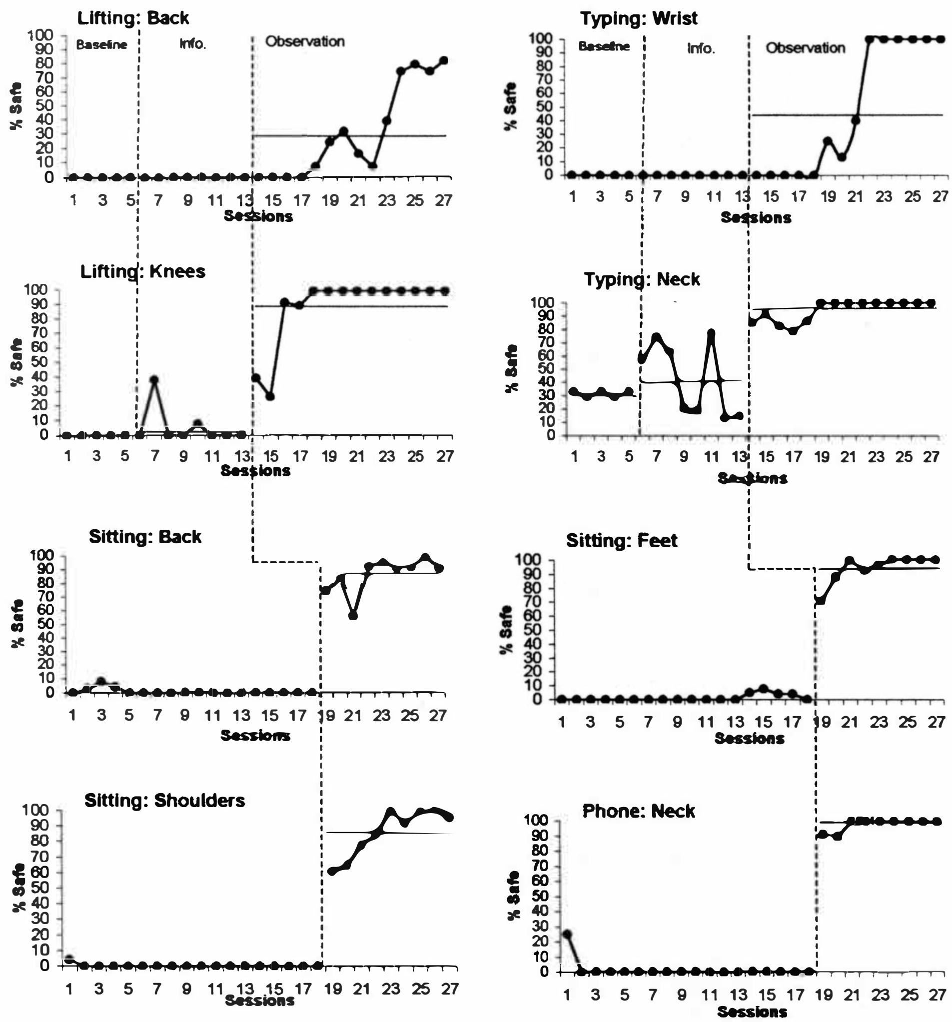


Figure 4. Data for Participant 4A. For Lifting Behavior, the Figure Represents Safe Lifting Behaviors as a Percentage of Total Lifting Opportunities. For the Remaining Behaviors, the Figure Represents the Number of Intervals in Which Safe Behavior was Observed as a Percentage of the Intervals Scored.

participant 4A engaged in safe back posture an average of 0.8% (SD: 2.12; range: 0% to 8%) in baseline and 87% (SD: 13.3; range: 57% to 100%) in the observation phase. Correct shoulder alignment changed from an average of 0.2% (SD: 0.94; range: 0% to 4%) to 86.3% (SD: 15.2; range: 61% to 100%), and feet position increased from a mean of 1.2% (SD: 2.38; range: 0% to 8%) to 94.2% (SD: 9.68; range: 71% to 100%). During tasks involving the phone, the participant's neck was correctly positioned 1.4% (SD: 5.89; range: 0% to 25%) of the time during baseline and 97.9% (SD: 4.2; range: 91% to 100%) during intervention.

Participant 5B

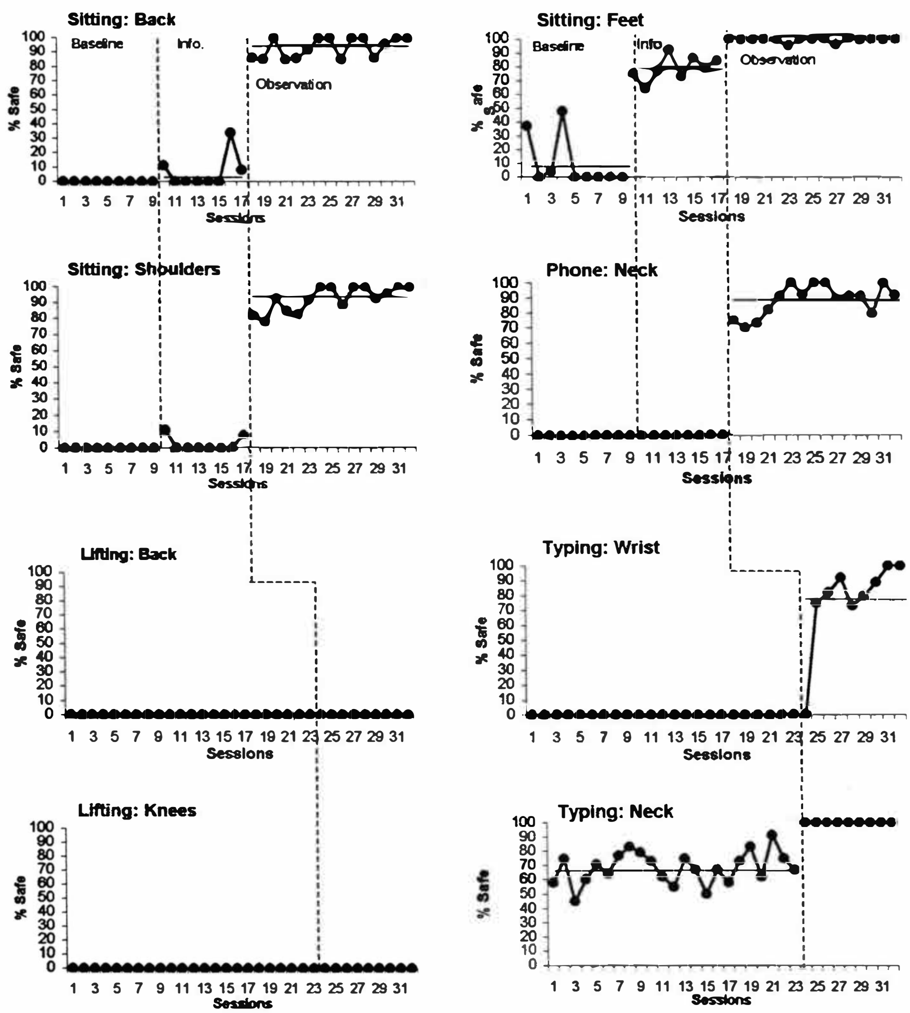


Figure 5. Data for Participant 5B. For Lifting Behavior, the Figure Represents Safe Lifting Behaviors as a Percentage of Total Lifting Opportunities. For the Remaining Behaviors, the Figure Represents the Number of Intervals in Which Safe Behavior was Observed as a Percentage of the Intervals Scored.

Figure 5 illustrates the performance of participant 5B. Both behaviors involved with lifts, back and knee positions, were performed unsafely throughout all of baseline and the observation phase. Wrist position was also unsafe during baseline, averaging 0%, but increased to a mean of 76.8% (SD: 30.4; range: 0% to 100%) during the observation phase. Neck position during typing tasks averaged 68.3% in baseline (SD: 11.2; range: 45% to 91%), but it improved to perfect levels (M= 100%) in the observation phase. Back posture while sitting averaged 0%, 6.6% (SD: 11.9; range: 0% to 34%), and 93.4% (SD: 7.02; range: 85% to 100%) during baseline, information and observation phases, respectively. Mean correct shoulder position increased from 0% in baseline to 2.4% (SD: 4.47; range: 0% to 11%) in the information phase to 92.7% (SD: 7.69; range: 78% to 100%) in the observation phase. Average feet position was 9.9% (SD: 18.7; range: 0% to 48%) safe in baseline, 78.8% (SD: 8.65; range: 64% to 92%) in the information phase, and 99.5% (SD: 1.41; range 96% to 100%) in the observation phase. Neck position during phone usage was unsafe throughout the baseline and information phases (M= 0%), and increased to 88.5% (SD: 10.2; range: 70% to 100%) in the observation phase.

Participant 6B

Figure 6 illustrates participant 6B safety performance. This participant performed unsafe lifts during baseline, during which both back and knee positions averaged 0%, and completely safe lifts during the observation phase, during which back and knee performance averaged 100%. During typing tasks, wrist position

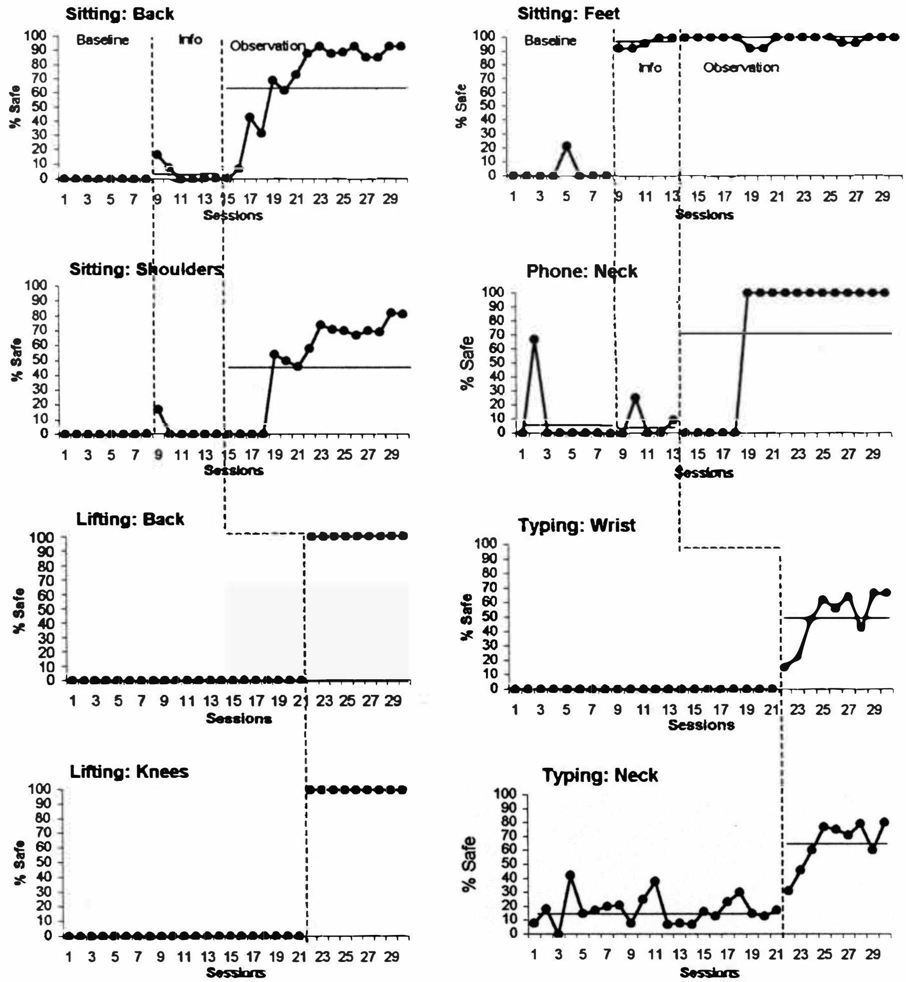


Figure 6. Data for Participant 6B. For Lifting Behavior, the Figure Represents Safe Lifting Behaviors as a Percentage of Total Lifting Opportunities. For the Remaining Behaviors, the Figure Represents the Number of Intervals in Which Safe Behavior was Observed as a Percentage of the Intervals Scored.

averaged 0% safe in baseline and increased to a mean of 49.3% (SD: 19.2; range: 15% to 67%) in the observation phase. Neck position increased from an average of 17.2% (SD: 10.3; range: 0% to 42%) to 64.3% (SD: 16.8; range: 31% to 80%) from baseline to the observation phase, respectively. Back position while sitting averaged 0% in baseline, 5% (SD: 7.55; range: 0% to 17%) in the information phase and 64.3%

(SD: 34.5; range: 0% to 93%) in the observation phase. Correct shoulder position averaged 0%, 3.4% (SD: 7.6; range: 0% to 17%) and 46.6% (SD: 32.5; range: 0% to 82%) across all three phases, respectively. Feet position increased from a mean of 2.6% (SD: 7.42; range: 0% to 21%) in baseline to 96% (SD: 4; range: 92% to 100%) in the information phase, and continued to increase to a mean of 98.6% (SD: 2.81; range: 92 to 100%) in the observation phase. When using the phone, participant 6B averaged 8.4% (SD: 23.7; range: 0% to 67%) and 6.8% (SD: 10.9; range: 0% to 25%) safe in the baseline and information phases, respectively, and increased performance to a mean of 70.6% (SD: 47; range: 0% to 100%) in the observation phase.

Participant 7B

The performance of participant 7B is shown in Figure 7. Throughout baseline, back position during lifts averaged 8.46% (SD: 11.2; range: 0% to 33%) safe, and it increased to a mean of 100% in the observation phase. Correct knee bends were performed about half of the time in baseline, averaging 43.3% (SD: 25.9; range: 0% to 100%), and increased to perfect levels of safety (M= 100%) in the observation phase. Wrist position during typing tasks was unsafe during baseline (M= 0.4%; SD: 2.04; range: 0% to 10%), and increased to a mean of 100% in the observation phase. Participant 7B had variable levels of safety for neck position while typing, averaging 16.8% (SD: 18.4; range: 0% to 88%) during baseline, and increasing to 88.6% (SD: 16.3; range: 53% to 100%) in the observation phase. While sitting, the participant had their back upright an average of 34.8% (SD: 21.9; range:

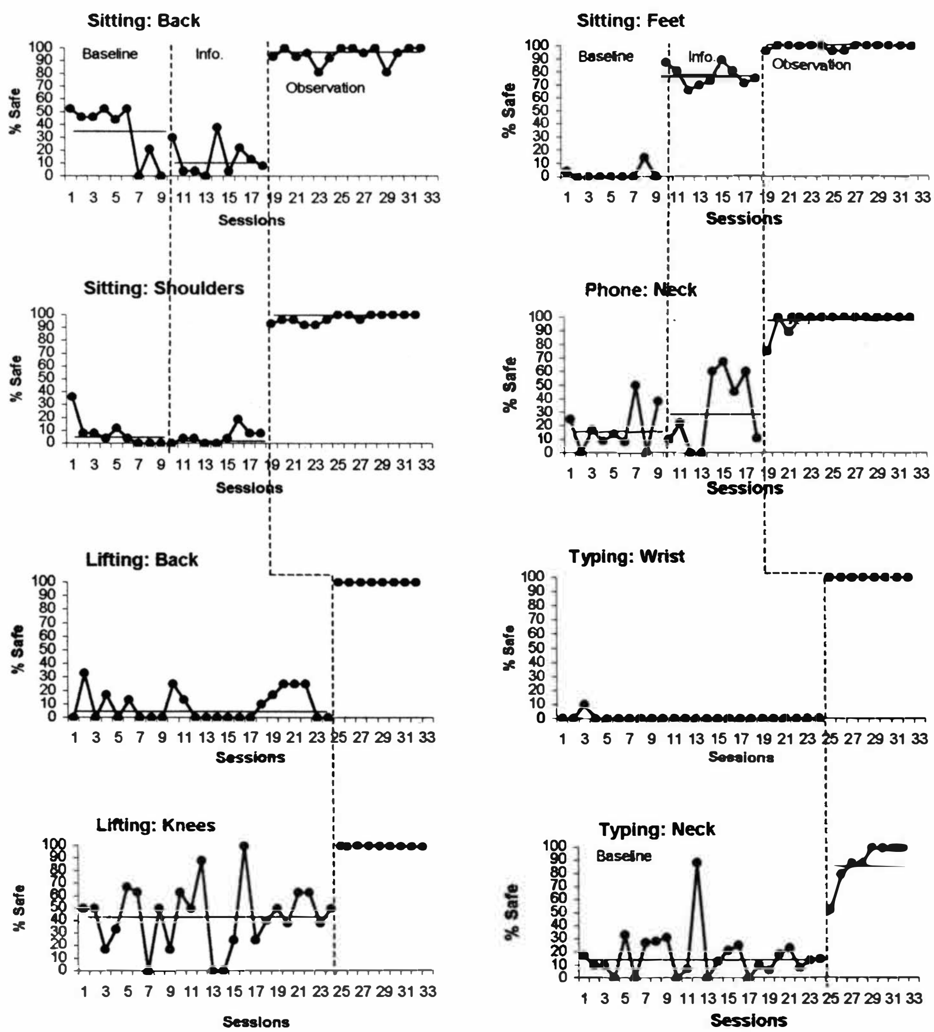


Figure 7. Data for Participant 7B. For Lifting Behavior, the Figure Represents Safe Lifting Behaviors as a Percentage of Total Lifting Opportunities. For the Remaining Behaviors, the Figure Represents the Number of Intervals in Which Safe Behavior was Observed as a Percentage of the Intervals Scored.

0% to 52%) of the time during baseline, and this level decreased to 13.7% (SD: 13.4; range: 0% to 38%) in the information phase, and then increased to 94.9% (SD: 6.57; range: 81% to 100%) in the observation phase. Shoulder position averaged 8% (SD: 11.3; range: 0% to 36%), 5.2% (SD: 6.04; range: 0% to 19%) and 97.2% (SD: 3.19; range: 92% to 100%) safe across each phase, respectively. Feet placement improved from an average of 2% (SD: 4.69; range: 0% to 14%) in baseline to 77% (SD: 7.92; range: 66% to 89%) in the information phase and increased further to a mean of 99.1% (SD: 1.7; range: 96% to 100%) in the observation phase. Neck alignment during phone usage rose from an average of 17.9% (SD: 17; range: 0% to 50%) to 30.6% (SD: 27.4; range: 0% to 67%) and then to 97.4% (SD: 7.09; range: 75% to 100%) across each phase, respectively.

Participant 8B

As illustrated in Figure 8, participant 8B's back position while lifting was unsafe throughout most of the study, averaging 0% during baseline and 5.3% (SD: 6.99; range: 0% to 17%) during the observation phase. Safety percentages for knee bends were also low, with a mean of 0% in baseline and 22.6% (SD: 8.62; range: 10% to 33%) in the observation phase. During typing tasks, wrist position was unsafe during all of baseline (M=0%) and averaged 39.1% (SD: 26.9; range: 0% to 58%) in the observation phase, and neck alignment averaged 20.1% (SD: 11; range: 0% to 35%) and 72.7% (SD: 9.39; range: 59% to 87%) in each phase, respectively. While sitting, participant 8B averaged 0.1% (SD: 1.76; range: 0% to 4%) safe back position during baseline, 2% (SD: 3.42; range: 0% to 7%) in the information phase and 47.3% (SD: 28.3; range: 0% to 93%) in the observation phase. Correct shoulder alignment averaged 0.4% (SD: 1.33; range: 0% to 4%), 0% and 43% (SD: 33.1; range: 0% to 93%) in each phase, respectively. Feet placement increased from a mean of 19% (SD 12.9; range: 0% to 36%) in baseline to 95.3% (SD: 5.31; range: 86% to 100%) in the information phase, and to 96.6% (SD: 5.88; range: 80% to 100%) in the observation phase. Correct neck position during phone usage was almost nonexistent throughout the study, averaging 0% safe in both the baseline and information phases, and increasing to 13.7% (SD: 20.9; range: 0% to 57%) in the observation phase.

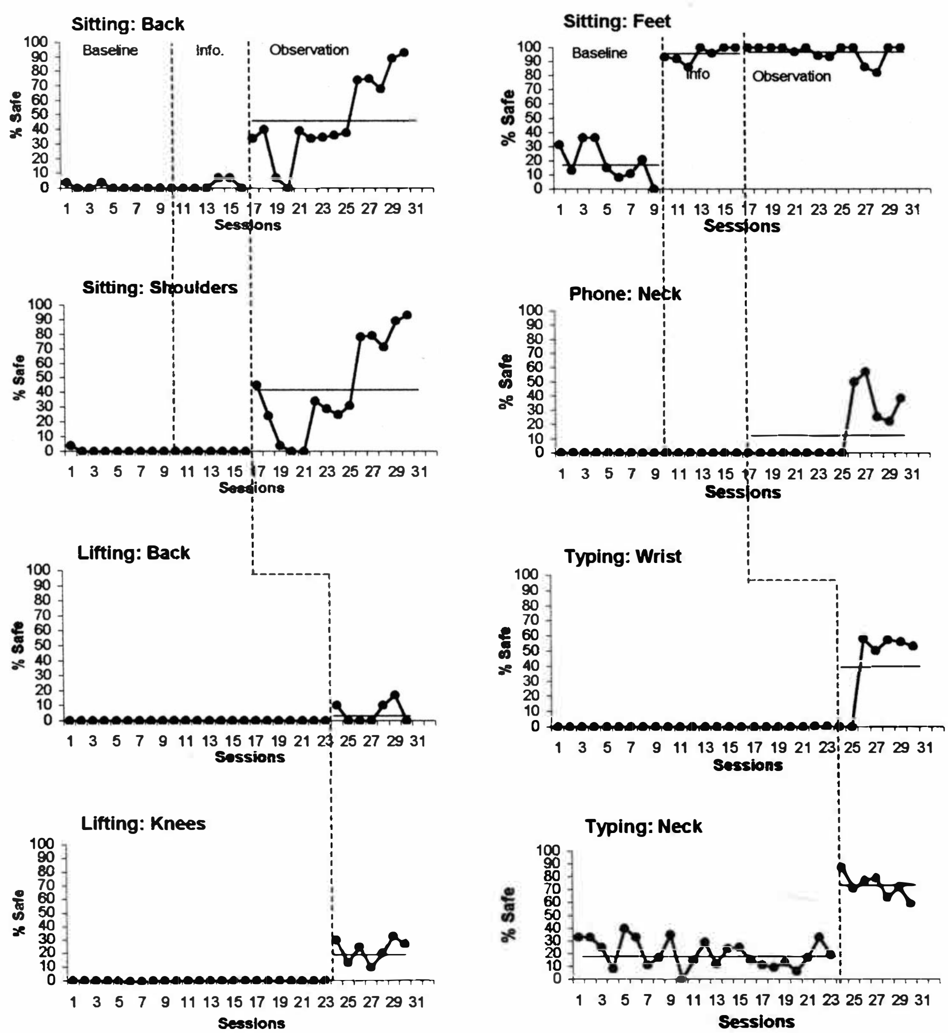
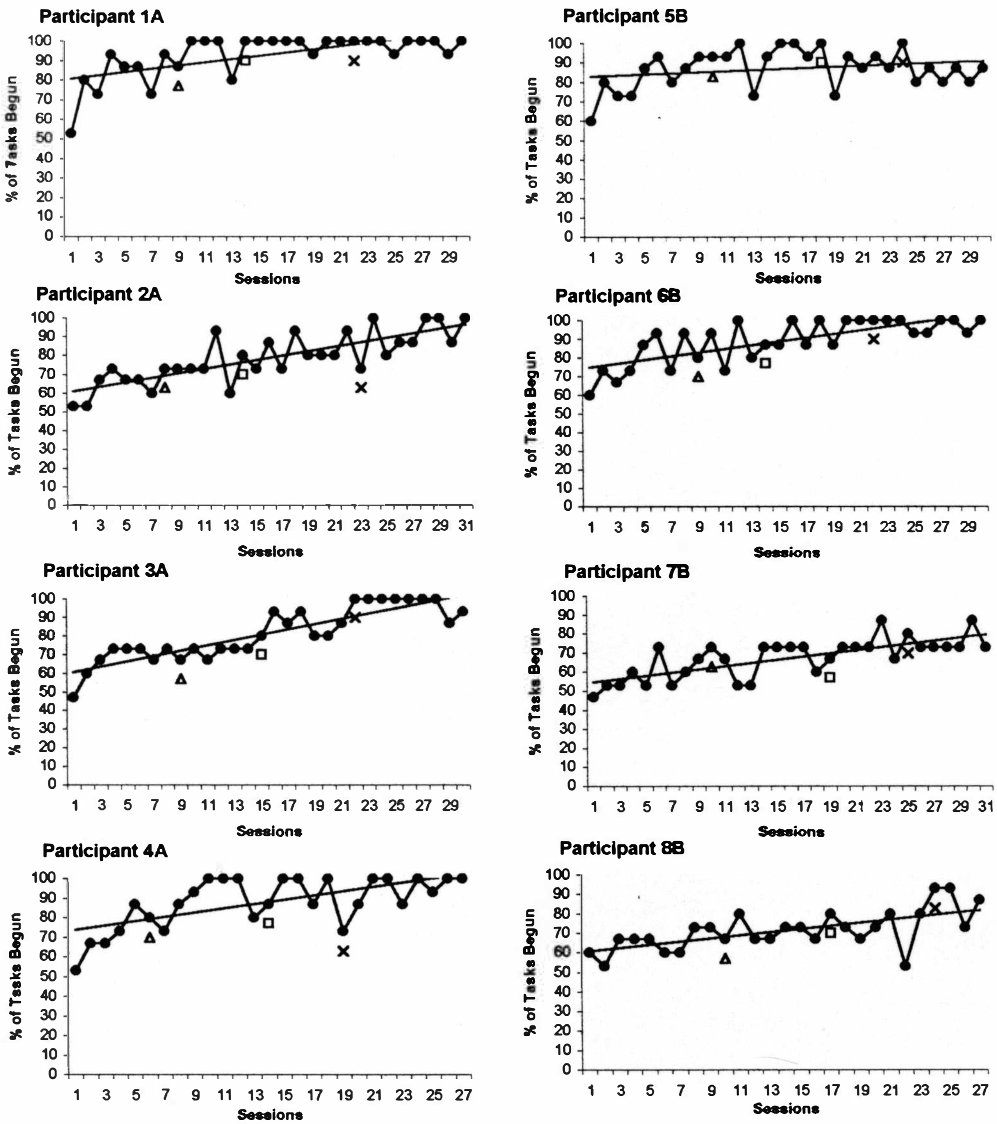


Figure 8. Data for Participant 8B. For Lifting Behavior, the Figure Represents Safe Lifting Behaviors as a Percentage of Total Lifting Opportunities. For the Remaining Behaviors, the Figure Represents the Number of Intervals in Which Safe Behavior was Observed as a Percentage of the Intervals Scored.

Performance Data

Each participant's performance data are shown in Figure 9. The data are



Legend. Open Triangles indicate the start of the Information Phase. Open Squares indicate the start of the Intervention Phase for the first 4 behaviors targeted. An "X" indicates the start of the Intervention Phase for the second 4 targeted behaviors.

Figure 9. Performance Data and Trendlines for All Participants

represented as percentage of tasks begun. Each participant was given a list of 15 tasks to complete during their 15-minute session. The number of tasks that were begun during each session was divided by 15 and then multiplied by 100%. No participant completed all of the tasks, but all of them did begin to work on the last task on several occasions (represented as 100%).

Exit Interviews

Below is a list of the questions asked of each participant at the end of the last session and a summary of their answers. Participant 8B did not attend the last three sessions, and therefore, was not available for the exit interview. Each question listed is followed by the answers given by each participant. Often the same answers were given by more than one participant, and each set of answers is represented by the letter "A" and the numbers "1" through "6".

Q1 (Question #1): What did you think this study was about? (Answer 1) given by participants 1A, 3A, 7B: safety in the office, (A2) participant 2A, 5B: office safety after the presentation of the information sheet, (A3) participant 4A: office safety and how bringing it to one's attention changes behavior, and (A4) participant 6B: the correct procedures to do things shown in the video.

Q2: What did you think was being measured? (A1) participants 1A, 2A, 3A, 4A, 7B: my safety on the behaviors we were given information on (on the information sheets and checklists), (A2) participant 5B: only the behaviors that I increased safety on, not the other behaviors even if they were on the checklists, and (A3) participant 6B: how accurately I scored the videos and how safely I performed.

Q3: Did you find yourself thinking about what you had to do correctly throughout each session? (A1) participant 2A: not in words, the video played in my mind while I did my work, (A2) participants 1A, 4A, 6B, 7B: after watching the videos I thought about doing this safely, (A3) participant 3A: I only thought about performing safely at the start of each session, and (A4) participant 5B: I thought about what each definition stated.

Q4: What did you think the purpose was behind scoring the videos? (A1) participant 1A: not sure, (A2) participant 7B: to show us how we were supposed to perform, (A3) participants 3A, 4A, 6B: to see if we knew the differences between safe and unsafe behaviors, and (A4) participants 2A, 5B: to remind me how to perform safely.

Q5: Do you think your performance changed throughout the study? (A1) participants 1A, 4A, 7B: yes, I was much safer, (A2) participants 2A, 6B: yes, I was much safer, even outside of the lab, (A3) participant 3A: yes, I was safer on the easiest behaviors to change, such as lifting, but not on the typing stuff because it was hard to do safely, I was even safer at home and (A4) participant 5B: there was very little change in my performance.

Q6: Why do you think your performance did/did not change? (A1) participants 4A, 6B: because I knew what was being measured after watching the videos, (A2) participant 7B: because I learned the correct behaviors by watching the videos, and (A3) participants 1A, 2A, 3A, 5B: not sure.

Q7: (If performance changed) Was there something that occurred that made you change your performance? If yes, what was it? (A1) participant 1A: not sure, (A2) participant 2A: scoring the video helped me think about being safe, and I compared myself to the person in the video, (A3) participant 3A: when you gave me the list of behaviors being measured on the information sheet, (A4) participant 4A: seeing the difference between safe and unsafe on the video, (A5) participant 5B: the information sheet helped me change, but watching the videos helped even more, and (A6) participants 6B, 7B: I just figured out what was being measured.

Q8: Was there something you said to yourself during each session? If yes, did this change throughout the course of the study? (A1) participants 1A, 3A, 5B: not that I can think of, (A2) participant 2A: no, I'd just picture the video in my mind, and (A3) participants 4A, 6B, 7B: only when I'd catch myself being unsafe, then I'd tell myself, "I'm not supposed to be doing this", or "I have to do this correctly".

Q9: Did you find yourself wanting to be given information/feedback about your performance? (A1) participants 3A: yes, I thought I was the control subject because I wasn't being given feedback, (A2) participants 1A, 2A, 5B: only when I first started the study, then I pretty much knew how well I was doing, and (A3) participants 4A, 6B, 7B: no, because I knew I'd be told at the end of the study.

Q10: How do you think receiving information/feedback would have changed your performance? (A1) participant 3A: not sure if it would've changed my performance, (A2) participant 6B: probably not because I already knew how safe I was performing, (A3) participants 1A, 5B, 7B: I would've been safer right away, (A4) participant 4A: it would've changed my performance before the videos did, and (A5) participant 2A: I don't think it would've changed my performance because the videos were very effective at changing my performance.

Interobserver Agreement

Agreement between observers averaged 96.9% (SD: 2.4; range: 89% to 100%) and can be seen in Figure 10.

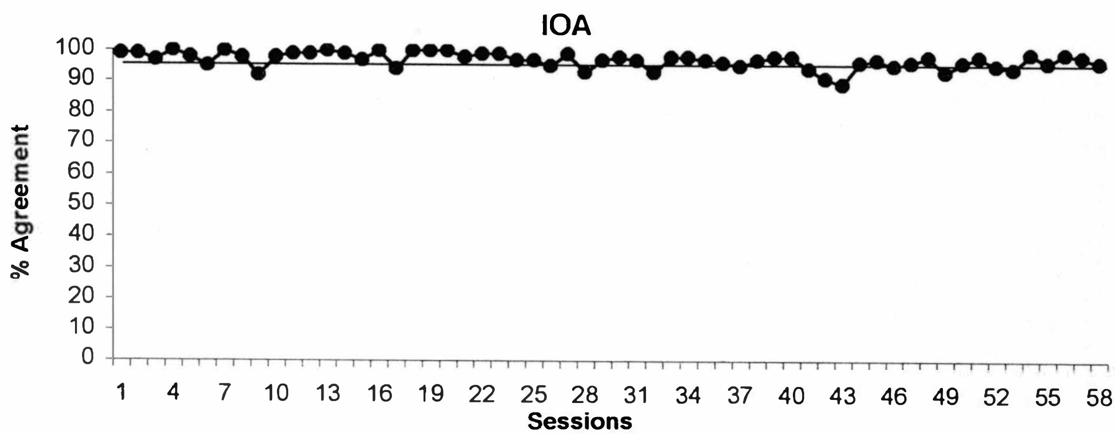


Figure 10. Percent Agreement Between Data Collectors.

DISCUSSION

The purpose of this study was to determine if the process of conducting observations has an effect on the observer's safety performance. Although the trends in safety performance varied, overall there were substantial improvements in performance during the observation phase. Does this mean that conducting observations has an effect on observer performance? Under the specific conditions of this laboratory experiment, the answer is yes. This is a first step toward answering whether or not such an effect would exist in an applied setting. Analyzing the results of this study and suggesting further research will place us even closer toward understanding the strength of the observation process in behavior-based safety.

The Overall Effects of Information

The information phase had varied effects on performance across participants: no effect, a temporary effect or a strong effect. Thirty-two target behaviors across eight participants were exposed to the information phase. During this phase, safety performance remained the same as in baseline for twenty-five of the behaviors. Temporary increases were observed in the following three behaviors: (a) participant 2A, lifting: knees; (b) participant 3A, lifting: knees; and (c) participant 4A, typing: neck. These increases were followed by gradual decreases toward baseline performance. Significant improvements in performance occurred in four behaviors: (a) participant 5B, sitting: feet on the floor; (b) participant 6B, sitting: feet on the floor; (c) participant 7B, sitting: feet on the floor; and (d) participant 8B, sitting: feet on the floor. It is likely that significant improvements occurred in this behavior because it was the least effortful behavior to engage in.

The Overall Effects of Conducting Observations

There were three observable trends in performance as a result of conducting observations: no improvements, gradual improvements, and dramatic improvements in safety performance. No improvements were observed for participant 5B (Figure 5) on the two behaviors involved with lifting: back alignment and knee bend. It is important to mention that throughout the entire study this participant did not get up from the chair to lift the box that was located across the room. The room was equipped with a chair that had wheels, therefore, participant 6B (a) "wheeled" herself to the box, (b) picked it up, (c) placed it on her lap, (d) removed the necessary materials, (e) placed the box back onto the ground, (f) and then "wheeled" herself back to the desk. These steps did not vary across phases. Although the target behaviors of lifting with back straight and bending at the knees were not observed, they were marked as "unsafe" because the lifting task was completed in an unsafe manner. Therefore, because the target behaviors were not observed it is difficult to offer a sound analysis on this particular finding.

Gradual improvements in performance were observed at least once in each target behavior, but this trend occurred most frequently in behaviors involved with typing and lifting tasks. A clear example of this trend can be seen in the lifting performance of participant 1A (Figure 1). Back alignment and correct knee bends increased gradually across each session during the observation phase. Both behaviors remained at zero percent safe during the first session of the intervention, and gradually improved to 83% (back) and 100% (knees) safe during the last session of the phase.

Of the sixty-four behaviors targeted across eight participants, forty-two increased substantially after the implementation of the observation phase. The most dramatic of these "jumps" can be seen in the lifting performance of participant 6B (Figure 6). Both back and knee behaviors averaged 0% safe during baseline and 100% during the observation phase.

Possible Behavioral Functions

In short, it appears that, at least for the majority of behaviors, observing the safety performance of others increases the safe behaviors of the observer. What is not clear is why these increases occurred, or why they generally did not occur during the information phase. Another point of interest is why some behaviors increased from 0% safe to 100% safe while others gradually increased in safety. There are several behavioral mechanisms that could be responsible for the effects of conducting observations on safety performance and may help clarify the above-mentioned issues. Some of these possible behavioral functions include: (a) a rule generating function, (b) a conditioned establishing operation function and (c) an antecedent function.

Rule Generating Function

Several theories of rule-governed behavior exist that offer possible explanations for the effectiveness of the observation process used in this study. Malott (1992) suggested that rules describe indirect-acting contingencies (e.g., "If I finish by 5 p.m. I will be given a bonus of $50"), and the behavior is controlled by direct-acting escape contingencies (e.g., fear of not receiving the $50 bonus). These direct-acting escape contingencies are based on the theory that the "rule statement might function as a conditioned establishing operation (Michael, 1982) that establishes noncompliance with the rule as a learned aversive condition" (e.g., fear, anxiety or guilt) (Malott, 1992, p. 54). Using Malott's analysis, the dramatic changes in performance observed during the observation phase could be explained in the following manner: The participant stated a rule to himself or herself that described an indirect-acting contingency (e.g., "If I perform these behaviors safely I will be doing what the researcher wants me to do", or "I will not get hurt while performing these tasks"). Fear or guilt of displeasing the researcher or of being injured would have been responsible for the increases in safe performance. In other words, safe behaviors were controlled by a direct-acting escape contingency (e.g., fear/guilt of displeasing the researcher or fear/guilt of ruining the results of the study, or fear of strain or injury).

Agnew and Redmon (1992) suggested that rules "alter not just the evocative function of discriminative stimuli, but also the reinforcing or punishing functions of consequent stimuli" (p. 68). It is those altered stimuli which then directly control the behavior. Using this theory, an interpretation of my results would be as follows: Participants stated a rule to themselves (e.g., "If I perform safely, I will be less likely to be uncomfortable.") that altered the function of stimuli associated with working safely (e.g., the sensation of the chair being positioned too high for feet to reach the floor became a discriminative stimulus which affected the behavior of positioning the chair to an appropriate height, and the sensations associated with having the chair adjusted properly became a reinforcing stimulus); and, after the statement of the rule, such stimuli maintained the behavior of working safely.

Both of the above-described analyses may explain the "jumps" in safety observed in most target behaviors during the observation phase, but they do not as easily explain the gradual increases that occurred. Rule control is often attributed to the response patterns of verbal humans (Agnew & Redmon, 1992), which differ significantly than those observed in nonhuman subjects (e.g., a scalloped pattern, etc.) (Bentall, Lowe, & Beasty, 1985). Thus, rules are often thought to be involved when performance increases dramatically.

Conditioned Establishing Operation Function

An establishing operation (EO) is a motivative variable that has at least two effects, (1) it alters the value of consequences, and (2) momentarily increases the frequency of behavior that has been correlated with the consequences whose value has been altered (Michael, 1993). A conditioned establishing operation (CEO) is a motivative variable that involves secondary or conditioned reinforcers instead of primary reinforcers such as food and water[1] (Michael, 1993). The observation procedure used in this study required participants to record aspects of another person's safe behavior. This procedure (conducting observations) may have altered the value of several safety-related outcomes. For example, a participant might rest their feet on the legs of the table (unsafe behavior) because it is more comfortable than placing their feet flat on the floor (safe behavior). Conducting observations on another person's safety performance, specifically feet position, might alter the value of safe feet position, making it less aversive (or less uncomfortable). It might be the case that the feeling of both feet flat on the floor could become a positive consequence, signaling the successful performance of the behavior being observed, thereby evoking behavior (placing feet flat on the floor) that produced that consequence. In summary, the observation process may be viewed as a motivative variable that has the following two effects: (1) it alters the value of consequences such as safe body positions (e.g., feeling of both feet flat on the floor), making them less aversive, and (2) momentarily increases the frequency of safe behaviors (e.g., placement of both feet on the floor) that have been correlated with the consequences whose value has been altered.

Antecedent Function

Conducting observations may serve one of several antecedent functions: (a) task clarification, (b) a reactive effect, or (c) a self-modeling technique.

Task Clarification

When a participant is asked to record specific aspects of a confederate's performance, observing those behaviors may clarify performance expectations. Viewing the observation procedure in this way would mean that the procedure's effectiveness would be determined by the degree to which the confederate correctly demonstrates the targeted behaviors. If the observation process primarily works in this way I would not expect to see a change in the observer's safety performance when they observe others performing unsafely at all times (a condition that was not presented in this study). Therefore, the observation process would only have an effect on the observer's performance when he/she observes the target behavior(s) being performed correctly for some part of the time. During the exit interviews participant 4A specifically stated, "...seeing the difference between safe and unsafe behaviors on the video made my performance change", and participant 7B reported, "...I learned the correct behaviors by watching the videos". If the observation procedure serves as task clarification (a process that clarifies how a person is expected to perform) for the observer, the number of safe behaviors that must be observed in order to have an effect would be a crucial and interesting issue.

Reactive Effect

The reactive effect is an often cited explanation for the effectiveness of self-monitoring as an independent variable (Nelson et al., 1982) and may also explain the effectiveness of the observation process used in this study. As previously mentioned, there are three widely accepted views explaining reactivity. I will analyze the effects of the observation process from each of the three standpoints. Kanfer and Gaelick-Buys' (1991) theory might suggest that a participant would self-compare the confederate's performance on the target behaviors (e.g., "When I lift the box, do I bend my knees the way the confederate does?"), then they would self-deliver consequences contingent on their own performance of the target behaviors. In other words, the self-delivered consequences would maintain safe performance. Evidence of both the self-comparison of performance and self-delivery of consequences was reported by three participants of the current study during the exit interviews. Participant 2A stated, "comparing myself to the person in the video helped me become more safe"; evidence that they compared their own performance to that of the confederate. Participants 4A, 6B, and 7B reported when they caught themselves being unsafe, they'd tell themselves, "I'm not supposed to be doing this" or "I have to do this correctly"; in other words, they self-delivered consequences contingent on their performance. Rachlin (1974) might suggest that the recording response, the self-administered consequences, or a combination of the two serve as cues to "remind" the participant of the external environmental consequences (e.g., the avoidance of injury, the kinesthetic feelings associated with engaging in safe behaviors) that actually control response frequency. During the exit interviews, participants 2A and 5B both stated that they believed the purpose behind scoring videos was to "remind me how to perform safely"; providing evidence to support Rachlin's theory. Hayes and Nelson (1983) might add that the entire self-recording procedure (e.g., the video, the checklist, the target behaviors, the confederate's performance) serves as an initiator of reactivity. In other words, everything associated with the observation process would make more obvious the environmental consequences.

Self-Modeling

The definition of self-modeling, the positive change in behavior that results from viewing oneself on edited videotapes that depict only exemplary performance, suggests that it is a mechanism in its own right (Possell et al., 1999). Dorwick (1999) suggests that people learn from the observation of one's own successful or adaptive behavior (or images of it). Although self-modeling techniques involve the observation of oneself and the current observations involve the observation of others the techniques are analogous, and self-modeling may help provide an explanation for the effectiveness of conducting observations. Participants observed a confederate's performance, but the setting and tasks that the confederate engaged in were the same exact ones to which the participant was exposed. This suggests that perhaps the person depicted in the video is not as crucial as the content of what is observed. The self-modeling literature also suggests that only exemplary performance be depicted during observation. In the present study, participants observed both safe and unsafe behaviors, but they were never presented with a video depicting only unsafe behaviors. Therefore, it may be possible that the effectiveness of conducting observations lies in the observation of safe behaviors. In other words, participants learned how to perform safely by observing the confederate safely perform the target behaviors.

Only two of the above antecedent explanations, task clarification and self-modeling, may also explain (a) the gradual increases in safety observed in some target behaviors, and (b) why there were generally no increases in safety during the information phase. If the observation phase served as task clarification for the target behaviors, then it might be possible that participants did not fully understand the safety definitions provided in the information phase or they may not have had the knowledge or skills necessary to safely perform the target behaviors. In other words, conducting observations might have either (a) clarified exactly what was expected of the participants and/or (b) demonstrated how to safely perform the behaviors. The gradual increases in safety may be due to skill acquisition or learning. The self-modeling theory also suggests that participants learn how to perform by viewing exemplary performance (Dorwick, 1999). Both of these explanations strongly rely on the observation of safe performance, and neither would be appropriate if it were demonstrated that the effectiveness of conducting observations remains the same when participants are presented with videos depicting only unsafe performance.

Strengths and Weaknesses of the Study

This study is the first to systematically test the effects of conducting observations on observer performance in an attempt to answer the following question: "Is the BBS observation procedure an effective independent variable for the behavior of the observer?" Although this question cannot yet be answered, the results of this study provide support for an affirmative answer. The laboratory setting was both a strength and weakness of the study. Real-world issues were sacrificed, but the control over extraneous variables was strengthened. One major weakness of the study was that it was unable to separate the effects of information from the effects of conducting observations. Although the purpose of the information phase was to separate these effects, the acquisition of this information was not tested. Therefore, participants may have simply read the information, but it may have not provided the detail necessary to acquire the skills to perform these behaviors safely. This detailed information may have been provided through the safe actions performed by the confederate in the video. In other words, the participants may have acquired the information they needed to perform safely after viewing the first video. Another weakness of the study that may not have been eliminated by the information phase is the presence of demand characteristics. Studies conducted in a laboratory often encounter the problem of participants changing performance merely to "please" the researcher. The purpose of the information phase was to try to minimize the effects of these characteristics. In other words, by telling the participants what was being measured (using the information sheets) I attempted to separate the effects of demand characteristics from those of conducting observations. Unfortunately, the possible effects of these characteristics in this study are not very clear (e.g., Did safety increase as a result of conducting observations or because the participants learned what the researcher "wanted" to see?); therefore, it is more difficult to hypothesize why a change in behavior occurred.

The performance data for each participant provide important strengths of the current study. Although future research is required to determine the behavioral function(s) of conducting observations, this study suggests that ergonomic safety does not negatively affect productivity. The performance data of all eight participants show that performance does not decrease as safety behaviors increase. The development of exit interviews is a strength of the study, and these provided critical information concerning the possible reasons for behavior change. The answers provided by the participants helped the experimenter to hypothesize regarding the possible behavioral functions responsible for their increased safety performance. Strengths also lie in the dramatic and clear effects demonstrated in the observation phase. These substantial effects seem to indicate that some sort of an "observer effect" exists, providing support for the continuation of this type of research.

Future Research and Applied Implications

Although the current research suggests that an observer effect exists, future research should "build" on this laboratory experiment to provide stronger conclusions. For example, a study similar to this one could be conducted in an applied setting. If safety performance increases as a result of conducting observations, then other studies may attempt to deconstruct the observation procedure to determine what part of the process is responsible for this change and why. For instance, a difference may exist between the effects of "observing" and "scoring". Would increases in safety occur if a person were to merely observe or watch another employee, or is the key in the actual behavior of scoring another person's performance using a checklist? As previously suggested, it may be of value to conduct a similar laboratory study and have all observations be conducted on at-risk behaviors. In other words, would an observer's safety performance increase if they only observed at-risk behaviors? The answer to this question may assist in our understanding of the behavioral functions responsible for the effectiveness of conducting observations. The exit interviews developed for the present study were perhaps a step in the right direction, but future interviews should be designed to obtain more detailed information from the participants. For example, participants could be asked, "Did you understand the information provided in the information sheets enough to demonstrate those behaviors?" and "Did the confederate's performance teach you how to perform the target behaviors safely?" Or, they could be asked to demonstrate each behavior after receiving the information. Answers to these questions may contribute to our understanding of the behavioral functions responsible for the behavior changes.

As stated above, the next step should be to conduct a similar study in an applied setting. If the observer effect does exist in applied settings, then it may be valuable to bring the research back to the lab for a more careful analysis of its critical components and why it works. The practical implications of such an effect would significantly aide practitioners in their application of the most effective behavior-based safety process. If an observer effect exists, practitioners may want to "adjust" their method of BBS implementation to account for it. In other words, it may be of practical worth and importance to have all employees conduct observations. It is important to note that the effectiveness and significance of feedback is not being undermined, and the author is not suggesting implementing one or the other (feedback vs. conducting observations) as an intervention. There are not data to suggest that one is more effective than the other, but conducting observations may add significant value and effectiveness to the behavior-based safety process.

FOOTNOTES

[1]A surrogate CEO is an exception to this definition of a CEO. According to Michael (1993), it is quite plausible a CEO can be paired with an unconditioned establishing operation (UEO) and come to affect the reinforcing effectiveness of the unconditioned reinforcer originally affected by the UEO and evoke the behaviors that were evoked by the UEO. In other words, it is possible that CEOs can affect the reinforcing effectiveness of unconditioned reinforcers and evoke behaviors that have resulted in them in the past.

Appendix A

Safety Information Sheet Provided to Participants in Group A

OFFICE SAFETY

WHEN LIFTING AND/OR PUTTING AN OBJECT DOWN

- ❑ Back should be straight: natural upright position throughout the lift, back should not be parallel to the floor, no twisting
- ❑ Knees should be bent: slight bend at the knees (120° angle is recommended)

WHEN TYPING

- ❑ Wrist position should be in line with elbows, not bent
- ❑ Neck position should be aligned with the back, eyes should be level with the screen & document

______________________________________ ____________________

Participant Signature Date

Appendix B

Safety Information Sheet Provided to Participants in Group B

OFFICE SAFETY

WHEN SITTING

- ❑ Back should be upright: parallel to the back of the chair (not leaning against it)

- ❑ Shoulders should be aligned with the back: shoulders in line with the back, not slouched forward

- ❑ Both feet should be flat on the floor: ball and heel of each foot should touch floor

WHEN USING A PHONE

- ❑ Neck position should be aligned with the back

______________________________________ ____________________

Participant Signature Date

Appendix C

Safety Checklist Used to Collect Data on Participants' Performance

Date:

Participant #:

Session:

BEHAVIOR	SAFE/ UNSAFE										#S / #S+U	% SAFE
LIFTING/PUTTING DOWN												
Intervals	1	2	3	4	5	6	7	8	9	0		
Back Straight – natural upright position throughout the lift, back is not parallel to the floor, no twisting												
Knees bent – slight bend at the knees (120° angle is recommended)												
TYPING												
Wrist Position – – in line with forearms & elbows (not bent upwards or downwards)												
Neck Position – aligned with the back, eyes should be level with the screen & document												
SITTING												
Back Upright - upright, parallel to the back of the chair (not leaning against it)												
Shoulders Aligned with Back – shoulders in line with the back, not slouched forward												
Both feet on the floor – both feet should be flat on the floors (ball of foot and heel should touch floor)												
PHONE												
Neck Position – neck should be aligned with the back												

S: Behavior was performed Safely U: Behavior was performed Unsafely

Appendix D

Safety Checklist Used by Participants in Group A to Score Video

Date:

BEHAVIOR	SAFE	UNSAFE	NOT OBSERVED
LIFTING/PUTTING DOWN			
Back Straight – natural upright position throughout the lift, back is not parallel to the floor, no twisting			
Knees bent – slight bend at the knees (120° angle is recommended)			
TYPING			
Wrist Position – in line with elbows, not bent			
Neck Position – aligned with the back, eyes should be level with the screen & document			

Appendix E

Safety Checklist Used by Participants in Group B to Score Video

Date:

BEHAVIOR	SAFE	UNSAFE	NOT OBSERVED
SITTING			
Back Upright – upright, parallel to the back of the chair (not leaning against it)			
Shoulders Aligned with Back – shoulders in line with the back, not slouched forward			
Both feet on the floor – both feet should be flat on the floors (ball of foot and heel should touch floor)			
PHONE			
Neck Position – neck should be aligned with the back			

Appendix F

Safety Checklist Used by Participants in Both Groups to Score Video on all Target Behaviors

Date:

BEHAVIOR	SAFE	UNSAFE	NOT OBSERVED
LIFTING/PUTTING DOWN			
Back Straight – natural upright position throughout the lift, back is not parallel to the floor, no twisting			
Knees bent – slight bend at the knees (120° angle is recommended)			
TYPING			
Wrist Position – in line with elbows, not bent			
Neck Position – aligned with the back, eyes should be level with the screen & document			
SITTING			
Back Upright – upright, parallel to the back of the chair (not leaning against it)			
Shoulders Aligned with Back – shoulders in line with the back, not slouched forward			
Both feet on the floor – both feet should be flat on the floors (ball of foot and heel should touch floor)			
PHONE			
Neck Position – neck should be aligned with the back			

Appendix G

Script of the Oral Description of the Study Read to Participants at the Start of the Information Phase

To be read by either the graduate researcher or the undergraduate research assistant.

"The purpose of this study is to observe individual safety behaviors in an office environment. Here's a list of the behaviors and their definitions to give you a better understanding of the study. Take a moment to read over this information before going to work in your office."

Appendix H

Oral Recruitment Script

"Hi, my name is Alicia Alvero and I am conducting a research study. The purpose of my visit to your classroom is to recruit participants. In order to qualify as a participant, you must be around during the Spring session. Participation would involve performing some office tasks such as typing, using the phone and lifting a small, box containing a few pieces of paper. Sessions will last between 15 to 30 minutes and I need students to perform approximately 25 sessions over about 3 to 8 weeks. You can schedule up to 2 sessions a day, with a minimum of a 2 hour break between sessions. Therefore, the exact length of participation will vary from student to student, depending on your schedule. Participants will be paid $5 an hour, the minimum you will be paid per session is $2.50. If you are interested in participating, please put your name on the sign-up sheet that I will pass around the class. Please indicate the easiest way to reach you, either phone or email. Again, remember that you must be around during the Spring session in order to participate. Thank you for your time."

Appendix I

Instructions for Tasks to be Performed by Participants

INSTRUCTIONS

For the purpose of this study, your role is an undergraduate assistant to a graduate student. You will be required to do the following: 1. make phone calls on behalf of the graduate teaching assistant (TA), 2. collect certain handouts/applications for the TA and 3. type certain parts of a manuscript using Microsoft Works.

1) **Dial 385-8164 and leave the following message**:

   Hi, I'm calling on behalf of your PSY 098 TA and here is the definition that you requested: Cumulative recorder. A commonly used laboratory instrument that records the frequency of operant behavior in real time. For example, paper is drawn across a roller at a constant speed, and each time a lever press occurs a pen steps up one increment. When reinforcement occurs, this same pen makes a downward deflection. Once the pen reaches the top of the paper, it resets to the bottom and starts to step up again.

2) **Type the following in Microsoft Works:**

   Participation Requirements. The testing material will require that you perform simple addition and subtraction problems, therefore it is important that you are able to answer simple addition and subtraction problems quickly and accurately. It is also important for you to be able to quickly and legibly write both numbers and letters.

3) **Place the box** on the chair and remove the Thurgood Marshall Application. Place the box back on the ground and place the application on the table.

4) **Type the following in Microsoft Works:** (continue where you left off)

   During today's introductory session, your eligibility to participate in the study will be determined. To participate: (a) you must be a Junior or Senior level college student, (b) cannot be a mathematics major or minor, (c) be able to correctly answer at least 55 addition problems per minute, (d) be able to write numbers and letters at a rate of 130 or more per minute and (c) be able to attend scheduled sessions.

5) **Place the box** on the chair and remove the Resident Application from the box. Place the box back on the ground and place the application on the table.

6) **Dial 385-8164 and leave the following message**:

This message is from Dr. Garcia. Here are the definitions that you need: Discriminated avoidance. Avoidance behavior that is emitted as a function of a warning stimulus. For example, a dog stops barking when its owner shouts, "Shut up". Differential response: When an organism makes a response in one situation but not in another, we say that the animal discriminates between the situations and makes a differential response. Direct replication: The exact replication of an experiment.

7) **Type the following in Microsoft Works:**

Explanation of Study Procedures. In order to assure that participants all have similar prerequisite speed and accuracy for writing letters, numbers, and answering addition problems, you will be required to write letters and numbers at a rate of at least 160 per minute, and correctly answer 80 addition problems per minute. If you did not reach these goals in the introductory session, you will be scheduled for extra sessions to practice.

8) **Place the box** on the chair and remove the ABA Membership form from the box. Place the box back on the ground and place the form on the table.

9) **Dial 385-8164 and leave the following message:**

This is your undergraduate TA for PSY 300 and I'm having problems with my email account so I'll have to give you the definition over the phone. Echoic: When there is point-to-point correspondence between the stimulus and response, verbal behavior may be classified as echoic. A further requirement is that the verbal stimulus and the echoic response must be in the same mode (auditory, visual, etc.) and have exact physical resemblance. An echoic is a class of verbal operants regulated by a verbal stimulus in which there is correspondence and topographic similarity between the stimulus and response. Saying "this is a dog" to the spoken stimulus "this is a dog" is an example of an echoic response in human speech.

10) **Place the box** on the chair and remove the Doctoral Fellowship Application from the box. Place the box back on the ground and place the application on the table.

11) **Type the following in Microsoft Works:**

Circumstances that may lead to the termination of your participation. Because it is important that all participants have similar prerequisite skills for writing numbers and letters and answering addition problems, if you do not reach the goal of 160 per minute for writing letters and numbers , and 80 per minute for answering addition problems after 5 sessions, you will be dismissed from the study.

12) **Dial 385-8164 and leave the following message**:

This message is on behalf of Dr. Martinez. Here is the definition that you need: Cumulative recorder. A commonly used laboratory instrument that records the frequency of operant behavior in real time. For example, paper is drawn across a roller at a constant speed, and each time a lever press occurs a pen steps up one increment. When reinforcement occurs, this same pen makes a downward deflection. Once the pen reaches the top of the paper, it resets to the bottom and starts to step up again. Good Luck on the exam and sorry that it took so long to get a hold of you.

13) **Place the box** on the chair and remove the OBM Network Membership Form from the box. Place the box back on the ground and place the form on the table.

Appendix J

Script of Oral Instructions Provided to Participants
at the Start of Baseline

To be read by either the graduate researcher or the undergraduate research assistant.

"For the purpose of this study, Room 2513 will serve as your office. You will be required to work in your office and the instructions I handed you are a list of the things you will have to do. Follow the instructions in order starting with #1. After 15 minutes of work, I will knock on the door to signal the end of your session. At that time, come back to this room for payment.

You can take as many breaks as you need. Restroom and water fountains can be found outside the room to the right. If, at any time throughout the session you feel tired, you are encouraged to take a break."

Appendix K

Script of Oral Instructions Given to Participants Concerning Conducting Observations on 4 of the 8 Target Behaviors

To be read by either the graduate researcher or the undergraduate research assistant.

"Before going to work in your office today, I'd like you to observe a 5 minute video of a person working in an office setting. Here are the behaviors you will be looking for (hand them the checklist). When you observe the behavior, immediately score it as safe or unsafe by placing a check in the appropriate box. Each time the behavior is observed put a check in the corresponding box. If the behavior is not observed after the 5 minute session, check the box labeled 'Not Observed'. After watching the video, turn the checklist over to me and then go into your office and start your work for the day. Now take a few minutes to familiarize yourself with the checklist, and let me know when you're done."

(Start the video after they've looked over the checklist)

Appendix L

Script of Oral Instructions Given to Participants Concerning Conducting Observations on all 8 Target Behaviors

To be read by either the graduate researcher or the undergraduate research assistant.

"Before going to work in your office today, I'd like you to observe a 3 minute using a different checklist. This checklist has a few more behaviors. Take a few minutes to familiarize yourself with the checklist, and let me know when you're done and I'll start the video."

(Start the video after they've looked over the checklist)

Appendix M

Script for Consent Process

To be read by either the graduate researcher or the undergraduate research assistant.

"Before you begin participation in this study you must carefully read and sign a consent form. I will read over the consent form with you. If you have any questions concerning the information we go over, please feel free to ask them."

(Hand the participant a consent form and read it aloud to them.)

Then ask, "Do you have any questions? Please sign one copy of the consent form for my records, and keep the other copy for your records."

Appendix N

Consent Form

WESTERN MICHIGAN UNIVERSITY
DEPARTMENT OF PSYCHOLOGY

Observing Performance in an Office Setting

Alicia M. Alvero and John Austin
WESTERN MICHIGAN UNIVERSITY

My name is Alicia Alvero and I am a graduate student in the Department of Psychology at Western Michigan University. You are invited to participate in a research study that will evaluate performance in a simulated office setting. This study will fulfill my thesis requirement.

Explanation of Study Procedures. You will be given a set of instructions describing the office tasks that you are asked to perform. The tasks will involve each of the following: lifting an empty box onto a desk, using the telephone to leave a message or typing information using a computer word processor. No sessions throughout the study will last more than 30 minutes. You can schedule these sessions as often as 2 times a day, with a minimum of 2 hours between the sessions. Sessions can be scheduled any day from Monday to Saturday.

Payment. You will receive $5.00 an hour for participation in this study which will be rounded up to the nearest half-hour, so the least you will receive for a session will be $2.50.

Benefits. You will not receive any direct benefits for participation, except the money you earn.

Risks. Because the tasks involved in this study are ones that students perform frequently, this research involves no risk greater than that in your daily life. During sessions you may experience minor fatigue. This will be offset by allowing you to take breaks if you feel tired. As in all research, there may be unforeseen risks to the participant. If an accidental injury occurs, appropriate emergency measures will be taken; however, no compensation or additional treatment will be made available to you except otherwise stated in this consent form.

Confidentiality. All information obtained in this study will remain strictly confidential. A number will be assigned to you and will be used to identify your data. When results are publicly presented, you will not be identified. By signing this consent form, you will be giving permission for data obtained in this study to be presented in professional presentations and publications.

Voluntary participation. Your participation in this study is completely voluntary. You are free to withdraw at any time without penalty, and you will receive compensation for the amount of time you participated. Your participation in this study, or your withdrawal from it will not affect your grades in any courses. At the end of the study, the experimenter will answer any questions you have and explain how your data helped us learn more about performance in an office.

Who to contact with questions. If you have any questions about this study you may call Alicia Alvero at 385-8164. In addition, Dr. Austin, my faculty advisor can be reached at 387-4495. You may also contact the Chair, Human Subjects Institutional Review Board at 387-8293 or the Vice President for Research, 387-8298 if questions or problems arise during the course of the study.

Your signature below indicated that you read the above information and agree to participate in the study.

____________________________ ________________
Participant Signature Date

Please keep the attached copy of this form for your records

This consent document has been approved for use for one year by the Human Subjects Institutional review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Subjects should not sign this document if the corner does not show a stamped date and signature.

Appendix O

Exit Interviews: List of Questions Asked to Participants at the Conclusion of the Study

To be read by either the graduate researcher or the undergraduate research assistant.

1. What did you think this study was about?

2. What did you think was being measured or observed?

3. Did you find yourself thinking about what you had to do correctly throughout each session?

4. What did you think the purpose was behind scoring the videos?

5. Do you think your behavior or performance changed throughout the study?

6. Your performance did/did not change throughout the course of the study. Why do you think this occurred?

7. (If performance changed) Was there something that occurred that made you change your performance? If yes, what was it?

8. Was there something you said to yourself during each session? Did this change throughout the course of the study?

9. Did you find yourself wanting to be given information/feedback about your performance?

10. How do you think receiving this information/feedback would have changed your performance?

Appendix P

Debriefing: Explanation of Study Given to Participants at the Conclusion of the Study

To be read by either the graduate researcher or the undergraduate research assistant.

This is a brief explanation of the purpose of this study. Feel free to ask any questions after I've given you the explanation.

The behaviors being measured were the ones on the checklist you used to code the video. Your safety performance was measured and monitored throughout the course of the study. The purpose of the study was to determine if your safety performance would change after you scored the video, or conducted observations.

Behavior-based safety is a safety process that requires employees to conduct observations on other employees. Employees receive feedback on their performance, but we were interested in determining the effects that conducting observations may have on the observers themselves.

Do you have any questions?

Thank you for participating in this study, your help is greatly appreciated.

Appendix Q

Protocol Clearance from the Human Subjects
Institutional Review Board

WESTERN MICHIGAN UNIVERSITY

Date: 28 May 1999

To: John Austin, Principal Investigator
Alicia Alvero, Student Investigator for thesis

From: Sylvia Culp, Chair Sylvia Culp

Re: HSIRB Project Number 99-04-20

This letter will serve as confirmation that your research project entitled "Observation Reactivity: The Effects of Conducting Safety Observations on an Observer's Safety Performance" has been **approved** under the **expedited** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: 28 May 2000

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