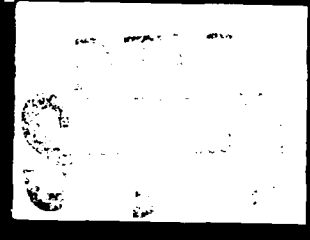
THESIS

WARNING LABELS: SAFETY COMPLIANCE AND THE EFFECTIVENESS OF AUDIO, VIDEO, AND WRITTEN INSTRUCTIONS

William D. Folk, Jr.



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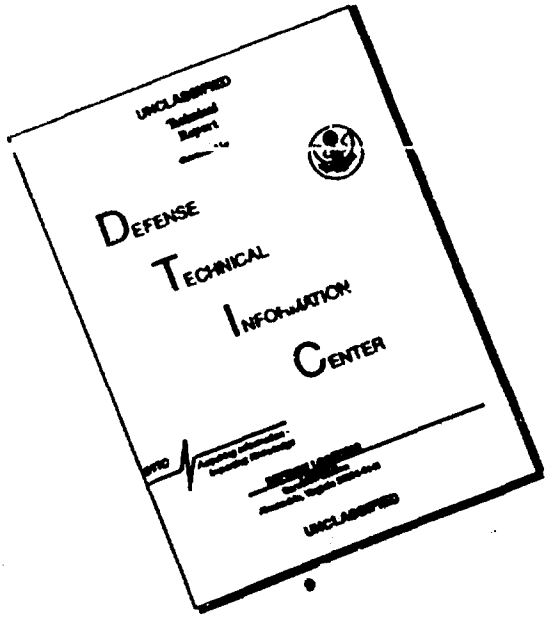

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This thesis entitled "Warning Labels: Safety Compliance and the Effectiveness of Audio, Video, and Written Instructions" and written by William D. Folk, Jr. is presented to the Graduate School of Clemson University. I recommend that it be accepted in partial fulfillment for the degree of Master of Science with a major in Applied Psychology.

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Thesis Advisor

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We have reviewed this thesis and recommend its acceptance.

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WARNING LABELS: SAFETY COMPLIANCE AND THE EFFECTIVENESS OF AUDIO, VIDEO, AND WRITTEN INSTRUCTIONS

A Thesis

Presented to

the Graduate School of

Clemson University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

Psychology

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by

William D. Folk, Jr.

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ABSTRACT

This research compared the effectiveness of three different consumer media of instruction on warning and safety effectiveness. The three methods of instruction were designed for an electric-powered leaf blower and included the traditional written owner's manual, an audio-cassette tape, and videotape. The subjects were told that this was an experiment to test different types of instructions for operation, maintenance, assembly, and safety procedures of the leaf blower. Each group was tested for compliance to warnings, knowledge of warnings, and perception of danger when using a leaf blower. The results showed that subjects from the Video and Audio conditions scored significantly higher on a test for knowledge of safety than those with the written instructions. Subjects in the Video condition scored significantly higher for compliance to warnings than those in the other conditions. The use of video and audio media can be used to increase the user's knowledge and compliance for safety.

DEDICATION

I dedicate this thesis to my wife, Jane, and our two sons, Justin and Zachary. They are my inspiration and my biggest fans. I am indeed blessed every day by their love and support.

ACKNOWLEDGEMENT

I would like to thank Dr. Nowaczyk for his guidance, professionalism, and sincerity. These qualities helped make my experience at graduate school less stressful, more productive, and enjoyable. I would also like to thank Dr. Reilly for her encouragement and high standards that made graduate school tough but fair. Finally, I thank Dot Kellett for her kindness and charm which was always available come rain or shine.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Warning Labels

Please do not swallow marbles, balloons, or drink coffee from Grandma's old china cup. From a hammer to multi-million dollar equipment, there is or should be a warning label for nearly every product designed. If not, there may be someone waiting to sue the manufacturer.

For years, companies claimed and the courts agreed with the "open and obvious" rule. If the danger or risk was obvious or in plain view to an ordinary person, the manufacturer was not required to warn the consumers. In 1991, this rule was challenged (Product Safety and liability Reporter, 1991). The challenger has been successful on some occasions and at other times unsuccessful.

A company who manufactures the cotton swabs to clean ears was recently sued, Stroth Kamp versus Chesebrough, MO Cir et, No. 882-02066, verdict returned 4-18-91 (Product Safety and Liability Reporter, 1991). In a Missouri Circuit Court in St. Louis, the jury awarded 1.5 million dollars to a five-year old boy who suffered permanent hearing loss and nerve damage. This child took a Q-tip from an unopened package and punctured his right eardrum. The plaintiff argued the package was not child-proof, and the Q-tips were dangerous. The manufacturer had failed in the design of the

package and to adequately warn of the risks in using a Q-tip.

The manufacturer successfully defended itself in over 40 previous cases involving Q-tips but lost this round. They argued to no avail that the risk was open and obvious. They also failed in their suit against the parents for neglect. The case is now pending appeal.

In Illinois, a state appeals court ruled in favor of the manufacturer in Smith versus America Motor Sales Corporation, I11 App Ct 1st Dist, No. 1-89-119, 6-14-91 (Product Safety and Liability Reporter, 1991). The plaintiff suffered a severe leg and foot injury when his jeep was broadsided by another vehicle. The plaintiff was resting his left foot on the footstep outside of the jeep's door. He contended that his leg was cramped and warm inside the jeep. The suit cited that poor design, failure to warn, and commercials advertising "cool people" with a leg or foot outside of the jeep contributed to the accident. The appeals court ruled in favor of the manufacturer stating that the risk was open and obvious to an average person.

While lawyers have grasped the significance of this situation, industry has failed to respond. "Management has made warning design the stepchild of the engineering department." (M. G. Moore, 1991, p. 23). Unappreciated and misused, many warning labels still do not serve the purpose or function that they are intended to perform. Warnings must modify or change people's behavior and in turn they

should reduce accidents and prevent unsafe actions (Peter, 1984).

Industry has increased the number and types of warnings, but compliance for warning labels are still often ignored. Waldman (1988) has called this the golden age of the warning label. We have reached a point where the consumer is being overly warned and therefore ignoring the warnings and efforts of industry (Dorris, 1991).

Historical Perspective

To understand the problems facing the design of effective warning labels, we must first gain an insight into the problem. Several studies have dealt with reasons why warnings are not effective. Purswell, Krenek, and Dorris (1987) cited four reasons why warnings are not effective.

First, there is the problem with information overload. The warning label has too many warnings, or a single warning is too long. In other cases, the warnings are spread throughout the instructions, and other information takes priority over the warnings.

Second, the problem of risk assessment or the benign experience of the user poses a problem. Some people simply do not believe that the danger or risk is real. The person has used the product or a similar product many times without injury.

Third, there are problems with comprehending the meaning of the warning. People do not always understand the language, technical terms, or the current hierarchy of

signal words, such as, danger, warning or caution. The reading comprehension level of the warning label should reflect a reading level for the fourth or sixth grade and not the twelfth grade.

Fourth, an effort must be placed on what is the best way of committing the warnings to memory. The warning is lost if it does not become part of long-term memory.

Partial attention is another reason cited for the failure to follow warnings. In studying over 150 accidents, Robinson (1991) discussed some factors that cause people to give only partial attention to warnings.

Warnings may appear well written and use plain language but can still be misunderstood. For example, "use adequate ventilation" can mean open a door or use only out-of-doors. The experts cannot agree exactly what this should mean or if its meaning should vary with the product.

When warnings refer to safety equipment that is not available or to situations that are unlikely, people will not take the warning seriously. Many owner manuals address using safety goggles when jump starting a vehicle, but no one provides safety goggles with a new vehicle. Sometimes, a lack of motivation causes people to ignore warnings. This is seen in warnings that appear to be in the wrong place. In an industrial plant, it is hard to justify a warning that states "keep away from small children". When warnings do not fit into the context of the work environment or if a request is made that one use safety equipment that is not

available, we are virtually guaranteeing that people will not give the warnings their full attention (Robinson, 1991).

Fifteen cardinal principles were developed by Peter (1984) to determine what was needed to make warnings effective. Peter discussed the purpose and criterion for warnings. Behavior modification should be the overriding purpose of the warning. The consumer must be made aware of the dangers and how to avoid injury. The criterion is met if the warning prevents injury or misuse of the product.

The designer or manufacturer must design a product that can be used safely or warns the consumer of any dangers or risks. The engineer must visualize how the consumer will use the product. The court will often rule in favor of the consumer who is confused about how to safely use a product. In the process of designing a product attention must be given to how the product can be misused, so action can be taken to correct the problem or warn the consumer (Ryan, 1984).

Warnings must be aimed at the consumer. The warning must be designed for the lower end of the target audience. Warnings are not designed for the average person but for the person most likely to misuse the product (Laughery and Brelsford, 1991). Some products will be used by both chemists, as well as, laborers. Warnings must be designed so all users can understand the dangers.

The Human Factors Society attempts to provide a summary update on research concerning warnings approximately every

other year. It attempts to provide direction in terms of theory and studies that may produce applicable findings.

The 31st Proceedings of the Human Factors Society published an article on product safety by Christensen (1987). Christensen stated that human factor psychologists must continually warn the engineers of the consumer's inability to recognize the dangers and the risks associated with misusing a product.

Christensen developed a Model for Development of Safer Products with five points. First, the design of a product must account for a wide range of the user characteristics. Second, the designer must work to remove all hazards. Third, if a hazard cannot be removed, a guard must be designed to prevent injury. Fourth, a warning must be developed that adequately warns all users and modifies behavior. The warning implies that the designer has not been able to eliminate a hazard through design. Fifth, training is needed to insure the consumer understands the product (Christensen, 1987).

The last point is often ignored, but very important. The typical hardware store sells many products that have a real potential for being dangerous. It should become the norm to provide training on the use of a stud gun, a riding lawnmower, or a power saw. "While experimental evidence is lacking, it is believed that appropriate warnings plus appropriate training will result in benefits to safety measured multiplicatively rather than additivity" (Christensen, 1987, p. 12).

Dejoy (1989) reviewed 30 articles that had a total of 40 separate studies and experiments between 1984 and 1988 that dealt with effectiveness of warnings. One conclusion was that warnings can influence user behavior. The problem is that in many experiments less than 40% of the users complied with the warnings. This leaves 60% who still did not understand or believe the warning. This indicates that there is much work to be done to convince people to comply with warnings.

The ability to convince people is affected by how they perceive the hazards and past familiarity with the equipment. If we can make the person understand the dangers and risks, the person is more likely to comply with the warning. Dejoy concluded that warnings may sensitize users to hazards, but do not alter or modify the behavior of many users. Second, while problems remain with well-designed warnings, a poorly designed warning is often useless.

Dorris (1991) reviews the results from past research. His first point attacks the effectiveness of research that only focuses on perception of risk or hazard and presentation of warnings, such as, format, signal words, colors, and symbols. While this is important, more work is needed in observing actual behavior that demonstrates behavioral changes due to warnings.

Second, Dorris takes a strong stand that excessive warnings do more harm than good. We must save our warnings for those high probability events. This point is perhaps the hardest to defend in light of the numerous lawsuits.

Third, fear tactics do not work for we cannot frighten consumers into complying with warnings. "To change behavior, a warning must, at a minimum, be seen, read, understood, believed, and complied with" (Dorris, 1991, p. 1076).

To conclude this section, it is important to look at warnings from two additional points of view. Moore, a lawyer who has handled over 200 cases involving product liability claims for injured patients, cites three problems with warnings (M. G. Moore, 1991). First, judges do not hesitate to tell the designer what is a legally sufficient warning. Second, management has invested only minimal resources to design and test warnings. Third, lawsuits cause knee-jerk reactions that do not solve the problem.

Moore's recommendations include more management involvement, adequate funding and testing, and field tests to be done with the users. The product needs to be studied qualitatively, quantitatively, and longitudinally. Finally, we must look to the other disciplines for help in the design process to include information theorists, linguists, psychologists, and graphic designers (M. G. Moore, 1991). These words echo what Christensen (1987) has been recommending.

The other point of view is from those who mend and fix broken bodies. Brondum, Spitalny, Waller, Herndon, and Vogt (1985), are physicians who studied snowblower injuries in Vermont during the winters of 1982, 1983, and 1984; they made three recommendations. First, there is a need for a

physical barrier over the blower chute to keep hands out. Second, manufacturers should send out annual safety reminders to owners before winter. Third, we can use mass media to re-educate users.

The first recommendation is a design problem. The last two recommendations could apply to many products that are used seasonally. More importantly, psychologists, lawyers, and physicians see the need for more work in educating the consumer about product hazards. The product and warnings must be tested before the product goes to the public for sale and use.

Laboratory Experiments

There are many ways to manipulate a warning label by itself. Experiments have tested the effectiveness of warnings at beginning or the end of the instructions. Others have tried various symbols and icons to attract the user's attention. The use of color, size of print, and highlighting have also been tested.

The following experiments have used college students in a laboratory setting. Most of the experiments have shown the test group performing better than the control group. The only caveat is that the test group seldomly performs better than 60% on compliance with the warning.

Desaulniers (1987) compared warning labels in outline form to warning labels in paragraph form. In the first experiment, the subjects stated which of the two warning

labels had greater eye appeal. The warning labels in outline format were rated as easier to process.

The second experiment tested for compliance. The subjects had to apply a fabric protector to a chair located in a small unventilated room. The warning required that the product be used in a well-ventilated area. Compliance with warning labels in outline format was 46% compared to 42% in paragraph format. This difference was not significant.

The third experiment inserted "do not use, if you have read this far" in the warning. Compliance for the outline format was 48% versus 16% with the paragraph format. This difference was significant. Desaulniers suggested that how we organize a warning is as important as the information that the warning conveys.

One would imagine that color and symbols might increase compliance. Rodriguez (1991) tested different colors and symbols in his research. He used red, green, and black as a neutral color, and for symbols, he used a triangle, octagon, or no symbol. The subjects were tested for compliance and retention. The task was to mix three chemical compounds.

For retention, the group using the red-colored label and an octagon answered 69% correctly on the retention test. None of the other conditions scored above fifty percent.

Compliance was tested in three ways. First, did the subjects use the safety goggles located on the lab table? Second, did the subjects use gloves located across the room? Third, did the subjects request a lab coat? Of the 98 subjects, thirty-eight subjects used the safety goggles,

nine used gloves, and no one requested a lab coat. Compliance was highest for the group with the octagon followed by the group with the triangle. Both of these groups performed significantly better than the group with no symbols.

Three points were noted from this experience. Color and symbols had an effect on both compliance and retention. Second, nothing worked in getting students to request a lab coat, and only nine subjects made the effort to walk across the room for the gloves. Third, there was a significant relationship between scores on the retention test and compliance. If one could remember the warning, the subject was more likely to comply with the warning.

The positioning of a warning at the beginning or the end of the instructions may have an effect on warning effectiveness. The signal word for a warning, such as, "warning" or "danger" may also have an effect. Wogalter, Godfrey, Fontenelle, Desaulniers, Rothstein, and Laughery (1987) tested these variables.

The researchers tested the signal words "warning" and "note" to see if there was a difference in compliance. Each signal word with its warning was tested by placing it at either the beginning or end of the instructions. The task was to mix chemical compounds.

The first experiment found little difference in compliance when comparing the two signal words. The positioning of the signal word did make a difference. The compliance was significantly higher with the warning placed

at the beginning of the instructions than at the end of the instructions.

The second experiment included an initial statement to please read all instructions before beginning. The warnings placed at the beginning still had a higher level of compliance, but the warnings at the end of the instructions with this statement did increase compliance.

Icons have been used to make warnings more noticeable. It may also help people who have problems reading. Young and Wogalter (1988) tested instructions and warnings using icons. They also used regular small print and conspicuous (enlarged) print.

The experiment included four categories: icons with conspicuous print, icons with small print, small print without icons, and conspicuous print without icons. The subjects completed a retention test concerning the warnings for a gas powered electric generator. The researchers used both a strict and liberal grading system. The subjects tested with icons and conspicuous print had a mean of .47 and .75 correct respectively. Subjects with plain print with icons present had .32 and .58 correct. The other two categories followed closely behind. The group using icons with conspicuous print was significantly better in performance than any of the three other categories.

There was no test for compliance. Young and Wogalter defended this position in that memory of warning information is critical because the user may not be able to refer back to the manual. Manuals and warnings must be designed to

enhance the ability of the user to notice and remember the warnings (Young and Wogalter, 1988).

Warnings are often imbedded into the instructions for items such as instruction manuals or on spray cans. The user must read the entire instructions to find the warnings. This method has been defended because of the importance of placing the warning next to the related instructions or because of a shortage of space on the label of a spray can.

Strawbridge (1986) tested the influence of imbedded warnings, highlighting a warning in orange and position of the warning on the label: top, middle, or bottom. The subjects used a product much like super glue.

The imbedded warnings were consistently poorer performers. Warning compliance with highlighted/unimbedded/ middle position and unhighlighted/unimbedded/bottom position had a 60% compliance rate. The worst compliance was with highlighted/imbedded/bottom position and highlighted imbedded/top position with both of these having 20% compliance. Imbedding was the only variable to have an affect on compliance. Warnings must be designed so the warning stands out from the other instructions (Strawbridge, 1986).

The studies presented in this section attempt to make the warnings stand out to the user. The use of outline format, conspicuous print, and warnings that are unimbedded in the text have shown some success in alerting the user. Icons, symbols, and the use of color have helped make warnings more noticeable. However, these studies have not

increased compliance over 60% which leaves room for improvement.

"Real-World" Studies

All experiments reviewed up to this point have used college students in a laboratory setting mixing fake chemicals, using a fabric protector, or shaking a bottle of super glue. While researchers are praised for their dedication and hard work, Laughery and Brelsford (1991) insisted that warnings must be designed for the lower-than-average user or the least educated. Experiments using "real people" in an actual working environment are few but very interesting.

There are some people that one hopes would be more safety conscious than others. First-time expectant mothers would fall into this category. McCarthy, Horst, Berger, Robinson, and McCarthy (1987) tested the new and old warning labels on infant car seats with first-time expectant mothers enrolled in a prenatal class.

The subjects were given five minutes to study the label for the car seat and given the opportunity to ask questions. The old label was written in plain text and located on the backside of the car seat. The new label used words and pictures and was located on the left side of the car seat and easily seen.

The subjects had to properly install the car seat in a vehicle. They were graded on positioning of the car seat, use of the seat belt to secure the car seat, and if they

adjusted the harness. The subjects had to adjust the harness so that a baby doll was safely secured in the car seat.

The old warning label had 70% of the subjects install the car seat correctly. The group with the new warning label had only 48% install the car seat correctly. The researchers were at a loss to explain this difference. The task of adjusting the harness to secure the baby doll accounted for 18 of the 22 errors. The researchers felt that perhaps the subjects did not take using the doll seriously enough. This concern for subjects not taking an experiment seriously is a common problem with testing for compliance with a warning.

Power tools, such as, drills, chain saws, and electric saws have a tendency to intimidate many people. When using such powerful tools, we are more inclined to think about our personal safety. The kickback hazard of a portable circular saw was studied by Moore and Rennell (1991) using a survey with 10 professional carpenters. This hazard causes the saw to jump back out of the cut in the wood and endanger the user.

The survey found that only half of these carpenters read manufacturer instructions. Only two carpenters could correctly identify the real reason for this hazard, and seven out of the ten carpenters believed that a blade guard would protect the user, which is false. The warnings for this saw tell the user to keep hands away from the saw blade and to hold the saw firmly, but it does not describe the

worst possible scenario, such as, the kickback hazard. Failure to understand the hazard and the inability of many warning labels to communicate hazards are major reasons why warnings do not work (Moore and Rennell, 1991).

Most people have flown in an airplane and have received the standard safety and in-flight emergency procedures from a stewardess. On all flights, passengers are directed to look at the passenger safety card during the briefing. Schmidt and Kysor (1987) collected 37 of the safety cards from various airlines.

The researchers reasoned that safety cards with words and diagrams integrated would be more effective than safety cards with just words. The experiment used 25 government workers who had flown at least once but not more than five times in the past year. The safety cards were put into one of five categories: (a) mostly words, (b) words and diagrams, (c) words integrated with diagrams, (d) mostly diagrams, and (e) words and photos.

For the experiment, five safety cards were used taking one safety card from each category. The subjects were given one of the safety cards and a safety briefing followed by a retention test. The category "mostly diagrams" had a mean of 85% correct followed by words with integrated diagrams with 76% correct. The category "mostly words" had the lowest percentage correct with sixty percent. While portrayed differently, each of the five cards provided the same information. The difference in the scores suggests

that presentation of material can influence our ability to retain information (Schmidt and Kysor, 1987).

The final experiment to be discussed used unskilled workers whose job was to unload and stack bags of asbestos. The experiment substituted granular limestone for asbestos. The warning label on each bag indicated the danger and need for respirators and ventilation.

Gomer (1986) used 17 men experienced at heavy loading and unloading. These workers handled 1600 bags of limestone each day for three days. On the third day, the bags contained the warning label for asbestos.

Previously on Day 2, three men had asked for respirators due to the dust thus indicating some of the men were safety conscious. On Day 3 with the warning labels, only three more men requested respirators. This was not a significant increase.

Gomer concluded that we need to train workers in how to interpret warnings. In addition, workers should receive training about the importance of complying with warnings. All 17 workers stated that they had noticed the warning label but only six workers complied. With unskilled workers or in times of high unemployment, some workers will believe that working any job is more important than safety.

These experiments represent a clear problem with effectiveness of warning labels. Whether the subject was a professional, unskilled worker, or an expectant mother, warning labels failed in their job to modify or change behavior.

Social Influence

There has been some interesting modeling research done with the use of confederates in experiments. If the confederate complies with a warning, we would expect the subject to comply with the warning.

Wogalter, Allison, and McKenna (1989) tested the use of confederates with compliance in two experiments. The first experiment had the confederate use gloves provided on a table for a chemistry task. Results showed all eight subjects also used the gloves. When the confederate did not use the gloves, only three of the nine subjects used gloves.

In the second experiment, the confederate had to ask for gloves. When the confederate asked for gloves, seven of the ten subjects did likewise. When the confederate did not ask for gloves, none of the subjects asked for gloves.

Wogalter et al. (1989) made several points in regard to these results. People will conform or copy what other people are doing. If one person is complying with the rules, others will do the same. Secondly, safety must be enforced in the work place, and proper safety equipment must be made readily available. Lastly, it is more effective to show people what to do than just tell them. Leading by example is the best way to have others follow.

Perception and Explicitness of Warnings

If the user does not perceive a danger or risk, they will not take a warning seriously. The warning must be

explicit and honest in warning the user about possible injuries. The dangers must also be communicated in such a way as to change the user's perception of the product.

Godfrey (1987) believed if a person sketched the worst possible accident that could happen with a product, their perception of risk would rise. The idea worked for a toaster, coffee maker, pesticide, bicycle, and lawnmower. It did not work, however, for a swimming pool, power saw, or asbestos.

The reasons for the scenario not working makes some important points. First, some products , such as, the power saw, naturally intimidate people. This product needs no introduction as to its dangers. Second, some people lack the knowledge to recognize a danger such as asbestos. The manufacturer or designer must educate the user as to the specific dangers and hazards of the product. The dangers of asbestos is not understood by most people. The user must be able to understand and visualize what the dangers are for a particular product (Godfrey, 1987).

Many times, people see a warning but do not know the real meaning of the warning or what actions to take. Leonard, Creel, and Karnes (1991) tested subject's understanding of 16 terms including flammable, poison, combustible, corrosive, and sensitizer. Performance was poor; for six of the twelve terms, over 50% of the subjects could not provide a correct explanation of the terms. For recommended actions, only four of the twelve terms had above 50% of the subjects to correctly state precautions to take.

The term vapor-harmful-flammable had the highest rating with 60.7% of the subjects correctly understanding the term.

Leonard concluded that we cannot assume that people understand warnings or recognize the dangers. Warnings must be tested with a representative sample of the user population. There needs to be more education for the general public about various hazards and how to handle dangerous situations.

To understand the hazards of a product, the user needs to know much more than just the warnings. J. L. Moore (1991) felt if the user had both the warning information and general information, this would increase the user's perception for hazards with the product.

Using a soft drink machine, subjects were given either the warnings for the machine, the system information which included everything but the warnings, or given both the warnings and system information. Moore reasoned that the subjects cold infer the dangers for the system if given just the system information. If given both sets of information, the person's perception of danger should increase.

The results showed few differences in perception for females regardless of the type of information given to them. All of the females had a good perception and understanding that rocking a coke machine could be very hazardous. For males, there was a significant increase in understanding of perception when both warnings and system information were given. This was the only category where males and females agreed on the perception of danger. J. L. Moore (1991) made

two points about the results. First, system information alone does not convey the danger to the consumer. Second, if the user has both system information and warnings, the user should have a better overall understanding of the product and the hazards.

When it comes to danger, a persons biggest concern is how badly will they be hurt. The more severe the injury, the more likely people will comply with the warning (Young, Brelsford, and Wogalter, 1990).

When faced with an unfamiliar product, people want more information about the product. Vaubel and Brelsford (1991) tested unusual products with both explicit and non-explicit warnings. The subjects were more likely to prefer explicit warnings when the product was unusual or the severity of the injury was great. The results suggested that when faced with uncertainty about potential harm, people prefer more detailed information.

Wogalter and Barlow (1990) determined the severity of an injury was more important to people than the likelihood of injury. Subjects were tested for compliance in a lab experiment. The significant finding was the comparison of low likelihood and low severity; for example, "contact with the skin can cause mild skin irritation" had a 44% compliance compared to low likelihood and high severity "contact with skin can cause intense skin irritation" which had 81% compliance. Warning communication should focus on how badly a person can get hurt, rather than on the likelihood of getting hurt. Wogalter and Barlow (1990)

concluded that warnings must still be realistic in describing the injury.

Training Videos

This section reviews two studies where the use of training videos increased compliance significantly. These studies demonstrate the value of using a role model to perform a task in a safe manner.

Chy-Dejoras (1992) tested compliance and risk perception using a six-minute step-by-step instructional video for tiling floors. The key step dealt with using protective gloves when applying adhesive remover to the tiles.

The test condition had two independent variables. The first independent variable had two levels of modeling. One level, Non-Protective Modeling, had the model not using protective gloves. The second level, Protective Modeling, had two models with one of the models wearing protective gloves and the other model not wearing the protective gloves.

The other independent variable had three levels of aversiveness of vicarious experience. One condition, No Aversion, had the model performing all steps correctly. The second condition, Slightly Aversive, had the model spilling the adhesive remover and expressing verbal pain. The third condition, Highly Aversive, had the model spilling the adhesive remover followed with a shot of a burned hand.

The factorial combination of the independent variables produced six versions of the video with 10 subjects tested in each condition. An additional control group had 16 subjects who were given no instructions except the warning label. The subjects were stopped prior to actually applying the adhesive remover, and the gloves were provided next to the can of remover.

Compliance for the Protective Modeling conditions had 87% compliance compared to 50% for the control group and 57% for the Non-Protective Modeling condition. To the author's surprise, the Slightly Aversive condition had 90% compliance as compared to 60% compliance for the Highly Aversive condition. The results suggested that modeling protective behavior can increase compliance. Furthermore, when depicting an accident, compliance is not increased by showing people injured in a way that might not seem real.

Racicot and Wogalter (1992) tested the use of video and voice warnings to increase compliance. The subjects were required to mix certain substances in a laboratory experiment. Plastic gloves and face masks were provided on a table next to the experiment.

There were three conditions. The Warning Sign condition consisted of a 30-second screen shot of a warning sign. The second condition, a Role-Model Video, had the warning sign and a man putting on a mask and gloves. The third condition had the warning sign, Role-Model Video, and a voice warning.

The results had 50% compliance for the Warning condition, 92% compliance for the Role-Model Video, and 100% compliance for the Combined-Information condition. Racicot and Wogalter concluded that this was support for the use of video training films where a model performs a task safely. Videos could be used for employee safety programs and consumer products used in the home.

Summary

The attempt to make warnings more noticeable have led to the use of icons, symbols, different colors, outline format, and conspicuous print. These designs have tried to capture the users attention and make them more aware of the dangers. Dejoy (1989) has found that industry is taking these steps, but while the user is more sensitized to the hazards, the improved warnings have not improved compliance to any great degree.

Studies that have tested actual users have reported even more dismal results for compliance to warnings that do laboratory studies. Compliance as ranged from 35% (Gomer, 1987) to 48% (McCarthy et al., 1987).

To increase compliance, the user must also believe and understand the warning. In some cases, people do not understand the dangers of a product (Godfrey, 1987), or people do not understand the terms used in the warnings (Leonard, Creel, and Karnes, 1991). The most effective method to increase compliance is for people to see another person performing a task safely (Wogalter et al., 1989).

This has been demonstrated further with the use of videos (Chy-Dejoras, 1992; Racicot and Wogalter, 1992). The videos provide an example of how to safely perform the task and ease the burden for understanding written instructions.

Current Study

The success with using role models and videos is encouraging. However, these studies (Wogalter, et al., 1989; Chy-Dejoras, 1992; Racicot and Wogalter, 1992) have three problems in common. First, the possible problem of demand characteristics exists. The subjects viewed the warnings and then performed the task with the safety equipment provided in plain view. The subjects may have anticipated the purpose of the experiment by seeing the safety equipment in front of them. Second, the tasks were to use an adhesive remover and the other, mixing chemicals. These do not represent common tasks performed by people on a routine basis. Third, the tasks had only one or two warnings to consider. In reality, many products have multiple warnings which could be much harder to remember than one or two warnings.

The present study was designed to replicate and extend the research done with training videos to increase compliance. It used a handheld electric blower that had 39 warnings. To reduce the possibility of demand characteristics, no safety equipment was provided until subjects asked for the equipment. Furthermore, the electric

blower is a rather common garden tool used by many families, and it as a large range of warnings to consider.

The study had three dependent variables. The first dependent variable was to test for compliance. The second dependent variable was a safety test to determine retention of safety knowledge, and the third dependent variable was a survey to measure perception of risk.

In addition to the Control condition with written instructions and the Video condition, an Audio Tape condition was included. If a video is developed properly, it can be quite expensive. Should the audio cassette tape produce the same result as the video, it can be produced at a lower cost than the video.

This research effort will test two hypotheses for the perception of danger and the retention and compliance with warnings.

Hypothesis One

The retention and compliance to warnings and perception of danger will increase if the user is given an audio or video tape of the operation of a leaf blower instead of the written owner's manual. This is based on the research findings of Chy-Dejoras (1992) and Racicot and Wogalter (1992).

Hypothesis Two

The video tape will increase the perception of danger and the retention and compppliance to warnings more than the audio cassette. This hypothesis is based on the fact that

the video provides a richer media for modeling safety behavior.

CHAPTER II

METHOD

Subjects and Design

Sixty Clemson undergraduate students from an introductory psychology course were used in this experiment. Participation was voluntary, and the subjects received extra credit for participation. There were no additional requirements, skills, or qualifications needed to participate in the experiment. Each of the three conditions had 20 subjects, 10 male and 10 female.

In the Control condition, the subjects read the owner's manual for the electric blower. In the Video condition, a video tape was constructed that provided the same information as in the owner's manual and in the same order of presentation. In the Audio condition, an audio cassette tape was prepared that provided the same information and order of information as in the owner's manual. The length of the video and audio cassette tapes were 20:30 and 20:24 minutes, respectively. There were three dependent variables, retention of safety knowledge, compliance to warnings, and perceived risk.

Materials

This experiment used the Weed Eater handheld electric leaf blower, Model 2510. The subjects assembled and used the blower in an outdoor environment.

The retention of safety knowledge was determined through a written test. The test consisted of 18 questions of which 15 were directly related to safety. Only the questions about safety were analyzed. The subjects could not use the owner's manual or tapes for the test.

The compliance to warnings was determined with a hands-on test with the electric blower. There were four measures. First, the subject was evaluated to see if he or she asked for safety goggles. Second, the subject was evaluated for proper securement of the extension cord to the blower. Third, the subject was evaluated on how he or she approached a wall when sweeping leaves with the blower. The correct way was to start at the wall to begin sweeping in order to prevent leaves and debris from being blown back in one's face. Fourth, the subject was evaluated to see if a broom and bucket placed in the area to be swept would be removed. The broom and bucket represented objects that could be blown about when sweeping with the blower. All four compliance measures were taken from warnings in the instruction material.

The third dependent variable was a survey designed to measure perception of risk. The survey consisted of seven questions. Four of these questions dealt with the perception of danger and were analyzed.

Procedure

The subject read and signed a consent form which described the study as investigating different methods of

instructions for an electric-powered blower. The subject then viewed one of the three methods of instructions. After completing the instructions, the subject took the written safety test. No feedback on performance was provided. Upon completion of this test, the subject was asked to assemble the blower. Assembly of the blower was not evaluated but was required in order to conduct the hands-on test.

The hands-on test was performed outside. The subject had to use the electric blower to sweep a small area for approximately two minutes. The subject was evaluated on each of the four compliance measures: (a) requesting safety goggles, (b) securing the extension cord properly, (c) removing the bucket and broom, and (d) proper approach to the wall.

Upon completion of the hands-on test, the subject completed the survey to measure perception of risk. Only one subject was tested at a time, and the procedure took approximately 45 minutes per subject.

CHAPTER III

RESULTS

Differences in performance on the written test, perceived risks, and overall level of compliance were tested using analysis of variance and a series of planned comparisons. The Audio and Video conditions were combined and compared to the Control condition. The Audio condition was then contrasted with the Video condition. The same set of comparisons were done to test for gender differences. All results listed as significant were based on an alpha level of $p<.05$.

Each of the four safety measures for compliance was evaluated for significance using the Chi Square test for independence. This was done because the scale for each measure was dichotomous, either compliance or noncompliance. For each safety measure, the Audio and Video conditions were combined and compared to the Control condition. The second comparison, compared the Audio condition to the Video condition. Differences in gender were also examined.

Written Test

The written test consisted of 18 questions of which 15 questions tested for a knowledge of safety. Table I provides the mean percentage correct based on the 15 questions for each condition.

The planned comparison between the combined conditions of Audio and Video against the Control condition produced a

significant difference $F(1,54)=11.80$. In Table I, the performance on the written test for both the Audio and Video conditions was significantly higher when compared to the Control condition. Table I tends to indicate that subjects in the Audio condition scored higher on the test than the other two conditions. However, the difference between the Audio and Video was not significant, $F(1,54)=1.58$.

The same series of planned comparisons was done with gender as an additional factor. No significant difference based on gender were found, $F(1,54)<1$.

Table I. Mean percentage correct for the written test by condition and gender.

Condition		Percentage Correct Male	Female
Audio	M	90.88	88.52
	SD	8.91	6.37
Video	M	87.41	85.11
	SD	9.21	10.39
Control	M	79.79	79.93
	SD	8.51	7.83

Overall Safety Compliance

Each subject was evaluated for compliance on four measures. The subjects had to request safety goggles, secure the extension cord, approach the wall correctly, and remove a broom and bucket placed in the test area. Table II

shows the percentages for each compliance task and the percentage for overall compliance.

The Video condition had an overall compliance of 63.75% as compared to 43.75% for the Control condition and 48.75% for the Audio condition.

One planned comparison for overall compliance combined the Audio and Video conditions against the Control condition. The difference was not significant, $F(1,54)=4.01$.

The second planned comparison between the Video and Audio conditions was significant, $F(1,54)=4.33$, with the video subjects being more compliant.

The planned comparisons to test for gender differences found no significant differences. Table II shows that the males and females in all conditions were relatively similar in overall compliance.

Individual Task and Compliance

For use of goggles, the subjects had to ask for safety goggles before using the electric blower. Table II shows the percentage of compliance for each safety measure. The first x^2 test of independence contrasted the Audio and Video condition against the Control condition. The analysis showed no significant difference, $x^2(1)<1$. Another analysis compared the Audio condition to the Video condition. This revealed a significant difference of $x^2(1)=5.23$. The subjects in the Video condition requested the goggles more

often than the Audio condition. No significant difference between gender were found.

Table II. Percentages of subjects complying with each safety measure and overall compliance by condition and gender.

Condition	Percentage Correct Male	Female
VIDEO		
Safety Goggles	40.00	70.00
Extension Cord	90.00	90.00
Wall	70.00	70.00
Broom	60.00	20.00
Overall Compliance	65.00	62.50
AUDIO		
Safety Goggles	20.00	20.00
Extension Cord	70.00	80.00
Wall	80.00	70.00
Broom	20.00	30.00
Overall Compliance	47.50	50.00
CONTROL		
Safety Goggles	40.00	40.00
Extension Cord	60.00	40.00
Wall	50.00	60.00
Broom	40.00	20.00
Overall Compliance	47.50	40.00

The second compliance measure dealt with securing the extension cord properly. Table II reveals clearly that the subjects in the Video condition did very well in securing the extension cord properly. The x^2 test for independence showed that the Video and Audio conditions combined were

significantly different when compared to the Control condition, $x^2(1)=5.48$. No other comparisons were significantly different for either media condition or gender.

The third compliance measure analyzed how well the subjects approached the wall. The subjects had to approach the wall so as to keep the leaves from being blown back at them. Table II indicates that subjects in both the Audio and Video conditions did well at this task.

The x^2 test for independence did not find any of the differences among the conditions for approaching the wall to be significant. In addition, there were no significant differences for gender.

The last compliance measure involved the subject removing the broom and small bucket before using the blower. Table II reveals that this measure had the lowest level of compliance. The males in the Video condition were the only ones to achieve above 50% compliance.

The x^2 test for independence found no significant differences when comparing the Video and Audio conditions to the Control condition, $x^2(1)<1$ or when comparing the Audio to the Video condition, $x^2(1)=1.02$. Further analyses, found no significant differences for gender.

Survey

Past studies have shown gender differences for perception of risk or danger. The survey used in this study had four questions that evaluated the subjects perception of

danger. Table III shows the means by condition and gender. The mean was based on the response to the four survey questions with a scale of 1 to 5, with 5 indicating a higher perception of danger. Table III shows a slight increase in the perception between the Control condition and the Video or Audio condition. The difference is more noticeable for the males.

Table III. Overall means for survey questions by condition and gender.

Condition		Percentage Correct Male	Female
Control	M	11.60	13.30
	SD	2.06	1.82
Audio	M	12.30	13.50
	SD	1.05	2.71
Video	M	13.30	13.70
	SD	3.26	1.88

However, the planned comparison for the Video and Audio conditions against the Conrol condition found no significant difference, $F(1,54)=1.48$. The planned comparison for the Audio condition compared to the Video condition was also nonsignificant, $F(1,54)<1$.

The planned comparisons for gender did not reveal any significant differences as a function of condition. The only significant difference based on gender dealt with the

question that asked if public safety commercials would be useful in reminding people about safety, $F(1,54)=9.57$. Females believed that public safety commercials would be useful, while males did not consider it useful.

CHAPTER IV

DISCUSSION

This study found that the use of Video significantly increased compliance as compared to the Audio and Control conditions. The written test which tested for retention of safety knowledge found that subjects in both the Video and Audio conditions performed significantly higher than those in the Control condition. The survey to measure for perception of risk found no significant differences for either condition or gender. However, the results of the survey were in the expected direction.

The overall compliance of 63.75% by the Video condition was impressive considering that no safety goggles were provided until requested by the subjects. The other three compliance measures of securing the extension cord, approaching the wall correctly, and removing the broom and bucket required the subjects to react to the test scenario by using the knowledge learned from the video.

Compliance for securing the extension cord in the Video condition was significantly higher than the Control condition. In the video, the model demonstrated how to secure the extension cord. This supports the Wogalter et al., (1989) study that people are more likely to comply to a warning if they see someone else comply. Furthermore, the results replicate previous studies by Chy-Dejoras (1992) and

Racicot and Wogalter (1992) that the use of video can increase compliance.

The overall compliance in this study of 63.75% is lower than the compliance in other studies, 90% in Chy-Dejoras (1992) and 92% in Racicot and Wogalter (1992). This difference could be attributed to demand characteristics. Chy-Dejoras (1992) found that most of the subjects would have completed the task without gloves if they were not available. It appears that the availability of safety equipment can be an influencing factor in compliance.

Other factors that might have influenced the level of compliance found in this study include the task itself and the number of warnings. For example, Racicot and Wogalter (1992) used the task of mixing chemicals with two warnings for compliance, wearing goggles and gloves. The use of a dangerous task with few warnings is typical in other experiments. Mixing chemicals is not a task performed routinely by the average person. The uniqueness of this task may have increased compliance. The present study used an electric leaf blower with 39 warnings. Electric blowers are becoming more popular as a typical lawn and garden tool, and the task of clearing leaves is not unusual. People have a tendency to ignore warnings for products and tasks that are familiar to them (Purswell, Krenek, and Dorris, 1987; Christensen, 1987). Therefore, the low level of compliance in this study is not unexpected. Furthermore, this finding

indicates the need for more emphasis on how warnings are presented especially for familiar products and tasks.

Dorris (1991) stated that excessive warnings may do more harm than good. The 39 warnings for the leaf blower may have also affected compliance as compared with previous results with fewer warnings. More specifically, the poor performance in the Control condition may reflect that 39 warnings is too much for an individual to retain. Since many products are likely to have more than three warnings, the prioritizing of warnings based on severity or likelihood of injury needs to be considered.

The problems of demand characteristics, type of task, and number of warnings do not detract from the success of using video. However, these problems should be considered in future research and when generalizing to other products and tasks.

Young and Wogalter (1987) stated that retention of warnings was important. The user must be able to recall warnings when the owner's manual is not available. In this study, the subjects in the Audio and Video conditions scored significantly higher than those in the Control condition who used the owner's manual. This difference could be attributed to the length of the written instructions and reading level. A problem with written instructions is determining an appropriate reading level (Purswell, Krenek, and Dorris, 1987). This is especially true when the product such as a leaf blower can be purchased by almost anyone.

The biggest puzzle in this study is why subjects in the Audio condition scored well on the written test but did so poorly on the compliance test. This may be the result of the Audio not providing sufficient modeling behavior for compliance while operating the leaf blower.

The survey found no significant differences for perception of risk and only minimal gender differences. This supports findings by J. L. Moore (1991) that when given hazard and system information males and females will have similar perceptions of risk. Effective warnings should help both genders to perceive the risk in the same manner.

Two final points to be made have to do with the construction of the audio and video tapes used in this study. Both were developed on an amateur basis, and the information was presented in the same order as in the written instructions. Professionally constructed audio and video tapes could be more effective.

Second, in a real world setting, a manufacturer would probably provide the audio or video tape with a owner's manual to help reinforce the material. The subjects in this study were given only one method of instruction. In spite of these differences, this study showed significant results when tested against the actual owner's manual for the electric blower.

Future studies could investigate ways for improving the presentation of warnings in the video. The video could have scenarios of a person using the equipment in a safe manner

under various conditions. The ordering of warnings and when the warnings are presented could also have an effect as it does for written instructions (Wogalter, 1987).

Finally, the use of the video should be tried with equipment that is difficult to use, requires multiple warnings, and requires that the user interact with the equipment (e.g., chain saws, circular saws, or riding lawn mowers). This type of equipment should benefit the most from a video providing how to safely operate the equipment.

APPENDICES

Appendix A

Written Safety Test

1. The leaf blower can be used to sweep leaves, grass clippings, light snow, and straw.

   TRUE OR FALSE_____

2. The leaf blower is simple to maintain, operate, and has only a few parts; but one should still conduct a pre-inspection before operating.

   TRUE OR FALSE_____

3. The velocity of the leaf blower is (circle one):

   a. 110 mph.
   b. 115 mph.
   c. 120 mph.
   d. 125 mph.

4. While the leaf blower has double insulated parts to protect against shock, you should only use an outdoor extension cord marked specifically for outdoor use.

   TRUE OR FALSE_____

5. The only tool(s) required for assembly of the leaf blower are (select one or more):

   a. Screwdriver
   b. Pliers
   c. Pen knife
   d. Hammer
   e. None of the above

6. To sweep an area with corners, one should work towards one side of the corner and out to the other side in order to reduce risk.

   TRUE OR FALSE_____

7. The leaf blower requires only minimal periodic lubrication.

TRUE OR FALSE_____

8. Keep children, animals, bystanders a minimum of _____ feet away when operaing the leaf blower (select only one).

a. 20
b. 25
c. 30
d. 35

9. Even if the operator wears safety goggles, respirator, and protective clothing; one should never use a leaf blower to spread fertilizer.

TRUE OR FALSE_____

10. Replacement parts for this leaf blower can be obtained from an authorized dealer such as (select one or more):

a. Craftsman
b. Weed Eater
c. Black & Decker
d. Briggs and Stratton
e. None of the above

11. What repairs must be made by authorized service personnel (select one or more).

a. Replace on/off switch
b. Repair blower motor
c. Replace blower motor
d. Replace recessed plug

12. If an object becomes stuck in the leaf blower follow this procedure--1. Turn off the leaf blower. 2. Gently pull he object by hand three times to remove it. 3. If the object remains stuck, you should take the leaf blower to an authorized dealer.

TRUE OR FALSE_____

13. The symbol for double insulation on an appliance is:

a.
b.
c.
d.
e. None of the above

14. The double insulation protects the operator from electric shock due to internal problems with the leaf blower and external problems, such as, wire fences or metal pipes.

TRUE OR FALSE_____

15. The leaf blower can only be safe operated using both the blower tube and nozzle.

TRUE OR FALSE_____

16. When using the leaf blower one should dress safely. Which of the following is correct (select one or more)?

a. Rubber gloves are recommended
b. A respirator or face-mask when working in a dusty environment
c. Earplugs are recommended to prevent hearing loss
d. Wear long pants
e. Sandals are appropriate to wear

17. This leaf blower can be cleaned using the following (select one or more).

a. Armor-All
b. Damp sponge and mild soap
c. Damp sponge and small amounts of gasoline for tough spots
d. Mr Clean and water

18. If an area is well inspected prior to sweeping for rocks, glass, and sticks, there is little need for safety goggles.

TRUE OR FALSE_____

Appendix B

SURVEY

1. Given that an accident or injury could occur with this leaf blower, how severe are the consequences?

    1. Very severe
    2. Severe
    3. Borderline
    4. Mild
    5. Very mild

2. Was the velocity of the leaf blower adequate to accomplish the job?

    1. Very severe
    2. Severe
    3. Borderline
    4. Mild
    5. Very mild

3. How hazardous is this leaf blower?

    1. Very severe
    2. Severe
    3. Borderline
    4. Mild
    5. Very mild

4. Do you feel that annual reminders from the company, i.e. Weed Eater or public service commercials would be effective in reminding people about safety when using a leaf blower or similar equipment?

    1. Very severe
    2. Severe
    3. Borderline
    4. Mild
    5. Very mild

5. Was the leaf blower easy to handle during operation?

    1. Very severe
    2. Severe
    3. Borderline
    4. Mild
    5. Very mild

6. Should safety goggles be provided by the manufacturer when purchasing the leaf blower?

   1. Very severe
   2. Severe
   3. Borderline
   4. Mild
   5. Very mild

7. Was the material provided about the leaf blower effective?

   1. Very severe
   2. Severe
   3. Borderline
   4. Mild
   5. Very mild

Appendix C

Summary of Data

SUB	GROUP	SEX	TEST	COMPLIANCE					SURVEY				
				1	2	3	4	5	1	2	3	4	5
01	C	F	86.8	1	0	1	1	3	2	3	4	4	13
02	C	F	86.8	0	0	0	0	0	4	2	4	4	14
03	C	F	80.2	0	0	0	1	1	1	1	3	4	09
04	C	F	77.0	1	0	0	1	2	3	3	4	5	15
05	C	F	78.9	0	1	1	1	3	4	2	4	5	15
06	C	F	80.2	0	1	0	0	1	3	3	4	5	15
07	C	F	73.6	0	1	0	0	1	4	2	3	3	12
08	C	F	86.8	0	0	0	1	1	2	2	4	5	13
09	C	F	62.2	1	1	0	0	2	4	3	2	5	14
10	C	F	86.8	1	0	0	1	2	4	2	3	4	13
11	C	M	85.5	0	1	0	0	1	2	1	4	5	12
12	C	M	66.2	1	1	1	1	4	2	2	2	3	09
13	C	M	73.9	1	0	1	1	3	4	2	4	4	14
14	C	M	85.5	0	1	0	1	2	1	2	4	3	10
15	C	M	67.8	0	0	0	0	0	2	2	2	4	10
16	C	M	86.8	1	0	1	0	2	5	1	5	4	15
17	C	M	83.9	0	0	0	1	1	2	2	4	4	12
18	C	M	78.9	0	1	1	0	2	5	1	2	1	09
19	C	M	92.1	1	1	0	0	2	3	2	4	4	13
20	C	M	77.3	0	1	0	1	2	2	2	4	4	12
21	A	F	78.6	0	1	0	0	1	1	1	3	4	09
22	A	F	90.1	1	1	1	1	4	4	4	4	5	17
23	A	F	80.2	0	0	1	1	2	5	4	4	5	18
24	A	F	86.8	0	1	0	1	2	3	3	5	2	13
25	A	F	86.8	0	0	1	0	1	4	2	4	5	15
26	A	F	92.1	0	1	0	1	2	2	2	4	4	12
27	A	F	93.4	1	1	0	1	3	2	2	4	4	12
28	A	F	85.2	0	1	0	0	1	4	2	4	4	14
29	A	F	92.1	0	1	0	1	2	2	2	4	3	11
30	A	F	99.9	0	1	0	1	2	3	3	4	4	14
31	A	M	98.7	0	1	0	0	1	4	2	2	5	13
32	A	M	86.8	0	1	0	1	2	2	2	4	5	13
33	A	M	99.9	0	1	0	1	2	3	2	3	4	12
34	A	M	85.5	0	1	1	1	3	2	3	3	5	13
35	A	M	86.8	0	1	0	1	2	3	2	4	5	14
36	A	M	99.9	1	1	0	1	3	4	2	2	4	12
37	A	M	98.7	0	0	0	1	1	3	2	4	4	13
38	A	M	72.3	0	1	0	0	1	3	2	2	4	11
39	A	M	93.4	0	0	1	1	2	2	2	2	5	11
40	A	M	86.8	1	0	0	1	2	2	2	4	3	11
41	V	F	86.8	1	1	0	1	3	2	2	5	5	14
42	V	F	91.8	1	1	0	0	2	4	2	3	4	13
43	V	F	80.2	0	1	0	0	1	2	2	5	4	13
44	V	F	93.4	0	0	1	1	2	2	2	4	5	13
45	V	F	70.4	1	1	0	0	2	5	1	5	5	16
46	V	F	85.2	1	1	0	1	3	3	3	5	5	16

SUB	GROUP	SEX	TEST	COMPLIANCE					SURVEY				
				1	2	3	4	5	1	2	3	4	5
47	V	F	64.4	0	1	0	1	2	2	2	3	4	11
48	V	F	93.4	1	1	0	1	3	5	3	4	4	16
49	V	F	93.4	1	1	0	1	3	3	2	4	2	11
50	V	F	92.1	1	1	1	1	4	3	2	4	5	14
51	V	M	98.7	1	1	0	0	2	3	2	4	5	15
52	V	M	78.6	0	1	0	0	1	3	3	4	4	14
53	V	M	78.6	0	1	1	1	3	2	1	4	2	09
54	V	M	85.5	0	1	1	1	3	5	2	4	4	15
55	V	M	77.6	0	1	0	1	2	3	2	2	4	11
56	V	M	92.1	1	1	1	0	3	5	4	2	5	16
57	V	M	78.9	1	1	1	1	4	2	2	1	2	07
58	V	M	85.5	0	1	1	1	3	5	3	3	4	14
59	V	M	98.7	0	1	1	1	3	5	2	4	5	16
60	V	M	99.9	1	0	0	1	2	5	4	3	5	17

SUB= SUBJECTS

GROUP
C= CONTROL
A= AUDIO
V= VIDEO

SEX
F= FEMALE
M= MALE

TEST
Test Scores for the Written Safety Test

COMPLIANCE
COL. 1= GOGGLES
COL. 2= EXTENSION CORD
COL. 3= BROOM AND BUCKET
COL. 4= WALL
COL. 5= OVERALL COMPLIANCE, THE NUMBER EQUALS THE SUM OF THE MEASURES COMPLIED WITH.

*** FOR COL'S 1-4, ONE EQUALS COMPLIANCE AND ZERO EQUALS NON-COMPLIANCE

SURVEY
COL. 1= SURVEY QUESTION ON INJURY
COL. 2= SURVEY QUESTION ON HAZARD
COL. 3= SURVEY QUESTION ON PUBLIC SAFETY
COL. 4= SURVEY QUESTION ON PROTECTION
COL. 5= NUMBER EQUALS THE SUM OF THE FOUR SURVEY QUESTIONS

*** THE SURVEY QUESTIONS USED A LIKERT SCALE FROM (1-5).

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