

What is Appropriate Signage for the Sport Industries?

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INTRODUCTION

One of the primary topics in sport management discussion and practice entails communication. There has been a significant amount of research published on personal communication (DeFluer, Kearney & Plax, 1998). Dispute resolution skills, non-verbal communication, guest relations and numerous other strategies help guide employees in their verbal and non-verbal communication. However, one major area that has not received significant coverage is static communication. Static communication entails any communication effort not requiring direct personal communication, which will be the same for each and every person that encounters the communication (Wood, 1997). Examples of such a communication technique are signs.

While signage has not been well researched in the sports industry, it has been well researched in the traffic area, with publications such as the Manual on Uniform Traffic Control Devices that highlights proper lettering, placement, reflectivity, and related issues (Blashke, 1990). Signage issues are also covered by the Occupational Safety Hazard Administration (OSHA) through appropriate signage, which warns individuals about hazards in the workplace (OSHA, 2000). The Consumer Product Safety Commission has addressed signage as it applies to playground safety issues (Safety Play, 2000). Signage issues have also been addressed in the fitness industry with the development of "standards" or "guidelines" by the American Society for Testing and Materials (ASTM), American College of Sport Medicine (ACSM) and the International Health Racquet Sport Association (IHRSA). While these "standards" can help provide guidance, they also tend to be very general when compared with warning and signage standards from the transportation and safety industries.

This article was written to help develop a more accurate understanding of what constitutes appropriate signage or warnings. Through analyzing relevant cases, statutes, industry standards, and conclusions

developed from traffic and safety industry research, this article will attempt to help provide a clearer picture to what constitutes appropriate signage in the sport industry. The article concludes with some suggestions for appropriate signage. Appropriate signage is critical because it can help create a safer environment, serve as a public relations tool, assist with customers, and can become a significant marketing tool. The entire spectrum of benefits associated with signage is not covered in this article.

SAMPLE SIGNAGE CASE

The impact of proper signage cannot be overestimated as demonstrated in *Van Dyke v. S.K.I., LTD* (1998), decided by a California Appellate court. The case stemmed from a skier becoming paralyzed after running into a warning sign. According to the facts of the case, the plaintiff, an experienced skier, was skiing with three friends on his first trip to Bear Mountain Ski Resort. The foursome skied down "Showtime," an advanced run accessible from lift No. 1. Just before the group started their second run they decided to ski over to lift No. 2. The plaintiff descended the "Showtime" run until he reached the crossover trail to chair-lift No. 2. He cut across "Showtime's" face at a 90-degree angle traveling at approximately 15 miles per hour. Van Dyke suddenly saw a black foam rubber object between 15 to 20 feet away, but was unable to ski around it. He hit the object and fractured his spine-rendering him a paraplegic. The plaintiff had run into a signpost that showed the direction to lift No. 2 and warned. . . "Be Aware [—] Ski With Care." The black foam rubber wrapped around the signpost blended with the shadows cast by the lift tower and tress. The plaintiff was unable to see the sign because he approached the sign at a 90-degree angle rather than straight ahead where he would have seen the sign. The sign was so hard to see that none of the plaintiff's skiing partners saw the sign and two skiers even missed the crossover trail (*Van Dyke v. S.K.I., Ltd.*, 1998).

The foam rubber around the post was specifically designed to reduce the blow if a skier ran into the hazard. The protective cylinders were designed to be placed around an object, but the ski resort split one such cylinder down the side and wrapped it around the particular post, which eliminated the cylinder's ability to absorb the impact.

The plaintiff sued the resort claiming among other allegations, negligent placement of the sign and improper use of the "injury reducing" cylinder. The resort brought a summary judgment motion that was granted by the trial court based on the plaintiff's assumption of risk. (*Van Dyke*, p. 1314). The appellate court overturned the lower court's

decision and concluded that the signpost was not a risk inherent in the sport of skiing. (p. 1318 & 1319). Moguls or lift towers are risks inherent in the sport, but most skiers would not know that a signpost would be placed in the middle of a connector trail. The appellate court also concluded that the evidence seemed to indicate that the risk of harm faced by skiers was increased when the resort placed the sign in an area where it was virtually invisible to skiers crossing the connector trail to the chair lift (p. 1319).

This case highlights the importance of proper sign placement and construction. The most detailed standards have very little value if they are not followed and common sense used in their application.

ACTUAL AND CONSTRUCTIVE NOTICE

In negligence cases, a primary defense is the assumption of risk defense. The assumption of risk defense is predicated on the nature of the risk or hazard being inherent in the activity, the plaintiff voluntarily consenting to continue even though there exists a risk, and the plaintiff knowing, understanding and appreciating the risk (van der Smissen, 1990). Normally a defendant is responsible for knowing what risks exist in a given activity or facility. A plaintiff is not responsible for knowing about a risk unless it is open and obvious or the plaintiff has been put on notice (whether actual or constructive) about the risk (van der Smissen).

The question then arises, how does someone know about a risk? Communication is the key. There are two means by which individuals can learn about hazardous conditions, actual notice and constructive notice. While notice is normally reserved as a claim against a defendant that they had notice of a risk, a facility user can also have notice. If a patron sees a warning sign then they have been put on notice. If the patron has knowledge of the risk, voluntarily continues in the face of that risk, and the risk is inherent in the activity, the defendant can then utilize the assumption of risk defense to attack the plaintiff's case.

Actual notice occurs when an organization or facility has specific information regarding a defect or hazard (Seidler, 1998). Actual notice may take the form of either oral, visual, or written warnings such as hazard signs. Actual notice is much easier to prove than constructive notice. When actual notice exists, the defendant can show that a sign was present and that a reasonable person would have read/seen/heard the warning and would have responded appropriately. More importantly though, actual notice provides the opportunity to prevent injuries through prudent patrons avoiding the hazard.

For constructive notice to occur an organization's personnel must have knowledge about the hazard, be aware of the conditions under which the hazard would develop, and recognize the repercussions possible if someone were to become injured by the hazard (Turnbow, 2000). While organizations and facilities are accountable for both actual and constructive notice, constructive notice is sometimes more difficult to prove, as the plaintiff has to show that from "the totality of facts" a reasonable person would have considered a situation dangerous. For example, if someone walked past a drinking fountain and saw a water puddle on the floor, then the facility could be on constructive notice about the slipping hazard if the leak had been active for several days. Similar to a patron having constructive notice of potential risks, they might also have constructive notice. However, since constructive notice is often difficult to prove, signage helps transform a risk that might otherwise have been considered difficult to notice, to a risk identified through actual notice.

Communicating information concerning hazards such as slippery floors is very important for the sports industry as well. A study in 1995 highlighted that 55% of analyzed published sport cases involved negligence claims, and a subsequent study concluded that the most frequent claim in sport cases were trip and slip and fall cases (Fried, 1999). While signage cannot eliminate all of these cases or injuries, signage can help communicate concerns in a more proactive manner. If information regarding hazardous conditions such as wet floors can be properly communicated to facility users, the prospect of reducing injuries and subsequent claims in the sports industry may be greatly reduced. Before examining how to properly convey warnings, it is important to look at the cases, statutes, industry standards, and industry research from various disciplines to examine what "appropriate" signage means in non-sport industries.

CASES

Most signage related cases analyze the appropriateness of the message, the placement of the warning, or related concerns that could have been addressed before the sign was written or posted (Fried, 1999). One of the most well known sport cases (*Pell v. Victor Andrew High School*, 1984) involved a 16-year-old high school sophomore who suffered a severed spine after performing a somersault on a mini-trampoline manufactured by AMF, Inc. A caution label was affixed to the bed of the mini-tramp, but when a high school faculty member assembled the mini-tramp, the bed of the tramp was placed upside-down so the label faced

the floor and was unreadable. The tramp had additional warning labels on the sides of the frame, but the frame pads covered these labels.

The plaintiff's claim maintained that AMF failed to adequately warn users that failing to use a harness, safety belt, and supervision could result in a severe injury. Her claim also stated that AMF was negligent in failing to provide a safety belt or harness to prevent improper landing. Pell further alleged that due to the direct and proximate result of the defect in the mini-tramp, the plaintiff landed on her neck, severed her spine and became permanently paralyzed (*Pell*, p. 862).

During the trial, the plaintiff successfully demonstrated that AMF's warnings were inadequate. The warning label did not specify that severe injuries resulting in permanent paralysis could result if the proper safety harness and spotter were not used. Pell also presented evidence proving that the assembly instructions failed to specify that the warning label should be placed in such a manner to be clearly visible to a mini-tramp user. Thus, the Illinois Appellate Court affirmed the Circuit Courts decision finding in favor of the plaintiff (*Pell*, p. 867).

IMPROPER WORDING CASES

Appropriate wording is critical for all signs. A recent gambling case decided by the Mississippi Supreme Court highlighted the value of appropriate signage (*IGT v. Kelly*, 2000). Nancy Kelly was playing a progressive jackpot machine with a total jackpot of \$250,136.91. She hit the royal flush and thought she had won. The casino indicated that she had a descending flush (A, K, Q, J, 10), which entitled her to \$1,123.14, but if she had hit an ascending flush (10, J, Q, K, A) she would have won the jackpot. She sued claiming the sign never said only an ascending flush would win the jackpot. The sign stated in pertinent part:

Royal Flush (Sequential Hearts)	Progressive
Royal Flush	Mini-Progressive
Royal Flush	(10, J,Q,K,A)

The casino claimed that by showing that a royal flush was in ascending order that was the only time they had to pay the jackpot. Kelly claimed that the sign indicated an example of the cards in a royal flush and that whether it was an ascending or descending flush did not matter. Since the sign was subject to various interpretations, the court upheld the lower court's ruling supporting Kelly's version and demanding that she receive the progressive jackpot. This case highlights how the non-placement of several clarifying words cost the casino over a quarter million dollars.

WARNINGS ARE NOT A SHIELD

As with all signage related concerns, the key component will normally center on the wording (Sattler, Lippy & Jordan, 1997). However, a sign, no matter how well written, will not absolve someone of liability if he/she acts in a negligent manner or places the warning on a defective product. A worker in Texas tried to install a 16-inch diameter tire on a 16.5-inch rim (*Uniroyal Goodrich Tire Co. v. Martinez*, 1998). A warning sign with yellow and red highlights instructed the worker not to place the smaller tire on a larger rim. There also was an illustration showing a worker being thrown in the air by an explosion. The worker saw the warnings, but nevertheless mounted the tire, which exploded and permanently injured him. The court concluded that the tire manufacturer was liable and the court provided in pertinent part that "You can't just slap warnings on a product and hope that it will get you a pass if there is a better way to design it and it is reasonable and cost-effective" (*Uniroyal Goodrich Tire Co.*, p. 1050). The court relied upon a new legal standard developed by legal scholars and published in the *Restatement (Third) of Torts: Product Liability* (comment 1, section 2) which states that warnings are not "a substitute for the provision of a reasonably safe design." (Viner Samborn, 1998, p. 30).

WARNINGS NOT ALWAYS REQUIRED

Having an appropriate warning is not always a necessary component to win a signage case. Courts tend to hold that when a danger is open, obvious, and known to the plaintiff, warning signage or the lack thereof will not create liability. In one such case (*Bodymasters Sports Industries, Inc. v. Wimberley*, 1998), a fitness equipment user sued Bodymasters claiming, among other causes of action, the failure to warn. The plaintiff claimed there should have been a warning sign that moisture on the bottom of the exerciser's shoes could cause her feet to slip off the platform. The court dismissed the claim since the plaintiff was aware of the danger which she claimed she should have been warned about. (*Bodymasters Sports Industries, Inc.*, p. 560-561).

RECREATIONAL SIGNAGE

One industry segment where warning signs have come under scrutiny is the natural recreation industry. The courts have examined whether a government agency has a duty to warn of dangerous natural conditions and, if such a duty exists, would a government entity receive immunity protection for posting warning signs. Some courts have concluded that

the issue in these cases is not whether or not a warning was adequate, but whether a person would need any warning at all if the danger is open and obvious (*Buchelers v Chicago Park District*, 1996). In *McCauley v. City of San Diego* (1987), an inebriated park user fell off a cliff and sustained serious injuries. He claimed there should have been more appropriate signage. The court concluded that the city had no duty to warn of dangerous natural conditions on unimproved property where the natural conditions posed a patent, not a latent harm. (*McCauley*, p. 739). Furthermore, the city did not jeopardize its statutory immunity by posted warning signs on unimproved natural dangerous conditions. (p. 739).

The *McCauley* court compared the facts of the case with another California case, *Gonzales v. City of San Diego* (1984). In *Gonzales*, the plaintiff claimed that rip tide conditions had existed for a long enough time and that the city should have provided a warning. The trial court agreed and found that while the beach was both natural and artificial, by providing lifeguards the city induced public reliance on that protective service and the service was provided in a negligent manner through not providing appropriate warnings. (*Gonzales*, p. 885-887). *McCauley* claimed that the *Gonzales* rationale should apply since signage was a voluntarily assumed protective service. The appellate court disagreed concluding that the protective service in *Gonzales* was active as opposed to the signs in the *McCauley* case, which were passive. (*McCauley*, p. 736). The court's rationale was based on the conclusion that posting signs that do not contribute to the dangerousness of a natural condition should be encouraged and immunity is extended in order to allow the flow of warning information.

Case law is often predicated on various statutes that identify signage related concerns. Two such statutes are highlighted below: the Occupational Safety and Health Administration (OSHA) and the Americans with Disabilities Act. Pseudo statutory concerns are also highlighted such as tobacco warnings and traffic control devices.

STATUTES

The federal government along with state and local entities develop significant standards and protocols for safety communication. Several federal agencies that are involved in safety communication include the Environmental Protection Agency (EPA), the Consumer Product Safety Commission (CPSC), OSHA, the National Institute for Environmental Health Science (NIEHS), and the National Institute for Occupational Safety and Health (NIOSH). OSHA regulations are discussed below

along with an analysis of how other laws, such as the Americans with Disabilities Act, can affect signage analysis.

Occupational Safety and Health Administration (OSHA)

OSHA, Public Law 91-596, §2, helps to guarantee safe working conditions for both men and women. The Act covers all employers and employees in the 50 states as well as all territories under the jurisdiction of the federal government. As defined by the Act, an employer is any "person engaged in a business affecting commerce who has employees, but does not include the United States or any state or political subdivision of a state" (United States Department of Labor, 2001, para. 2).

OSHA is allocated two responsibilities by the Act: setting standards, and conducting inspections of the workplace to insure that employers comply with the standards. It is the responsibility of the employers to make themselves aware of the various standards that pertain to their organizations. These employers may be required by OSHA to embrace various policies, procedures and practices to insure a safe working environment for their employees. Even in areas where OSHA does not state a specific policy, employers are expected to comply with the Act's "general duty" clause. This clause [Section 5(a) (1)] mentions that every employer "shall furnish . . . a place of employment which is free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees" (United States Department of Labor, para. 6).

While the Act does not speak specifically about signage, it does briefly mention training requirements for schools, theaters, museums and other similar employers. These requirements discuss the training for "accident prevention signs and tags." (McMann, 1995, p. 7). They require instruction of all employees in the following areas: 1) the meaning of danger signs, 2) the meaning of warning signs, 3) the meaning of warning instruction signs, and 4) the meaning of accident prevention tags (McMann).

Businesses comply with OSHA mandates through various notices or regulations that require an employer to properly communicate hazards. For example, OSHA requires warning labels on all chemicals that potentially pose a hazard. A typical example could be a product's name such as "Flooring Stripper" and the appropriate warning might indicate that the chemical is "flammable." OSHA does not require precautionary measures to be listed, but many employers and products contain such additional information, which could include, for example, "do not use near open flame." (OSHA, 2000).

Americans with Disabilities Act (ADA)

The Americans with Disability Act is also not considered a traditional statute involving signage related issues. (ADA, 1990). However, the ADA requires facility accessibility and signage can impact the manner in which a patron uses a facility. In *Steger v. Franco, Inc.* (2000) a blind facility user sued a large retail and office space building based in part on the unavailability of Braille or raised signage to mark the bathrooms. The court concluded that the lack of signage was one of the reasons the blind patron was entitled to proceed with an ADA claim. (*Steger*, p. 893-894).

Employment related statutes that require specified posting in the workplace mandate additional posting and signage requirements. These postings include OSHA notices, California Proposition 65 (toxic hazard) notices, industrial injury prevention plan notices, and other notices (Fried & Miller, 1998).

Other Statutory Guidelines

Signage related regulations also provide significant guidance for safety notification and traffic control devices. Government regulations can specify what wording provides the greatest impact or notice. By specifying acceptable language, the government can help develop what would be considered "appropriate." In 1986 Congress enacted the Smokeless Tobacco Act in response to two alarming trends. (Comprehensive Smokeless Tobacco Health Education Act of 1986). These trends were the health hazards of tobacco use and the dramatic increase in the number of young people using smokeless tobacco (*Public Citizen v. FTC*, 1989).

In order to reduce these alarming trends Congress enacted legislation "to make the public aware of the adverse health consequences of using smokeless tobacco products" (Congressional Record, 1986). The Smokeless Tobacco Act's most powerful component was the warning scheme. All smokeless tobacco packages were required to contain one of three prescribed health warnings.

WARNING: THIS PRODUCT MAY CAUSE MOUTH
CANCER;

WARNING: THIS PRODUCT MAY CAUSE GUM DISEASE
AND TOOTH LOSS;

WARNING: THIS PRODUCT IS NOT A SAFE ALTERNA-
TIVE TO CIGARETTES. (*Public Citizen v. FTC*, 1989, p. 1545).

Similar warnings are mandated for other products such as smoking tobacco and alcohol based drinks. Besides consumer protection, regula-

tions also dictate the warnings, which guide people through the rough terrain of vehicular safety.

Traffic Safety Warnings/Signs

The everyday use of signage affects the efficient and safe flow of vehicular traffic. Tort liability for traffic signage related issues is predicated upon standards established by each states' Manual on Uniform Traffic Control Devices (MUTCD). Under these guidelines government entities are required to develop uniformity in communicating safety concerns. Uniformity means that the same type of device should be used for the same type of road condition, which helps drivers to develop and maintain certain expectancies (Blashke, 1990). The MUTCD uses terms such as "shall," "should," and "may" to suggest or demand the application of traffic control devices. If the word "shall" is used it is a mandatory term and the state has to follow the guidelines. In contrast, the term "should" indicates only a strong recommendation, but not a mandatory recommendation. A good example of this difference can be seen with stop signs. The MUTCD states that stop signs "shall" be an octagon and further provides that when two highways intersect the stop sign "should" be posted on the minor street (Blashke, 1990). The difference between "shall" and "should" is very significant for traffic sign cases since liability is harder to prove if the state was not required to post a sign when compared with instances where the state failed to post a required sign.

The above highlighted cases and statutes attempt to identify and define some signage related hazards or guidelines. However, these statutes often serve as the starting-point for more comprehensive industry standards that cover such topics as wording and placement.

INDUSTRY STANDARDS

One of the most comprehensive sport industry standards was developed and approved by the members of the American Society for Testing and Materials (ASTM) in 1997. The ASTM established Standard F1749-96 entitled "Standard Specification for Fitness Equipment and Fitness Facility Safety Signage and Labels." Under these standards a safety sign can include such terms as "safety first" or "be careful." Such signs cannot include any words such as "danger," "warning," or "caution" since those signal words are supposed to be used only for hazard communication and not safety communication (ASTM F 1749-96, 1997). Hazard communication was specifically defined as follows:

4.1.1 Danger-Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

4.1.2 Warning-Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

4.1.3 Caution-Indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

4.2.1 Danger-The signal word danger shall be in white letters on a safety red background.

4.2.2 Warning-The signal word warning shall be in black letters on a safety orange background.

4.2.3 Caution-The signal word caution shall be in black letters on a safety yellow background. (ASTM F 1749-96, 1997, p. 2).

The ASTM standards go on to develop additional rules for safety labels and warnings such as:

- Pictorials shall not be used on general warning labels, however pictorials can be used on other signs so long as they conform with ANSI Z535 for user acceptance and understandability,
- In no case can the signal words panel for a general warning label be red, green, or yellow when the word "warning" is used,
- Multiple warnings can be placed on the same label so long as the "information for each hazard is presented effectively,"
- The lettering for the word warning shall be in sans serif font with a minimum of 0.16 inches in height and the word warning has to be at least 50% larger than the statement of the hazard,
- The label shall be positioned where it can be encountered prior to the person commencing exercise,
- The minimum wording requirements is to include mentioning the possibility of serious injuries or death and that all warnings and instructions need to be read and followed (ASTM, F1749-96, p. 2).

Additional standards were established for a general facility safety sign, which is meant to supplement specific warnings and labels on equipment. Such signs should have the signal word in white letters on a safety green background. The message should be in black letters on a white background. In addition, no pictorials shall be used on such sign, the sign should be at least 8 inches by 11 inches, and the sign should be posted on locations such as locker room doors and doors leading into the fitness equipment room. The standards also put a burden on equipment manufacturers by stating that they "shall" provide one facility safety sign with each equipment order and provide mounting instructions. Besides some of the requirements listed above, a facility safety sign should also

include warnings that individuals should seek assistance or training prior to using equipment and that they should not attempt to fix equipment that is not functioning properly. (ASTM, F1749-96).

ASTM also has guidelines for playground related signage. Standard F1487, Section 14 provides that signs shall, "inform, warn, and educate purchasers, installers, and those supervising children who play on the equipment about the on-going danger of installing equipment over hard surfaces" (Safety Play, 2000). The Consumer Products Safety Commission (CPSC) also has various guidelines for playground related signage covering such issues as drawstring choking hazards for children's clothing.

Two organizations, the American College of Sport Medicine (ACSM) and the International Health Racquet Sport Association (IHRSA) developed signage guidelines/standards. These standards provide for the design, placement and minimum wording requirements. While these established standards/guidelines might represent good intent, they fail to provide significant guidance to facilities concerning what is "appropriate" signage in comparison to other industry standards.

ACSM's standard number 4, from ACSM's Health/Fitness Facility Standards and Guidelines (1997) provides in pertinent part that: "[A] facility must post appropriate signage alerting users to the risks involved in their use of those areas of a facility that present potentially increased risks." (ACSM, 1997, p. 4) Areas that present the potential for increased risks include saunas, whirlpools, steam rooms and swimming pools. While areas that present increased risks are partially identified, the standard fails to identify what "appropriate signage" means. While appropriate signage is not described, ACSM provides some sample signs in the Guidelines' appendix.

ACSM is not alone in *not* providing significant information to post necessary safety signs. IHRSA's standard number 9 provides that: "[A] club must post appropriate signage alerting users to the risks involved in their use of those areas of a club that present potential increased risk(s)." (Herbert, 1998, p. 15) IHRSA's standard is almost identical to ACSM's standard, thus giving more credibility to both standards. However, appropriate signage is not defined nor is the term "post" elaborated upon to give facilities guidance concerning where to post necessary signs.

These standards help highlight a major concern for all facility owners/managers. Standards are often disguised as "guidelines," but others who might think they are designed to have the same effect confuse them. Unfortunately, standards might exist that can be raised in litigation, but

these standards might not provide enough information to help a jury determine whether or not an owner or manager complied with the standard. For example, would a facility be liable if a German only speaking guest was injured in a facility that had a warning sign printed only in English? A jury could be thrust into the position of trying to determine if the language was "appropriate," the font size accurate, the color scheme bright enough to draw the reader's attention, the sign linguistically accurate for the disabled, could a pictorial representation of the hazard prevented the injury, and other concerns based on location or demographics.

Safety and warning sign guidance and clarification for the sport industry can be obtained from other industry segments such as research for consumer product, the workplace, and traffic safety. These standards can help develop more appropriate application and implementation in the sports industry.

OSHA SAFETY RESEARCH

OSHA funded a major study completed in part by researchers at the Environmental Health Education Center at the University of Maryland Medical School (Sattler, Lippy & Jordan, 1997). The study was conducted because industry standards and label design guides have failed to provide definitive guidance. Some findings from this study include:

- label warning effectiveness is very subjective,
- symbols or colors are effective if the viewer is properly educated about their meaning,
- pictographs help increase compliance rates,
- placement of the warning is one of the keys in determining effectiveness,
- older people need a stronger signal word and then they respond at a higher level to warnings,
- women are more inclined to follow warnings,
- the term "danger" connoted greater strength than "warning,"
- red resulted in the highest awareness of any color,
- perceived severity of consequence strongly influences behavior, and
- horizontally printed warnings are found more quickly compared with vertically printed warnings (Sattler et al., 1997).

These findings are discussed below in greater detail.

Comprehensibility

Comprehensibility refers to the ability of an individual to read a label or warning and to understand the information enough to take the de-

sired action (Sattler et al., 1997). Just because someone might comprehend the warning does not mean they will follow the warning since this final step is composed of a complex mix of attitudes, motivations, and experiences that interact with the perceived consequence of inaction. However, one factor that helps enhance comprehensibility is using the bullet-point outline format rather than a paragraph warning since outlines have greater eye appeal, are easier to process, and are more effective (Desaulniers, 1993).

Sign Design

The first component of the Sattler research focused on the communicative effectiveness of symbols. For symbols to be effective they have to be recognized and then acted upon. The research concluded that simple pictorials were easier to understand compared with complex pictorials. (Sattler et al., 1997). Even though simple pictorials are easier to understand, with training on complex pictorials, people can show greatly increased future comprehension (Sattler et al.). Research by Frantz, Miller and Lehto (1994), on flame and poison warnings, concluded that even though individuals understood the generic meaning of the symbols, many had trouble inferring the specific safety precautions necessary to avoid the hazard (Sattler et al., 1997). Thus, the research tended to show that while pictures can help identify a hazard and individuals can be exposed to even more complex pictures, they still need to be educated about the symbols and the expected conduct to avoid a given hazard.

The proper shape of any warning was another critical concern in signage design. A triangle arranged on its vertex was the most preferred shape for a warning sign. Even though circles are commonly used as the backdrop for signs, it was one of the least preferred warning shapes according to researchers (Sattler et al.). Even though circles might not be preferred, they are still commonly utilized and suggested. In contrast to warning signs, warning labels are most often displayed in rectangular shapes. Research determined that rectangles have been used for their simplicity. The final shape of the rectangle is predicated on the elements contained in the warning such as signal words, pictograms, or the message text. Even though triangles and rectangles are the most preferred communication shapes, one researcher recommended shapes such as the octagon shaped stop sign due to perceptual learning phenomenon where individuals are so frequently exposed to stop signs that whenever they see an octagon they think the sign will require them to not engage in some conduct (Sattler et al.). The American National Standards Institute (ANSI) has suggested the following guidelines:

- Equilateral triangle resting on its base for warnings and hazard alerts
- Circle for mandatory actions
- Circle with a 45 degree slash from the upper left to bottom right for prohibited actions
- Square or oblong for informational text (ANSI, 1972).

Shapes and symbols can be combined with text, but the results are not always effective. In one research study a sign containing a hazard label and instruction such as "Gasoline-No Smoking" was rated easiest to understand, most informative, and most likely to obtain compliance. However, such a sign was least likely to be recalled at a later time. Signs with just a hazard label such as "Poison" were rated as least informative and most difficult to understand, but were also considered most likely to be recalled and complied with. Signs that just provided information or instructions such as "Do Not Enter" were considered least effective (Sattler et al., 1997).

Readability

Readability represents another concern for effective signage. The government required cigarette manufacturers to put warnings on packets, but did not supply sufficient information on how they should appear. Thus, the initial warnings were very blurry, contained small type size, and showed little contrast between the ink and paper. To help avoid this problem the government required warnings for beer and wine to use the words "Government Warning" in boldface letters (Sattler et al.).

Research has shown that readers are more likely to read warnings in Helvetica type (sans serif face) and Century Schoolbook type. Furthermore, bold type is more likely to be read than Roman type. The larger the font size the more likely the warning will be read. Thus, there is a greater likelihood that a small warning written in 10-point size will be read compared with 8-point size. Furthermore, a difference in size between the signal word in the warning and the main text will produce a greater likelihood of being read, but the difference would not be that great. For example, a 2-point difference in size between the signal word and the text (**Warning** please proceed with caution) was more effective in one test than a 4-point difference (**Warning** please proceed with caution) (Sattler et al.). This could possibly be due to the fact that if the text disparity is too large the reader might just read the signal word and avoid the main text.

Besides the ink, letter size, background contrast and related clarity issues, the text itself has to be reader friendly. A warning that the reader cannot understand is worthless. Most product warnings should be writ-

ten at the 4th to 6th grade level range to insure that readers can understand the message (Sattler et al.).

ANSI has developed some guidelines for word usage on product safety signs or labels. Under these definitions "Danger" indicates an imminently hazardous situation, which could lead to death or serious injury and is limited to the most extreme situations. In contrast, "Warning" indicates a potentially hazardous situation that can possibly lead to death or serious injuries. "Caution" is the lowest risk indicator highlighting a potentially hazardous situation that can lead to minor injuries. These guidelines for potential definitions have been supported by research that has shown that the term "deadly" is perceived as connoting greater strength than "danger" or "warning." These studies have also shown that the word "deadly" had a stronger connotation than many other potential terms (Sattler et al.).

Placement

Proper placement is also critical for readability. In various experiments of labels on alcoholic beverages, warnings on the front were found more quickly than warnings on the back (Sattler et al.). Clutter associated with the label design also affected the speed in which the warning was found. Furthermore, warnings printed horizontally were found quicker than those printed vertically (Sattler et al.).

Research has shown that warnings are more effective when options are available that allow the reader to avoid the harm while still proceeding in their desired activity. In one research study, warnings were posted on various items such as copy machines, phones, and doors indicating they should not be used. Most people did not use the phone or copy machine with the warning. However, the warning on the door was not obeyed unless there was an alternative exit close by. The research showed that a warning with a low cost of compliance was more effective than a warning that required significant compliance (Godfrey & Laughery, 1993). In the sport context, if a locker room shower is out of order someone might go to the next shower if one is available. However, if there is no other shower available, the patron might use the broken shower if the compliance cost of not taking a shower is high for them.

Thus, if there exists an easy solution to avoid harm, people would be willing to take that alternative. Otherwise, people would proceed even if there existed a potential harm and they were specifically warned about the hazard. This scenario can be seen with crosswalks where individuals

are willing to use the crosswalk if it is nearby, but will cross a busy street if it saved them from having to walk a block or two to a safer crossing.

Placement concerns can also be identified in warning instructions. Consumer products often come with owner manuals that have detailed instructions and warnings. These manuals often have warning or precaution sections separate from the operating instructions. Research has shown that the reading rate for these warnings was increased from 37% to 89% and the compliance rate from 48% to 83% by moving the warnings from the precaution area to the instructions area (Sattler et al.).

Audience Analysis

Any effective analysis of warnings has to consider the potential end user. Individuals often look for four elements in a warning; 1) a standard signal word such as "Danger," 2) a statement of the hazard, 3) the potential consequences, and 4) how to avoid the hazard (Sattler et al.). While most people look for these elements, they do not all need to be present to have an effective warning or information sign. This fact has been shown in research about the learned behavior associated with stop signs and restroom signs. People have learned the importance of "stop" and "restroom" signs even if they do not contain all four elements (Sattler et al.).

Other findings associated with the end viewer have shown that women are more likely than men to look for and read warning signs and likewise are more likely to comply with the signs. Older patrons are more likely to take precautions when they see a warning sign. However, those over the age of 40 exhibit a lower level of comprehension when the safety sign is a picture. The major issue associated with personal related factors deals with the person's view of the perceived severity of a consequence associated with not following a warning. Importantly for sport managers, "the more explicit the warning is about the severity of the injury consequence, the greater the perceived hazardousness and recall of warning information" (Sattler et al., pg. 22). Thus, the research tends to show that a perception of danger must be present to change a person's safety behavior.

Cost of Compliance

The cost of compliance is associated with the difficulty in getting someone to appreciate a hazard and to provide a warning that will not be ignored (Sattler et al.). The cost of compliance is the amount of effort someone must exert in order to comply with the warnings. For example, a corrosive consumer product might have rubber gloves in the product's

package, which would represent a low cost of compliance since the step necessary to insure safety was readily available (Sattler et al.). The person using the product would probably be more willing to use the gloves since the excuse that they do not have gloves has been taken away. This concept was previously highlighted in the placement section where compliance is achieved more readily when an easy alternative option is available.

This concept was analyzed in the sports context by two studies concerning racquetball players wearing protective eye-guards (Dingus, Wreggit, & Hathaway, 1993). If the players were not given the eye-guards or had to search for them, which would represent a high cost of compliance, the result was no compliance. However, in a low compliance setting, such as giving the players eye-guards, the compliance rate was 60% (Dingus, Wreggit, & Hathaway). The researchers in this study and several related studies have shown that providing the players with information regarding severity and frequency of injuries, such as lost eyesight from eye injuries, as well as providing the protective equipment can markedly improve a warning's effectiveness (Sattler et al., 1997).

TRAFFIC INDUSTRY RESEARCH

The analogy between sport industry signage and traffic industry signage is very appropriate. Both activities involve rapid movements with various obstacles. A driver has to control his or her body and his or her reflexes must be able to adjust to various external factors in fractions of a second to avoid serious injury. Similarly, an athlete has to control his or her body and his or her reflexes must quickly respond to external factors such as the competition or the sport facility. Both a driver and an athlete have very little time to absorb and respond to a warning sign. The brain can only process one channel at a time and can only consider one problem at a time. The brain can absorb material in a sequential manner and store the relevant data to process a second later, but if too long of a time period intercedes the data might be forgotten. This phenomena affects warning signs in both the traffic and sports industries. Thus, a warning sign placed either too close or too far in advance of the hazard might not be processed (Lunenfeld, 1987). A previous study highlighted the three basic human functions required in driving as observation, identification, and interpretation (Hanson, Bennett & Radelat, 1966) and all three functions are required in sport.

Research in the traffic sign industry, often referred to as "traffic control devices," has produced significant valuable information that can be transferred to the sport industry. The focus of this research has often

been on the ability to place or create signs in a manner that allows the driver to see, understand and react to the sign while faced with countless distractions (Gallagher & Lerner, 1966). Distractions are also inherent in a sport environment. Would a fitness equipment user see a warning sign when the walls are filled with workout guides, equipment information, and other informational materials? Patrons can be hampered by clutter and/or distraction elements. Clutter is defined as the ability of a sign to compete with other similar objects. If the confusing elements can be identified, their size distribution known, and the average reflectance is known then the clutter can be countered by appropriate sign design (Jenkins & Cole, 1966). Distracting elements are not necessarily similar to the sign, but attract the driver's attention (demand load) and reduce their ability to focus on their driving (Jenkins & Cole). Distractions can include the lack of sign luminance.

Luminance, similar to the concern in the *Van Dyke* case earlier in this article, can be defined as a driver's ability to read a sign and the sign's conspicuity. Conspicuity is a measure of how well the sign "stands out" from its background or in the alternative, how often the sign is noticed (Pietrucha, 1987). The more a sign contrasts with its background the greater the distance from which it can be recognized by the driver (Hanson & Woltman, 1967).

The position of a sign and its background are not the only variables that can affect conspicuity. The terrain and the type of roadway also impact conspicuity (Hanson & Woltman). Thus, a sign that contrasts significantly from its background, such as a red sign against green trees, will still lack conspicuity if it is placed at the bottom of a hill where there exists significant rolling roads before the hill.

Distraction can also arise through a sign's understandability. Understandability measures how well the meaning or intent of the sign is communicated (Pietrucha, 1987). This is a cognitive analysis rather than an analysis of the signs contrast with its background or visual environment. Understanding the meaning of a sign, and what is the appropriate response to that sign is of prime importance (Dewar, 1987).

Another variable addressed by some traffic research has been a sign's "target value." Target value refers to a sign's ability to stand out and is dependent on the sign's size, shape, contrast with background, and the sign's relative position along the curb (Hanson et al., 1966). Thus, a parking regulation sign should have a lower target value and as such command less attention than a traffic control sign such as a stop sign. Since most signs are only observed through a quick glance, studies have examined just how quickly someone can acquire information through a

glance. One such study has concluded that a message of more than three words cannot be conveyed at a glance (Hanson et al., 1966). Symbols are one technique that helps overcome the problem associated with glance observation. Another technique requires utilizing multiple warning techniques such as posting signs and painting the curb (Hanson et al.).

Research has highlighted three major criteria for traffic signage success. First, the sign must have enough background contrast to help it stand out (target value). Second, there must be sufficient contrast between the letters and the sign background. Lastly, the message must be conveyed in enough time that the driver can make a smooth and natural response (Woods & Rowan, 1970). All three factors are interrelated and dependent on each other. The best color contrast, for example, is the white lettering on black backgrounds, but such a combination is not considered desirable since there is a poor contrast with possible backgrounds. Other colors such as red, yellow, and orange are not utilized for certain signs such as street signs since the colors are associated with other control devices. That is why blue and green are the most frequently utilized colors for street signs. The best contrast that can be created by the lettering on the background is light letter color on a dark background. White letters on a green background is often the best color scheme for street signs (Woods & Rowan, 1970).

Another concern addressed by the traffic research entailed the material used in making the sign. This concern is highlighted by the fact that numerous lights that illuminate signs do not work or are not replaced when they burn out. The possible cost for replacing lights needed to illuminate traffic signs has been estimated in the billions of dollars (McNees & Jones, 1987). Studies have researched which materials are the most effective in allowing legibility with low or no lighting. These studies were trying to determine if any specific background material and wording scheme could be effective during the day and still be visible with minimal light at night. The most legible sign at both 900 feet on lighted and unlighted routes was engineer reflective sheeting. Signs with texts were most legible from a distance (863 feet) when the sign was made of super engineer grade reflective sheeting using removable buttons for the copy. The second best combination visible at 825 feet was a combination of high specific intensity reflective sheeting using high specific intensity stick-ons for copy (McNees & Jones).

Research on sign perception has shown that symbolic messages have a number of advantages over written signs (Dewar, 1988). Some of the problems identified in traffic sign research, especially word based signs,

include the legibility distance, recognition of signs under degrading visual conditions, glance visibility, sign learnability/familiarity, sign understandability, increasing response time, and greater conspicuity (Dewar). Part of the problem associated with word based signs is the lettering height and width. These factors can be plugged into a formula with the vehicle's velocity and the required reading time (King, 1970). Other factors that go into determining proper letter size include the offset distance and angle from the road, and the number of messages on the sign.

Placement

Signage legibility may be increased through various techniques such as improved technology, and developing a signage management program. Some might argue that technology can help improve the communication process. A 1992 study highlighted concerns associated with drivers being able to identify fiber-optic letters on a sign. Most drivers (90%) were not able to read the word "Ok" from beyond 200 feet with glance legibility. Numerous individuals in the test guessed at the word when they were far away. This guessing was based on the complexity of the letter "k" (Gisler, Rowan & Ogden, 1992). The researchers hypothesized that a greater number of subjects were able to read the word "only" from farther away because once the subject was able to discern the "o" and the "y" they would be able to guess at the other letters due to their simple form.

Testing Methodology

One benefit from traffic research that can be utilized in future sport industry research entails the testing process. The multitude of variables such as time of day, weather conditions, location, scenery, and the testing novelty effect, all impact the testing process (Lunenfeld, 1987). Field tests provide the "real world" environment necessary for testing and have greater test reliability as they can simulate driving conditions. However, such testing is often very difficult to measure since expensive equipment might need to be installed into a car to monitor the driver's eye movement and reaction time (Dewar, 1987). Furthermore, such material in a car alerts the driver to the fact they are being tested, which can influence their driving behavior. Similarly, testing a skier while they are skiing might be impossible, but they can be asked after they have completed the run if they noticed any signs and how they might have responded to the sign. Other testing methods can be utilized such as observing a driver from the shoulder of the road to see if their head turns in response to a sign or if they follow a sign such as not turning if

there exists a "no turn" sign. Such testing can also be conducted in sports with an observer examining if individuals follow a given sign such as "no running" on a pool deck. However, as highlighted by the research on racquetball safety, non-compliance can be large in sports where numerous individuals do not think they will be injured even if they can take minor steps to significantly reduce the potential of an injury. Based on the variety of testing techniques and the purported effectiveness, some testers only utilize slides of a sign and test the viewer's comprehension based on a simple slide (Dewar).

TRAFFIC INDUSTRY CASES

Producing a vague sign or placing a sign in the wrong area are good examples of how to increase rather than decrease risks. Numerous courts have held that government agencies have no duty to erect traffic signs. Furthermore, they are not liable for placing traffic signs under the government immunity doctrine since placing the sign is a discretionary act (*Dohrman v. Lawrence County*, 1966, *Franks v. Lopez*, 1994, *Sparks v. Kansas City*, 1942). When a government agency or contractor followed plans and specifications furnished by the state and under supervision of state officials they would not be held liable for those who were injured in accidents if a driver failed to see a sign (*Morriseau by Morriseau v. Rifenburg Construction, Inc.*, 1996). However, government agencies can lose that protection when they place a sign in a manner that in fact increases the risk of injury. Such liability can be raised from various theories ranging from ordinary negligence to nuisance claims (*Jones v. Shelly Company*, 1995). The *Jones* court concluded that the failure to properly place a sign, any improper reflectorization, and allowing overgrown tree branches to block signs all contributed to a finding of nuisance. (*Jones*, p. 320-321). In the *Franks* case, the court refused to expand nuisance to include failing to erect signage, but the court concluded that the failure to maintain existing signs could constitute a nuisance. (*Franks v. Lopez*, 1994, p. 346).

In *Nowlin v. City of New York* (1992) an automobile accident victim sued the city for her injuries and claimed the city was negligent in posting the sign so close to a curve that a driver did not have a chance to respond to the sign. According to the road plan, the curve-and-speed-advisory sign was supposed to be posted at lamp post H-9, but was placed instead at H-6 which was 300 feet closer to the mouth of the curve. Photos and accident reports were presented in court showing numerous accidents at the site. The court concluded that the city was negligent with respect to posting and maintaining signage and failing to post

the curve-and-speed-advisory sign sufficiently in advance of the mouth of the curve. (Nowlin, p. 672). The court also concluded that while the state was initially responsible for building the highway, once the city undertook maintenance and safety functions, it could not later claim it had no duty. (p. 672). Thus, the city could be liable for negligent signage since it owed a duty to maintain appropriate signage.

SIGNAGE MANAGEMENT PROGRAM

Sattler et al. (1997) recommended a multiple step signage management program containing the following steps:

- 1-Carefully assess the risks that can be successfully measured. Who will be the target audience?

- 2-Select the appropriate medium and materials, how was the message developed, has it been tested, will it be effective?

- 3-Develop appropriate material and conduct a pretest to establish appropriateness. Can the audience understand the message, recall the message, accept the message as important, and will they agree with the proposed tactics?

- 4-Implement signage strategy and analyze if target audience is paying attention and reacting appropriately to the sign.

- 5-Assess the effectiveness of the sign based on the criteria established in the planning phase.

- 6-Utilize feedback from various sources such as patrons.

Sign maintenance is also a major concern. Graffiti, theft, and deterioration can make a sign ineffective or illegible. In a 1983 study, it was determined that about \$50 million is spent annually by state departments of transportation to replace stolen or vandalized signs (Frith, 1986).

When these concepts are transferred to the sports industry, the following suggestions can be integrated in a comprehensive sport signage management system. Such a system might incorporate the following concerns.

There is no one correct definition of "adequate" signage since signage can be adequate in one instance, but inadequate when the facts are changed. For example, a sign not to run on a pool deck might have a greater impact on women, seniors, and children. However, the same sign might have little impact on men who have no reason to follow the warning since they have never fallen on a pool deck and do not foresee themselves facing that danger.

Besides developing the most appealing and effective sign design and phrasing, no warning system will be maximized without having an educational program designed to teach individuals both about risks, and more

importantly, what actions to take to avoid harm. Warnings should be included in any instructional or registration materials since they will have a greater chance of being read. Warnings will only be effective if there exists an easy solution to avoid the hazard. Thus, efforts should be focused on trying to develop solutions to address a hazard. For example, while the ASTM standards advocate posting a warning not to repair broken equipment, most people will not follow such a warning if they think they can repair it themselves or if it is a busy location and they do not want to lose use of the machine. Roving employees can help make repairs or assist the patron in finding another machine.

Posting more and more warnings will not necessarily provide more education. Only through developing an educational training program will people start to get the message, which should be reinforced by properly placed and adequate signs.

CONCLUSION

The following suggestions summarize some of the key findings in this paper and provide useful strategies for administrators and sport managers in implementing a more successful signage management program.

- The more likely someone will go out of their way to look for and read a sign, the more likely they will be to follow the warning (Sattler et al., 1997).
- The sign must be able to communicate to English speaking, non-English speaking and illiterate individuals.
- Understand that there is a difference between having a right to know about a risk and the right to understand what the risk was.
- Avoid technical language and multi-syllable words.
- The major emphasis should be on severe and high likelihood hazards.
- Indicate that a hazard exists, but for the warning or sign to be effective it also needs to provide instruction on how to avoid the hazard.
- Consider issues that affect filtering of the warning such as information overload, improper risk assessment, improper situational assessment, or benign experiences with a hazard that have not been seen or materialized.

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