

# Research Study Evaluating the Effectiveness of Caution Signs and Cones

Patricia G. Jortberg, Ph.D

## Abstract:

The most common caution signs and cones were evaluated in a perception study with 246 participants to determine the effectiveness of the delivery of the warning message. Four products were tested (2 signs, 2 cones). Results show that “Banana Cone” significantly outperformed all of the products examined. Prior research shows that novelty (including shape and color) gains more attention and pre-existing knowledge aids in the delivery of the message. This study concludes that pre-existing knowledge of the banana peel slip is the root cause for “Banana Cone” to significantly outperform all other products in tests for safety perception.

## Introduction:

Society is exposed to signs so frequently that most go unnoticed, but others do tend to catch your attention. Safety experts cite breaking through that “noise” is the biggest challenge to minimize slip and fall liabilities. Safety signs come in all shapes and sizes—from cones to collapsible A-Frames to wall-mounted one dimensional signs. Shapes, lettering, language, color and placement play a critical role in the strength of a warning message. An example of an efficient shape is an octagon, used as STOP sign; an effective use of lettering is an exclamation point portraying DANGER! Getting noticed is the first requirement of an effective warning. Dr. Wogalter reports that once noticed, the warning message will tend to reinforce what the receiver already knows (and in the process make those beliefs and attitudes stronger and more resistant to change)<sup>1</sup>. The most effective way for a brain to remember something is if there is pre-existing knowledge aiding in the message delivery.<sup>2</sup> In regards to preexisting knowledge of the products in this study, one could have previously experienced an injury or lawsuit, or in the case for one product, have a faint recollection of their favorite cartoon character slipping on a banana peel. Different shapes are often used that aid in attracting attention, but this does not correlate with the message being delivered and comprehended. Recently a new design was created that not only draws more attention, but delivers a clear message in the shape of the warning.

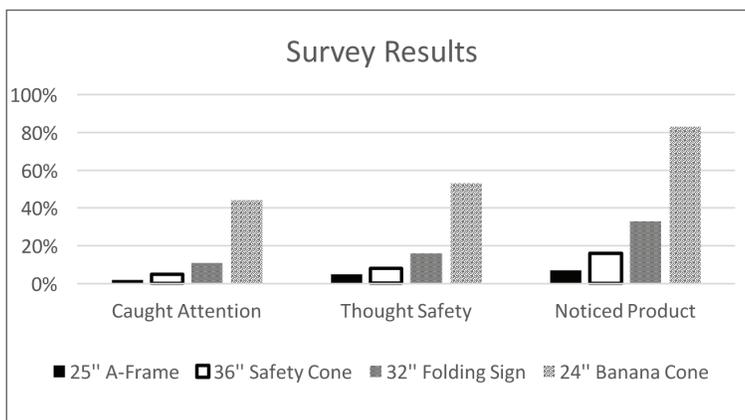
## Background:

In this study, researchers tested the most common warnings used to prevent slips, trips and falls. Slip and falls are the leading cause of unintentional injuries in the United States; accounting for approximately 8.9 million visits to the ER every year<sup>3</sup>. In the United States the annual direct cost of disabling injuries on the job due to slip-and-fall related accidents is over \$11 billion, according to OSHA.

The experiment design was selected to include a cross-section of people, with ages, ethnographic demographics and gender being representative of the typical environment where safety signs are used. Subjects were randomly self-selected into the experiment. In this experiment, all people who walked through a hallway where a safety cone/sign had been placed on the ground were interviewed once they left the facility. They were not able to look back into the hallway to answer questions. The building population consisted of 33% residential occupants, 33% commercial office workers, and 33% hotel guest. The experiment included changing the variable (type of cone or sign) after the desired sample size was interviewed. The variable was placed 1/3 of the way across the hallway, which was approximately 2 meters in diameter.

Three questions were formulated to measure attention, safety, and noticeability of the product. Taking prior research analysis into consideration, the following were asked to all 246 participants after walking past the sign.

1. Did anything catch your attention when walking through the hallway?
2. Did anything remind you of safety or draw attention to a hazard?
3. Did you notice a safety sign (or cone) on the ground?



**\*The products involved in this study are currently being produced by Rubbermaid Commercial Products, Impact Commercial Products, Continental Products, Scott Young & Research and Banana Products. It is estimated by industry experts that these five manufacturers combined produce 3M+ units every year capturing over \$20M in annual sales from these products alone.\***



US Patent: 4253260-A Titled “Self “Standing Floor Sign”, 1981



US Patent: D462286-S1 Titled “Safety Cone”, 2002



US Patent: 7047681-B2 Titled “Folding Sign”, 2006



US Patent: D737164 Titled “Banana Cone”, 2015

**Analysis:**

The critical design components that make up a warning are shape, color, size and wording. The use of common and uncommon shapes aid the brain with “pre-existing knowledge”, ultimately improving the ability to understand and comprehend a warning<sup>1</sup>. Noted in the Communication – Human Information Processing (C-HIP) Model<sup>6</sup> to the right, if the warning is not comprehended, then behavior will not change, or highly unlikely to change; resulting in a failed warning<sup>5</sup>. In the case of this study, the “Floor Sign” only caught the attention of 2% of participants. Since not everyone is guaranteed to actually change their behavior after seeing the warning, one could derive from the CHIP Model that this particular product has a success rate of no greater than 2%. Bhalla and Lastovicka, 1984<sup>7</sup> proved that when only changing the shape, there was a small positive impact on gaining attention for warning messages. In this study, the triangular floor sign outperformed the rectangular floor sign and tall safety cone by 2x which coincides with previous research. However, the Banana Cone significantly outperformed the others by up to 22x. This is far more than Bhalla and Lastovicka found in their analysis. If changing the shape from a rectangle to a triangle increased by 2x, then why did a banana peel shape cause a 22x increase? Dr. Wogalter reports that the most effective way for a brain to remember something is by the use of pre-existing knowledge aiding in the message delivery. (e.g., Young and Wogalter, 1990)<sup>2</sup> In this case, the pre-existing knowledge to accurately and efficiently deliver the intended warning is the global banana peel slip, which has been around since the early 1800’s. Originally gaining popularity in the United States by Carl B. Frank, lack of sanitation and little regulations resulted in an abundance in trash on the streets. It didn’t take long for bananas to rot, turning the sidewalks into slime-covered booby traps. Now a popular comedy gag worldwide, the banana peel slip is recognized by both children and adults.

**Conclusion:**

Gaining attention is best achieved by using a creative solution. Attention is a prerequisite to message processing, and thus avoidance action. In the study referenced above, when surveyed, **88% of participants noticed the “Banana Cone”, versus 7% noticing the “Floor Sign”**. These statistics imply that the individuals are perceiving and processing the message, and thus are more likely to use caution. While there is a presumed correlation between cognition of caution and fall avoidance, this proves to be difficult to measure. Beyond design creation, gaining attention, and changing behavior, getting the right warning in front of audiences is not an easy task. Laughery and Wogalter (1997) show in Fig. 2 the ecosystem

between a manufacturer, distributor, employer, and end-user.<sup>8</sup> Distributors are the bridge between manufactures and employers and it is their duty to utilize the most effective warnings for the safety of the target population. It is the manufacturers responsibility to produce quality products at a sustainable and reasonable price. This study concludes that changing the shape and increasing the size had a positive impact on perception and when added to the shape being a banana, leveraging their preexisting knowledge, results were even more positive. The banana peel slip dates back to the early 1800’s and is recognized by billions of people around the world. The Banana Cone significantly outperforms all of the other products examined because the preexisting knowledge of the banana peel slip works with the shape of the cone do deliver a clear, precise, and humorous message.

Figure 1: C-HIP Model

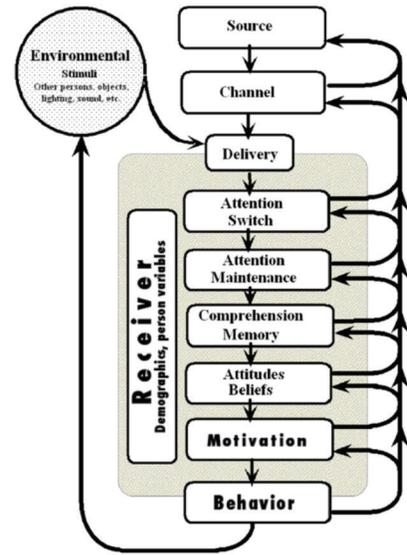
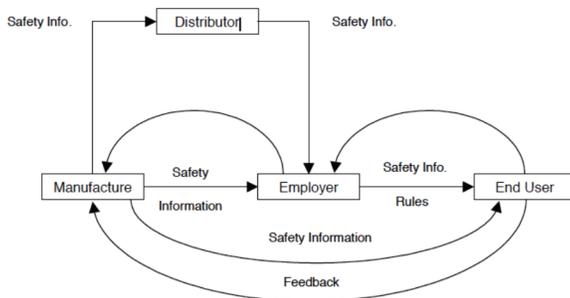


Figure 2: Ecosystem and Communication Model



**References:**

1. Wogalter, M.S (2004). 249 Wogalter, In. Warning! Sign and Label Effectiveness: Brazil Dr. Michael S. Wogalter
2. Young, S. L. and Wogalter, M. S. (1990). Comprehension and memory of instruction manual warnings: conspicuous print and pictorial icons. Human Factors, 32, 637-649.
3. National Safety Council (2011) NSC Injury Facts; Slip, Trips, & Falls: www.nsc.org/NSCDocuments\_Advocacy/Fact%20Sheets/Slips-Trips-and-Falls
4. ISSA/Sanitary Maintenance, Sanitary Supply Distributor Sales (2010): Results of a joint research study conducted by Sanitary Maintenance Magazine and ISSA
5. Wogalter, M.S. and Leonard, S.D. (1999). Attention capture and maintenance, in M. S. Wogalter, D. M. DeJoy and K.R. Laughery (eds.), Warnings and Risk Communication, London: Taylor and Francis, pp. 123-148.
6. Wogalter, Smith Jackson (2001): Methods and Procedures in Warning Research, Communication Human Information Processing (C-HIP) Model
7. Bhalla, G., & Lastovicka, J. L. (1984). The impact of changing cigarette warning message content and format. Advances in Consumer Research, 11, 305-310.
8. Laughery, K.R., Wogalter, M.S., 1997. Warnings and risk perception. In: Salvendy, G. (Ed.), Handbook of Human Factors and Ergonomics, 2nd Edition. Wiley, New York, pp. 1175–1197. AND DeJoy, D.M., 1999. Attitudes and beliefs. In: Wogalter, M.S., et al. (Ed.), Warnings and Risk Communications. Philadelphia, PA, Taylor and Francis, pp. 189–219.