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# Rhetoric of warning labels: Human figures in cross-cultural design

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**Rhetoric of warning labels: Human figures in cross-cultural design**

by

**Kylie M. Jacobsen**

A Thesis submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of  
MASTER OF ARTS

Major: Rhetoric, Composition, and Professional Communication

Program of Study Committee:  
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Iowa State University

Ames, Iowa

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## ABSTRACT

Evaluation of warning label design does not always include the perspectives of researchers or graphic designers and legally, warning labels hold no responsibility for changing human behavior. Over the past two decades, much attention to warning label design has come from fields such as human factors, ergonomics, and social psychology, but scholarship on abstract visuals in technical communication is not emphasized. Warning labels use generalized abstract bodies to depict the risk of great and potential hazards, demonstrating a removal from physical reality. This paper will look at warning labels through the lens of abstraction.

Abstraction is a non-mimetic form of an object or an idea, and its interpretation greatly depends on the context and culture it is observed in. Arnheim's theory of abstraction can help designers create effective designs that communicate cross-culturally based on a system of symbols, signs and pictures. The range of abstraction is evident in hybrid warnings that employ both symbols and pictures. Historical uses of warning labels have been subtly reshaped over the years from highly modernized images to ones that contain symbolic images that aid context and understanding of risk.

To analyze the way culture shapes warning images, vending machine warnings were analyzed to understand how context and culture affects the abstraction. A selection of wet floor signs was also analyzed for the cultural influences observed in the abstract representations of human figures. Even though the images are standardized, the international images uncovered links between the designs of the warnings and their current usage that suggested they were influenced by prominent art movements during the 20<sup>th</sup> century. While standardization is the surest way to represent ideas across all audiences, the images analyzed in this paper demonstrate that warning label designers can stretch the boundaries of standard designs. Very few of the images remained constant between signs that demonstrate the same warnings, which suggests that viewers are responding well to localized images.

## CHAPTER 1. INTRODUCTION

“Neither engineers nor designers alone should be permitted to have the final say on symbols. The task requires the combined efforts of psychologists, linguists, educators, anthropologist, sociologists, lawyers, engineers, designers, and many others” (Modley, 1966 p. 125).

Warning labels are traditionally applied in three types of situations: to improve safety and mitigate injury or property damage, to influence behavioral actions needed to maintain safety, or to inform people of potential hazards in order to allow them to make informed choices about their own safety (DeJoy, Laughery & Wogalter, 1999). In short, they are meant to alert people of a hazard in a short amount of time. Evaluation of warning label design does not always include the perspectives of researchers or graphic designers (Collins, 1982, p. 2). Legally, warning labels hold no responsibility for changing human behavior (Robinson, 2009). That is, warning labels are designed arhetorically—without rhetoric. Understandably, standards for warning labels exist to create an ideal universal language of risk that protects both the manufacturer and the consumer, and research shows that pictorials greatly affect human perception of risk (Rodriguez & Asoro, 2012; Schneider, Gadinger & Fischer, 2012; Wogalter, Conzola & Smith-Jackson, 2002). Over the past two decades, much consideration on warning design has come from fields such as human factors, ergonomics, and social psychology, but scholarship in abstract visuals in technical communication is not emphasized. Warning signs demonstrate hazards through abstract representations of human form through pictures, signs, and symbols. These seemingly simple abstracts protect consumers of machinery and household products as well as the general public.

In 1982 Collins analyzed the development and evaluation of effective symbol signs in which she calls attention to a need for “a more comprehensive model for evaluation or symbol performance in terms of the relevant psychological processing dimensions” (p. 2). Her argument concluded with a call for an urgent need to create and standardize symbols that communicated safety information and hazard warnings, and since then, consumer safety has become an important issue confronted by the International Standards Organization (ISO, 2013), yet scholarship does not analyze the psychological processing dimension of abstraction as it relates to human figures used in warning labels. Abstraction, however, is studied more in art than in technical fields, where the warnings are created; therefore, the risk *communication* is not always the focus of the warning label as much as *perceived risk* is. This oversight is problematic cross-culturally as well since the images are often intended to be universal.

The psychological processing dimension of abstraction occurs when any reader is asked to visually interpret a non-mimetic image, but the reader’s perception does not fill in the incompleteness of its abstraction. Arnheim argues that completing the image with imagination is nearly impossible and a reader’s “desire to attempt is quite rare” (1969, p. 138). He adds that a cartoon is only perceived at its level of reality as it is drawn; yet the meaning is transferred by the specific use of line and color. “It is true that the abstract style of such pictures removes their subject matter from physical reality. Human traits and impulses appear, unencumbered by physical matter and free from the tyranny of gravitation and bodily frailty” (Arnheim, 1969, p. 138). In other words, the abstract quality of the image is only communicated by the abstraction of reality. This idea poses a problem for warning labels because they utilize generalized bodies to depict the risk of great and potential hazards.

Therefore, if the abstraction demonstrates a removal from physical reality, can warning labels be effective? This paper will look at warning labels through the lens of abstraction.

I initially became interested in the representation of humans in warning labels when I stayed in the office late one evening and decided to get a caffeinated beverage from the vending machine to keep me focused on work that was to take me late into the night. While I was waiting for a particularly slow-dispensing machine, my eye caught the neon orange warning label on the corner of the vending machine warning not to rock the machine. Amused by the dramatic display of tiny lightening bolts of panic emitted from the human stick-figure getting crushed by a falling vending machine (Figure 1), I glanced at the warning label on the neighboring vending machine. To my surprise, the warning label depicted a different scene, one of much less bodily harm to the stick figure, as it effortlessly held the rocking vending machine in mid-air. Intrigued still, I noticed the warning label on the third neighboring vending machine was again different. This time the figure appeared to struggle under the weight of a tipping machine, made evident by the degree to which the figure's back angled downward and an unbalanced foot raised off the ground. Although the message was the same on each sign, the image was different, and I wondered what amount of standardization determined how the figures were designed. But most importantly, in a world saturated with images and text, the different signs made me *look* at them. Questioning the range of "standard" designs, I began some research into standardizations of warning labels, which consequently led to an interest in cross-cultural interpretations of human-figures in warning labels.



Figure 1. Range of vending machine warning labels

### Questions

Using Arnheim's theory of abstraction, this paper aims to contribute to the conversation about globalization or localization of visual language in warning labels by focusing on localization and therefore, more vivid images. This paper will answer the following questions:

- What is the range of abstractness in warning labels? Has it changed over time?
- Are we able to determine the reality of the potential hazard that the picture is experiencing even though we are simply seeing an abstract reflection of it?
- If so, does that abstract reality become universal?

## CHAPTER 2. REVIEW OF LITERATURE

Understanding how warning labels begin to depict real-life incidents through abstraction, humans must first be able to categorize what is being observed in the image on the label. Plato's Theory of Forms asserts that we are only able to categorize things by the way we see them through comparisons of one object to its perfect and timeless object that is situated in the "real world," which is outside of the material one we currently live in. In short, the Form of an object is unchanging in the "real world," yet the actual object itself does change in our material world. In this manner, the human figures in warning signs are Forms, even though humans have changed sizes and shapes and have lived and died throughout time. Yet we still have an understanding of what makes humans truly human, even though there is no "perfect" human in the material world. What we observe are imperfect reflections of humans. This paper examines how we are able to use abstraction of the perfect "real world" inside the "material world" to correctly identify forms in warnings, based on our past experience and ability to categorize, in order to maintain physical safety. From there, this paper will discuss whether the degree of abstraction present in our material world benefits the viewer, or if the viewer would benefit from more "perfect," or idealistic, images.

Abstraction in human forms is evident in the silhouette-like resemblances inside warning labels. The significance of the silhouettes is exemplified by Plato's allegory of the cave. Plato describes a group of prisoners chained up in a cave for their entire lives. Behind them is a fire, a light source, and between the fire and the prisoners is an elevated walking path. The prisoners are only able to see the shadows of anything that walks across the path and hear the echoes of anything or anyone in the cave. Once one of the prisoners is released, he is able to see the world outside of the cave in full color and sound, only to realize that

what he thought was real and true in the shadows of the cave were actually incorrect, and instead distorted representations of reality. When the prisoner returns to his fellow prisoners in the cave, he tries to explain that their reality is actually a mere representation of true reality, but his former cave mates cannot comprehend the concept and therefore despise him (Rowe, 2012). This allegory mimics the way our material world (the cave) is just a reflection of a perfect world (outside the cave).

Interestingly, Neurath explicitly designed his Isotype images to mimic a silhouette, or a shadow, because of its simplicity and stark contrast. We can begin to see warning labels as shadows of the real world reflected as abstractions onto a neutral background, waiting to be categorized and understood. But a slightly richer background for the images currently observed in warning labels is needed before we can appreciate the range of abstraction. From the beginning of symbols to the standardization of them, a subtle shift in the designs since the early 20<sup>th</sup> century reveals a tendency toward greater abstraction.

I offer a brief history of the development of the standardized signage and warning labels. Warning labels exhibit a rather young history. In the 20<sup>th</sup> century, the automobile gained popularity and allowed quicker and easier travel between countries, which increased travel and trade. As a result of the rapid increase of international travelers, a greater need for universally recognized road signs became evident as well as signs that addressed the range of hazards created by the influx of drivers on the road but that did not rely on language-specific messages (Collins, 1982).

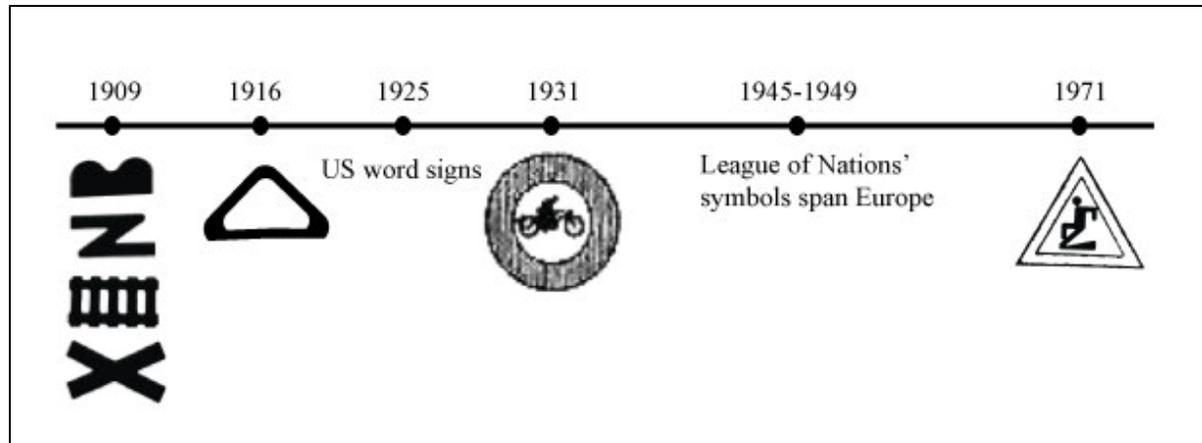


Figure 2. Timeline of standardized visuals

Consequently, in 1909 the Paris convention on International Circulation of Motor Vehicles developed the first standardized signs (curve, bump, intersection, and railroad grade crossing). The success of the four signs resulted in the development of three more in 1916 (linked curves, uneven pavements, and the triangle for warnings). By 1931, The League of Nations designated 26 systematic uses of color and shape in road signs. Signs up to this point exclusively used lines and shapes to convey meaning. Human figures seem to first appear in standardized symbols in this set as a highly stylized silhouette motorist on a motorbike.



Figure 3. First human figure in standardized symbol. (Schipper, 2009). Source: (LoN, 1938 : 240).

After WWII ended and the GI Bill passed in the United States in 1945, the US economy flourished and international travel saw an even higher increase, often resulting in a demand for more signage. Unfortunately, the rapid expansion resulted in different signs for the same meaning (Collins, 1982). In response to the need of signage, in 1949 the United

Nations applied designs influenced by the League of Nations' 26 symbols and enforced a unified system of road signs and symbols across Europe (Collins, 1982). Additionally, technical communicators, who were needed to write manuals depicting proper use of new machinery during the war, were in demand after the war and throughout the 1950s as technical and professional writing detailed risk communication to keep consumers safe while operating the plethora of new products (Schriver, 1997). However, *Consumer Reports* indicated that the instruction guides that accompanied the products were difficult to understand. At the same time, research in audience analysis and reader-writer relationship, in addition to research in organizing visual and verbal information, benefited risk communication. The Swiss Style, or The International Typographic Style Movement, of the 1950s promoted organizing visual and verbal information distinct from exaggerated propaganda and advertising popular during the war. Instead, the style focused on function and clarity in favor of design as a useful social activity (Schriver, 1997).

While symbol regulations were adopted in Europe, the United States retained its reliance on word signage. The standard, developed in 1925 by the Association of State Highway Officials, is surmised to have been created as a way to establish an official network of highways to deter private promoters of tourists from creating competing and confusing signage (Collins, 1982). Under the influence of the Highway Safety Act, by 1971 the U.S. likened its signs to the UN protocol, although the US still heavily utilized English word signs.

Not until the late 1980s did risk communication get a serious review in effectiveness. In 1983, the U.S. observed the largest number of poor citizens since 1964 with numbers reaching 35.3 million people, and consequently, literacy rates dropped. A year later, 36

states regulated written policies requiring plain language so that insurance contracts offering life, accident, sickness, or auto policies scored between 40 and 50 on the Flesch readability test (Schriver, 1997). In 1989, consumers in the U.S. sued companies with product manuals that continued inadequate instructions or warnings, which prompted studies of ethical design of risk communications, public service messages, and environmental impact statements. Throughout the 1990s, consumers continued to push for “ease of use,” especially in the accompanying documents of products (Schriver, 1997). Instances such as *Hubbard-Hall Chemical Co. v Silverman* declared that instructions written only in English were not sufficient warnings as a matter of law to be cause of injury (Robinson, 2009). The outcome suggested that bilingual warnings might serve manufacturers better; however, in 1992, *Stanley Industries, Inc. v. W.M. Barr & Co., supra*, made a justifiable case for pictorial symbols in addition to English warnings as adequate, depending on the jury’s analysis. Three years later, *Henry v. General Motors Corp* made a case for the manufacturer who used English-only warnings, but a yellow caution label was considered sufficient warning especially since the illiterate worker did not heed caution even though he admitted to noticing the colored label (Drahos, 2013).

Today, warning label design is essentially studied in two forms: non-text and text. Non-textual elements in a warning design might include color or pictorial design. Textual elements might include signal word choice or phrases that imply consequences (Wolgalter, Conzola & Smith-Jackson, 2002). Using the C-HIP model designed for expanding the human information-processing model by Wolgalter, researchers found components that take into account attitudes, beliefs, and motivations behind human behavior resulting from risk communication, including salience, wording, layout and placement, pictorial symbols,

auditory warnings, and personal factors (Wogalter, Conzola & Smith-Jackson, 2002).

Saliency refers to the noticeability of the warning considering color, shape, size, and contrast.

Wording includes four types of texts to consider in a warning: a signal word, description of

hazard, description of consequences for non-compliance, and finally a description on how to

avoid the hazard. Layout and placement addresses the context of use. Pictorials are images

used in place of text for universal comprehension among children, illiterates, and the multi-

lingual. Abundant literature supports and counters uses of pictograms in warning labels, but

Davies, Haines, Norris & Wilson suggest that pictograms are probably best used as a

reinforcement and reminder of already established safety messages (1998). Verbal warnings

are recorded messages that indicate tone, auditory icons, or speech to bring attention to the

visual warnings that may have been overlooked in context. Finally, personal factors such as

demographics and culture indicate that warnings are more likely to not only be noticed, but

also read if they are particularly relevant to a specific group or individual (Wogalter, Conzola

& Smith-Jackson, 2002).

Cultural studies in visual rhetoric specifically take into account a universal audience,

as the early traffic sign conventions demonstrate. Interestingly, around the same time Otto

Neurath was developing a system of visual language with the graphical expertise of his hired

artist, Gerd Arntz. Ultimately, Neurath envisioned an objective, pictorial language that

would unite intercultural societies. Verbal language, he claimed, was subjective and

therefore ineffective in a global context. The resulting system, which he named the

International System of TYpographic Picture Education (Isotype), became an

epistemological way to make transparent and simple visualizations of data based on positivist

principles. The simple images Arntz designed represented relationships far more memorable

than complex images that displayed exact data. Neurath aimed to make a symbol void of cultural or semantic denotation in favor of a one-size-fits-all language that could be easily reproduced. The resulting designs embodied modern design well, and emphasized a scientific approach. “An Isotype character is similar to a scientific formula; it is a reduced and conventionalized scheme of direct experience” (Lupton, 1986, p. 50). Modernism was founded on the ideals of universality by producing designs with clear and concise forms that were void of cultural conventions (Kostelnick, 2011). Therefore, Neurath and Arntz’s representation of human forms in simple, Isotypic images were extremely economical, consisting of lines that represented the essence of man.

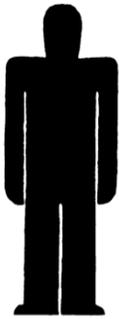


Figure 4. Neurath’s human figure. (Lupton, 1986).

Hoping to create an a-cultural language, Neurath also helped establish logical positivism. Logical positivism, according to Lupton, combined two philosophical attitudes: rationalism and empiricism (Lupton, 1986). Essentially, logical positivism attempted to apply a scientific method to analyze language by observing all underlying vocabulary of all languages. In turn, those words would be synthesized into images. In parallel, Arnheim proposes that an abstraction of an image can only occur when the object or essence the image represents has been generalized to its core of recognition. While logical positivism has been influential in modern design (Lupton, 1986), the ideal of a perfectly universal language poses

an issue cross-culturally because of the interpretation needed to understand the images and the way images are used.

Without the ideals of a universal language, a look at a “culture-specific” approaches also possess a range of limitations. A former student of Neurath’s, Rudolph Modley brought Isotype-inspired designs to the United States (Crawley, 1994). Modley aligned much of his visual statistical theory with Neurath, but differed in regards to his designs of the pictorial. Instead, Modley opted for more personalized and culturally specific, or localized, images. In this way he hoped to embrace the changing perceptions of his audience and engage them in the data on a different level. In his design of human figures, Modley reflected emotion in individual images representing distinct data. For example, the popular image of the unemployed man (Figure 4) demonstrates the subtly curved lines used to evoke a pathetic appeal for the man’s slumping shoulders and hands idly in his pockets. Modley demonstrated that simple images influence sympathy and therefore become rhetorical apart from the data.



Figure 5. Modley’s human figure. (Modley & Myers, 1976)

Brasseur addresses the success of localized images when she tells the story of elementary school children graphing the favorite color of jellybeans amongst their classmates. She concludes that, “visual forms of communication that rests in the community, that have a heuristic function, and that are produced and shared collaboratively are clearly the

most successful” (p. 147). Even though some visual language is not intimately shared with the audience (Brasseur highlights Snow’s use of dots in his analysis of cholera in London), the language can still make an impact on them, which makes the case for culture-specific images needed to be universal, but it still poses a limitation of never reaching the entire population. Culturally, some words and images will never invoke the same cognitive impact based on the exclusive experiences evident in a specific culture.

Kostelnick considers the cognitive approach to universal visual language as well as the localized approach. He maintains in his argument that “much of this research is founded on the notion that regardless of cultural background or other in-group identity, the perceptual response of the eye and brain can be measured and predicted” (1995, p. 184). However, conventions are created as a result of acculturation. Therefore, cognitive approaches lack a sense of universality because visual processing is guided by what we learn and experience (Kostelnick, 1995).

The quest for the ideal universal image language system continued throughout the mid-20<sup>th</sup> century. Henry Dreyfuss, an American industrial engineer, concerned himself with “functional, instructive graphic symbols” (Dreyfuss, 1972) that promoted safety in the workplace because they operated as supplements to all languages. Akin to Neurath, Dreyfuss believed that simple forms or colors registered with the brain faster than written word, and in the case of potentially dangerous farm equipment, split seconds could save a limb (20). Moreover, his designs emphasized the relationship between humans and products (Woodham, 2004). In 1937, Dreyfuss began working for Deere & Co., after which he focused on making machine controls safer for cross-cultural workers. He believed symbols were ideal for communicating quickly across language barriers because symbols could fit

easily on knobs compared to text, since symbols were practical at both large and small scale whereas text becomes illegible (Dreyfuss, 1984), and because they only made contextual sense when placed on the controls (Collins, 1982). In the early 1970s, Dreyfuss compiled 20,000 symbols from around the world and documented a majority of them in his *Symbol Sourcebook* in hopes of defining them for a wide range of users and travelers. “Flatman,” a common nickname for human-figure silhouettes found in warning labels, became popularized in the U.S. and Canada in the 1970s and 1980s (Robinson, 2009).

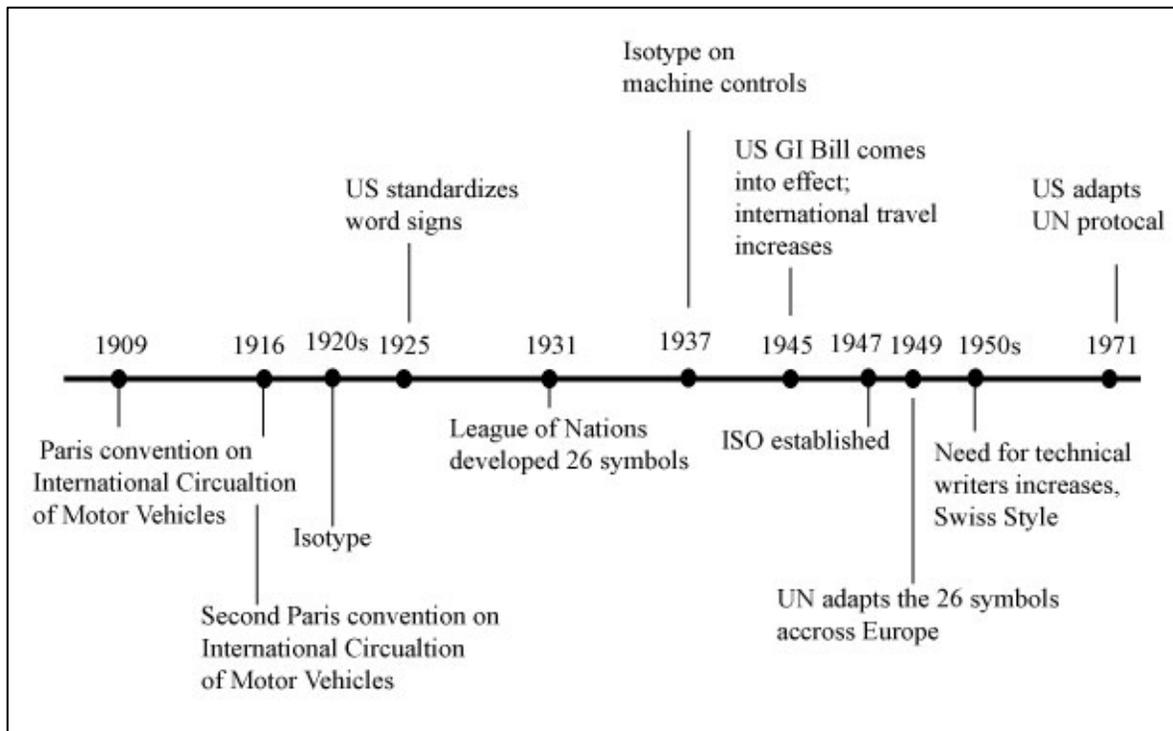


Figure 6. Timeline of standardization events

Nigel Holmes cites Neurath and Modley as strong influences in his design work. Apart from simple pictorials, Isotype observably influences Holmes’ work. Ultimately, Holmes wanted his audience to connect with his information graphics by making them look different from each other, similar to Modley. Holmes also cautions against trying to create a universal language, and defines the act of doing so a “common pitfall” among designers

(Holmes, 2013). While a universal pictorial language is ideal to Holmes, his work aims to celebrate different cultures by making them visible. He likens this concept to Modley's approach to a universal language from the mindset of another commercial artist. Even though Holmes would consider himself an art worker (like Modley) instead of a transformer (like Neurath), he claims Neurath's method as an efficient way to allow pictures to demonstrate statistical accountability.

### Standardization

To prevent the same problem of creating many signs for the same hazard that occurred in the UN after WWII, standardizing one image for one hazard came into practice and is still important today. The International Standard Organization (ISO), an international governing body for standards, maintains the process. At least one nongovernmental organization is established in each nation, according to Warren (2011); for example, the United States has the American National Standards Institute (ANSI), Great Britain uses the British Standards Institute (BSI), and Japan, the Japanese International Standards (JIS). All of the organizations are members of ISO, which has been the official standard organization since 1947. The ISO's administrative structure, based in Geneva, Switzerland, is supported by discipline-specific technical committees, which are further split into subcommittees, many of which are from a wide range of countries and therefore cultures. "Standards happen through a multinational consensus process that reflects governmental and industrial needs and involves considerable cross-cultural communication" (Warren, 2011, p. 291). Warren notes that cross-cultural communication does not happen so often within the reports or documents of standards, given their technical nature, but instead communication issues can arise during the process of documenting. For example, determining definitions across

cultures can impose difficulties because of the way cultures define words. Western culture, for example, might use analogy, etymology, or a myriad of other definitions to determine the agreed upon meaning of a word (Warren, 2011).

To fully understand the complexities of cross-cultural communication between committees that establish standards, it is important to understand the infrastructure of ISO. Warren illustrates the structure in detail, but this paper only briefly outlines the complexities. ISO is comprised of a number of volunteer committees and subcommittees that design and maintain the process of each standard. Participating National Members (P-Members) comprise the governing body of the organization and represent multiple countries.

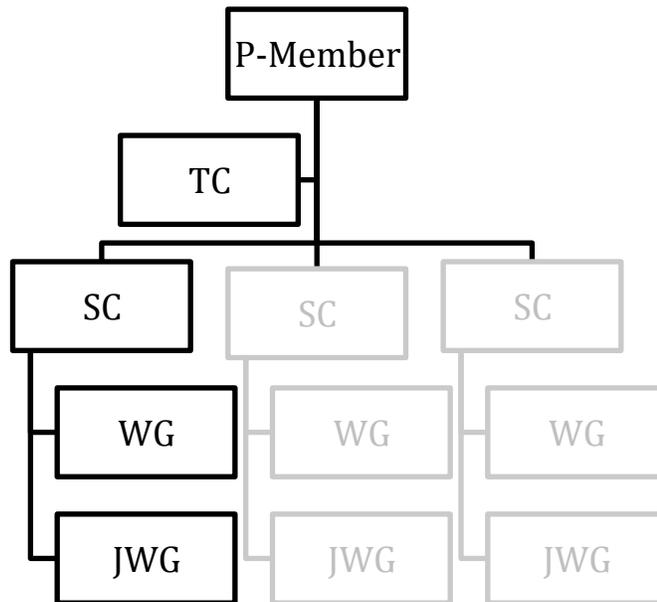


Figure 7. Hierarchy of the International Standard Organization

The P-Member organizations can appoint expert technical members to Technical Committees (TC), which are discipline specific and are further comprised of subcommittees (SC). In each SC, a working group (WG) and joint working groups (JWG) does the work of the organization and is a collaboration of individuals representing at least five P-Member countries (Warren, 2011). In short, at any given time during the development of an

international standard, at least five cultures are communicating with technical experts, not writers or editors. The process of defining the guidelines follows a complex path of procedures and can take from as few as two years to as many as four, although the normal is three (Warren, 2011).

Participating countries are split into three categories of membership: member body, correspondent member, and subscriber member. A member body will represent its country's interests during negotiations, inform its country of decisions and opportunities, and provide a secretariat and membership dues. A correspondent member is typically one that does not have an established national standard organization, but is allowed to remain informed of standardization work without participating in the technical work. A subscriber member pays reduced fees because it typically has a small economy. Because they cannot participate in the technical work, subscriber members do not sell or adopt ISO standards nationally (ISO, 2013).

Application of the research-based guidelines is clearly translated into standards for warning labels among health and safety agencies. For example, ISO and OSHA comply with many of the guidelines to produce their visual risk communication. ISO specifically works to overcome language barriers by designing graphics that pertain to health and safety warnings. Such standardization includes “internationally accepted requirements for designs, colours, content and shapes of graphical symbols” (ISO). However, as Warren points out, the standards must comply with local law and international law; therefore standards utilize words such as *should* instead of *must* when referencing standards to follow (Warren, 2011, p. 218). Warren defines standards as agreements between nations and, while documented with specific criteria, are treated as “suggestions, guidelines, or definitions” (2011, p. 220). In

other words, standards are not absolutely required, but if a company within a body member wishes to operate in conjunction with other markets in other countries, the standards are the most cost-effective and efficient way of ensuring prosperity.

ISO explicitly likens itself to that of Isotype and the graphical influence of Neurath. Consistent silhouetted symbols objectively represent outcomes intended by the sign. However, as Modley considered, some of the graphical signs have become outdated for risk miscommunication (e.g., life jacket icons are limited to fashion). Interestingly, the rationale ISO asserts for standardizing graphical symbols also closely reflects Neurath's design philosophy. Similarities between a push for a language outside of words, legibility at a variety of sizes, consistency, and clarity reverberate in ISO standards, specifically ISO/IEC 80416, which does not include safety signs (ISO, 2013). ISO 7010 asserts that while all of the above applies for safety signs, a second component to creating universal safety signs includes learning because safety signs "are not always intuitively understood. Often training needs to take place to inform people about the meaning of a graphical symbol" (ISO, 2013). Perhaps, by catering more toward cultural-specific designs, less training will be needed since the audience brings past experience to the designs already.

Basic standards can be used to teach and assess cross-cultural communication. Risk visualization pertaining to shape and color are consistent with universal languages as defined by the standards. Overall, ISO identifies five different types of safety signs. They are:

(a) warning sign, distinguished by a yellow triangle with a black border underneath a black symbol with accompanying text; this sign signals potential personal injury or threat to health;

(b) prohibition sign, distinguished by a red circle with a diagonal bar on a white background under a black symbol with accompanying text; this sign alerts immediate or potential risk of personal injury or threat to health;

(c) mandatory action sign, distinguished by a blue circle under a white symbol with accompanying text; this sign indicates required actions in order to avoid personal injury and threat to health;

(d) safe condition sign, distinguished by a green square under a white symbol; this sign indicates actions to relieve emergency situations; and

(e) fire safety signs, distinguished by a red square under a white symbol with white flames; this sign indicates location of fire equipment.

In order for a company to be protected by ISO-compliant standards, it must pay a licensing fee. In the United States, ISO standards can be purchased through ANSI. Individual companies can make their own pictograms to eliminate the ANSI fee; however, the company risks creating confusing signs.

Since 1983, the Hazard Communication Standard (HCS) has been responsible for providing ample information about the chemicals in a workplace to all employees and employers through OSHA. To establish a more standardized manner for delivering this information, the HCS has adopted the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) in hopes of enhancing reading comprehension among employees and employers. A statement from OSHA explicitly mirrors the universal language issue enforced by Isotype.

“For example, labels and safety data sheets may include symbols and hazard statements that are unfamiliar to readers or not well understood. Containers may be labeled with such a large volume of information that important statements are not easily recognized. Given the differences in hazard classification criteria, labels may also be incorrect when used in other countries. If countries around the world adopt the GHS, these problems will be minimized,

and chemicals crossing borders will have consistent information, thus improving communication globally” (“Modification of the Hazard Communication Standard”).

These changes will include standardizations of hazard classification, safety data sheets, and labels. Labels “will be required to provide ... a harmonized signal word, pictogram, and hazard statement for each hazard class and category. Precautionary statements must also be provided” (“Modification of the Hazard Communication Standard”). OSHA breaks down the definition of each component of the new label:

- **Pictogram:** a symbol plus other graphic elements, such as a border, background pattern, or color that is intended to convey specific information about the hazards of a chemical. Each pictogram consists of a different symbol on a white background within a red square frame set on a point (e.g., a red diamond). There are nine pictograms under the GHS. However, only eight pictograms are required under the HCS.
- **Signal words:** a single word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for less severe hazards.
- **Hazard Statement:** a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.
- **Precautionary Statement:** a phrase that describes recommended measures to be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling of a hazardous chemical (“Modification of the Hazard Communication Standard”).

## CHAPTER 3. METHODOLOGY

Abstraction within warning signs continues to this day because images can be, and are, made at any level of abstraction. There is merit to understanding how the range of abstraction affects each type of image. This paper specifically looks at the standardized pictures inside warning signs. Rudolph Arnheim, who asserts that language is possible only through individual sensory knowledge, distinguishes between three functions of images: pictures, symbols, and signs. He qualifies each definition by stating that an image can act in each function, but the distinctions exist in order to make clear comparisons between them and the thing they represent, both in realistic form and in non-mimetic ideals.

A sign represents content without demonstrating any telling visual characteristics; it serves as a mere reference. In other words, a sign uses no cues that alert the reader to the appearance or content of an object. Arnheim suggests the purest form of an image as a sign could be letters of the alphabet in an algebraic equation. The letters represent an abstract quantity of an object, but the viewer has no visual insight as to what the object is.

An image is a picture when it alerts the reader to the thing represented by demonstrating its visual qualities at a lower abstraction than the object resembles in real life. An example could be a hand drawing of a dog. The degree of abstraction “is a means by which the picture interprets what it portrays” (Arnheim, 1969 p. 137). A hand drawing of a dog might look like a dog, but the viewer does not need the strands of fur or contour of snout to understand the drawing depicts a dog. Interpretation plays a strong role in abstractness because the reader calls upon his or her past experiences to fill in the perceptual “incompleteness” (Arnheim, 1969 p. 137). Pictures are abstract to the extent that they are statements about an object and statements are understood regardless of abstraction, despite

the myth that an image needs to be complete in order for the viewer to fill in the abstraction, even given the range of past experience a viewer possesses. “But abstraction is not incompleteness,” Arnheim, argues (1969 p. 137). Furthermore, Arnheim asserts that “‘completion’ by ‘imagination’ is all but impossible and the desire to attempt it quite rare” (1969 p. 138). In short, readers can supplement the abstraction in order to understand it, but they often will not extend that perception beyond what they have to in order to make sense of the image.

Finally, an image becomes a symbol when it portrays something at a higher level of abstraction than the object in the image is itself. An example is an image of a dove as a symbol for peace. The ideals of peace extend beyond the simple lines used to recognize the contour of a dove. Sometimes the symbol needs to be accompanied by heavy contextual application or text to explain highly abstract symbols if it cannot stand alone. Symbols can provide the “flesh and blood” to an idea

(Arnheim, 1969 p. 140) and appear very lifelike, which is beneficial for viewers in the material world, but they symbolize only part-time objects. Arnheim exemplifies the idea of a part-time symbol by analyzing the visit of a father and son to a mural of a train at a

local school. The father tried to explain that the tracks and the train were symbols for the future and the country’s unity, but the son replies that indeed it was a picture of a train. At this level, the train is only a part-time symbol for the ideals of future and unity because it is a full time object as a piece of railroad equipment. The train cannot be both at the same time

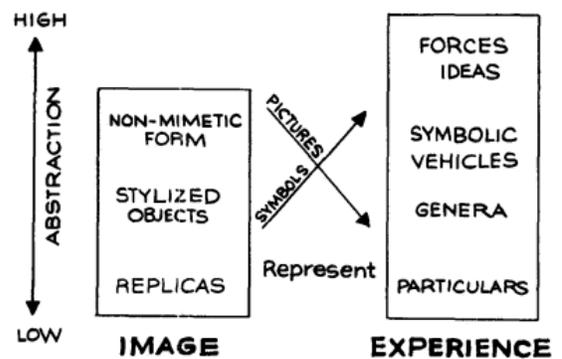


Figure 8. Arnheim’s two scales of abstraction (Arnheim, 1969).

because the real world only views it as railroad equipment because it is too realistic, but at a more localized scale, it can serve as both for a short period of time through abstraction.

Arnheim discusses the range of abstractness in images and focuses on two extreme ends of the range: highly realistic images and highly abstract images. Highly realistic images are ideal for raw material for cognition; however, the viewer uses the lowest level of cognition to understand the image since there is very little for the viewer to interpret (Arnheim, 1969). If an image uses lots of realistic characteristics, the image does not contribute to deeper understanding because the viewer simply does not have to think. Furthermore, the image might offer too much perception and make the image more difficult to distinguish because the essence of the object is competing with its own details. Arnheim suggests the opposite is necessary in order to understand the visual language. “Without the dominance of these expressive forces the picture is reduced to the presentation of pure matter” (Arnheim, 1969 p. 140). When an image has low abstraction (more visually specific), it represents an experience at a higher level than the image because the reader has to refer to his or her prior knowledge in order to recognize the image and its implications.

Conversely, a symbol with a higher level of abstraction (less visually specific) represents an experience at a lower level because it relies on the prior knowledge of the reader in order for the image to communicate the purpose of the image. See Arnheim’s figure (Arnheim, 1969, p. 151). Ideally, the lowest perceptual symbol is able to connect to a specific connotation for each viewer, and each picture is able to connect to a broad understanding for a range of viewers.

But how can process-warning labels, differentiated from object-oriented warning labels because they depict an action instead of one tangible item, exhibit more localized

representation of the abstract real world without undoing the universal benefits of standardization? Consider the blank background that virtually every figure in a public sign or warning label is placed against. Some might argue that the contrast is strictly for the gestalt principle of foreground/background, but Arnheim suggests that in order for a viewer to assess the image upon seeing it for the first time, he or she must participate in primary abstraction. If the viewer had seen the image many times before, he or she would be able to generalize the abstraction into a meaningful image. Arnheim likens this notion to that of research by William James. He begins with the analysis of an infant, who may become “confused” not because he or she lacks the faculties to extract meaning from a particular stimulus, but because the stimulus has become overwhelming all at once for the infant’s particular processing power (1969). If the sensory stimuli come all at once and the child has not experienced them individually, he or she will fuse every sensory detail into one experience (Arnheim, 1969). However, infants will scan their surroundings for long periods of time in order to categorize individual stimuli against an otherwise neutral canvas. In a similar way, a warning label will use a blank background to emphasize the figure-ground contrast.

The blank background of a warning label could be likened to the blank cave wall the prisoners in Plato’s allegory saw. When shadows first appeared on the wall, they had nothing to compare the images to until they developed their own sense of reality, only to find out later that it was false. But does the same happen for viewers of warning labels? They must rely on their previous knowledge to create conventions with which to interpret the silhouetted human-figure on the warning. Through standardization and modernism, the pictures produced embody an abstract form of the human figure. Are we able to determine the reality

of the potential hazard that the figure is experiencing even though we are simply seeing a reflection of it? If so, does that abstract reality transcend universally?

In order to assess the implications of warning label design interculturally and cross-culturally, this paper will use abstraction to identify what is recognized and communicated in a label. Then, the content will be situated in a framework of high- and low-culture contexts. Low-context cultures typically identify by the individual and respond favorably to procedures and efficiency and explicit directions by use of words. Conversely, high context cultures typically identify in groups and prefer working in teams and communities that value context and accuracy as well as nonverbal communication (Hall, 1976).

## CHAPTER 4. RHETORICAL ANALYSIS

Unsurprisingly, the standardizations presented in this paper by some of the largest and most influential companies do not exhibit extreme differences. While much research has analyzed the meanings behind color and signal word associations, little attention has focused on the Isotype pictorials (Leonard, 1999; Braun, Kline, & Silver, 1994). This analysis will focus on process-warnings that explicitly demonstrate what *not* to do in a warning sign based on ISO's handbook, the International Language of ISO Graphical Symbols. Both warning and prohibition signs display a background shape overlapped by a black symbol. Furthermore, warning and prohibition signs give explicit instructions on what *not* to do in a situation, lest the agent risk personal injury or threaten their health. Therefore, it can be concluded that all black symbols depict an action that should not be acted on in order to avoid injury. Conversely, mandatory, safe condition, and fire safety signs display a background shape overlapped by a white symbol. All three signs demonstrate what *to do* to prevent further harm. Moreover, safe condition and fire safety signs demonstrate what *to do* in the event that risk or an emergency is already in the process of occurring. Therefore, it can be concluded that all white symbols depict an action that should be acted on in order to avoid injury. For the purposes of this analysis, black symbols reflect what *not* to do in order to preserve safety.

Borrowing from Kostelnick's discussion on defining intercultural contexts, this section assumes intercultural context is considered to be communication within a specific culture (1995). First, I will analyze a range of abstract warning signs from the western culture using Arnheim's theory of abstraction. Next, I will analyze five examples of slippery/wet floor caution signs in the northern United States using the concepts of high- and low-context

cultures, and finally end the analysis with a look at cross-cultural examples of the slippery floor signs.

### Range of Abstraction

Arnheim specifically mentions the two extreme ends of abstraction: highly realistic and highly abstract. Yet, he did not make specific mention of the middle range in which both realistic images are interwoven with symbolic images. When these two are blended, the reflection of the human figure in the warning becomes an interesting combination of culture and perception. For instance, the range of abstraction in the previously mentioned vending machine warning labels exemplifies pictures and symbols. The scale below demonstrates conventional items used across warnings. On the highly abstract side is the zigzag symbol representing electrical shock danger. On the highly realistic end is a picture warning for moving equipment with the danger of getting crushed under heavy equipment. Unfortunately, part of the warning was ripped off due to natural weathering, as is common with warnings printed on the objects. Both signs reflect symbols inside of the vending machine warning, but are applied in a different way so as to demonstrate a different type of warning.

The highly realistic warning is also highly positive because it does not include any prohibition signs or danger colors, such as orange (although the man is wearing an orange shirt, other standardized elements are void of any hazard colors). Viewers see a picture of a man operating the heavy equipment in a safe way, while the surrounding text instructs the user of the proper way of handling the equipment. Based on the apparent receding hairline, dated jeans, slight potbelly, and fair skin, the audience can infer that the operator is a middle-aged Caucasian man. The amount of detail reflects a perfect world but also risks alienating women employees or both genders from countries where the Caucasian population is the

minority. However, Arnheim suggests that the less abstraction visible, the more cognitively understandable the image is, even though not much cognitive effort is put forth. In turn, deeper understanding does not occur. While the extreme degree of detail may not be appropriate for other concepts requiring abstraction, the low cognitive processing demand might benefit readers of warnings who must make quick decisions or risk bodily harm.

On the other side of the spectrum is the abstract symbol for electrical shock danger. An interesting representation that has become a contextualized norm is the symbol for electricity. Typically, the symbol is a zigzag line ending in an arrow pointing downward. Perceptually, it appears that the lightening, and therefore electricity, comes from the sky toward the earth. However, a cloud-to-ground lightening bolt is actually observed the opposite way. When a storm cloud emits an invisible path of negative electricity toward earth, positively charged items on the ground react to the negative charges by sending an upward streamer to meet the opposite charge. When the paths meet, a return stroke is evoked and the visible flash occurs. The return stroke happens so quickly that the human eye cannot catch it and the perception is that the lightening is coming downward. Electricity is generally invisible while being properly used, and therefore the zigzag line is a perceptual interpretation of electricity. Even so, the concept of electricity is apparent give the context: clearly the warning sign below is not an electric storm warning.

The picture of the man from the highly realistic image and the lightening bolt in the highly symbolic image become significant when they are combined to create a hybrid between an abstract and realistic warning. Such a hybrid is apparent in one of the vending machine warning labels (Figure 1). The middle image demonstrates a negative image (because of the prohibition sign) in which the heavy piece of equipment is falling and

crushing the individual who is interacting with it. The use of a silhouetted figure pulls from the realistic image in that it is clearly a human; however, the viewer cannot determine sex, age, or race of the figure. Since pathos is typically not represented in the modern design of warning images, four zigzag lines surround the figure's head. Symbolically, the zigzag lines become mimetic of panic, and not electricity in this case. Interestingly, the symbol for panic borrows a thicker end of the arrow and narrows into a point, near identical to the electricity sign, implying the source of the panic is coming from above, like the perceived source of lighting, instead of being internally emitted.



Figure 9. Range of abstract and realistic warning images

#### Wet Floor Signs: Intercultural and Cross-Cultural

The United States as a whole has appeared on lists for both high and low context cultures (Copeland & L. Griggs, 1985, Wurtz, 2006), but is now considered both a high and a low-context culture separated by the northern and southern states. Northern states are considered low-context and southern states are considered high-context cultures. The north likely gets this distinction because of the culture of industry and factory assembly lines, which was task-oriented and promoted as a linear approach to production. In fact, the first factories in the U.S. were established in the northeastern states. The following signs were

collected from the upper Midwest, and thus it is important to distinguish them from high-context cultures of the south.

A small sample of five warning signs for wet floors/slippery floors was collected in a Midwest college town (Figure 7). This particular warning was chosen for three reasons: 1) human figures are represented; 2) the sign uses the triangle warning sign; and 3) the images depict a process warning, not a tangible item. The detail of precautionary statements varied greatly; two of the signs used Spanish in conjunction with English, and one additional sign used French along with Spanish and English. The heavy use of words and the variety of languages supports the northern U.S. as a high-context culture because words are valued, much like the traffic signs originally popular in the U.S. The signal word “Caution” is emphasized by the color red or by white on black reverse type. Because of the high range in cultural diversity present in the U.S., a sense of community is not as strong, but instead the emphasis is on individuality. Additionally, red is associated with an alert in Western culture.

Apart from language use, the small sample also makes interesting use of the human figures. The slight differences between all of the human figures is also indicative of low-context culture that needs a lot of detail and guidance to communicate a message because low-context cultures lack a strong sense of tradition or community as indicated by the diverse use of language. Two signs with multiple languages show the human figure with heads attached to the body and the warning triangle outline empty. They also have nearly the same body frame, except that the sign with all three languages uses negative space in the arms and legs to depict hands and feet. Four out of five signs display the silhouetted human figure falling, presumably slipping; however, only two signs give context to the background with one straight line to resemble a wet surface drawn under the falling figure. Almost all the

falling figures are facing the right side of the sign with both the left arm and leg bent at an upward angle. The only sign to have the figure falling left is also the only one to not supply a precautionary statement. For the most part, each silhouette is highly modernized.

Human figures in an image are typically the largest indicators of cultural orientation. A plethora of characteristics apparent in figures such as “skin tone, hands, dress, gestures, and gender roles” allude to the cultural identification of a figure (Kostelnick, 2011). However, since warning labels are using silhouetted representations of human figures, they do not emit telling characteristics such as skin tone, dress, even gender. This cross-cultural analysis will rely on the style of human figure representation as it is reflected by its culture even though the warning sign is influenced by international standards.



Figure 10. Five Wet Floor Warnings in the Northern United States

An example of an intercultural sign is the Japanese wet floor sign (Figure 8). Since Japan is considered a high-context culture, it makes sense that the image is not accompanied by words. Instead, the figure is apparently slipping on two lines that represent water. The human-figure makes a unique use of organic forms for arms and legs, giving the appearance of a more bulbous, cartoon-like figure flailing his or her arms during the fall. The style of this

human figure might reveal influences from an art movement that originated in Japan and eventually dominated European art for centuries. The Japanese *Ukiyo-e* style, or “floating world,” became highly influential among European artists and graphic designers in the 19<sup>th</sup> century because of its newfound presence due to the increasing trade between Japan and the west during American military threats. The bold outlines and flat color reduced perspective and eliminated 3D qualities (Eskilson, 2007). The flat, cartoon quality Japanese form apparent today could be considered a lasting implication of this movement, but also a precursor to the highly abstract silhouettes produced by Neurath and Arntz in the early 20<sup>th</sup> century.

The Russian slippery floor sign (Figure 8) only uses one language (which translates to “caution slippery”), thereby adhering to the general idea of community favored by high-context cultures. Russia, which has experienced many influences in art as a political result of the Bolshevik Revolution that occurred when Neurath and Arntz were implementing Isotype, made patriotic use of *lubok*, which might shed some light as to why their warning sign uses two lines to represent a slick surface instead of one line. During the early 20<sup>th</sup> century, Russian artists used a woodcut known as *lubok* to advance lithography and make prints. Stylistically, *lubki* artists used a lot of color and applied “horror vacui” (filling the entire space with artwork) as a way to invoke national tradition (Eskilson, 2007). The general principle of filling in the white space might suggest why the warning sign tries to fill the small space available inside the triangle with two lines, instead of the economic use of just one.

Brazil’s example of a wet floor sign (Figure 8) also utilizes one language to explain the warning; the Portuguese translates to “Caution wet floor” instead of the adjective

“slippery.” Although Brazil is another example of a high-context culture, this figure uses a higher degree of abstraction, only has one visible arm, and does not appear to be slipping on anything. Additionally, the gestalt principle of figure-ground contrast is not employed, as the figure is not filled in; it is merely outlined in a thin, black stroke. The warning triangle is also a mere outline. The open negative space might be a reflection of the Cannibalism movement that occurred in Brazil at the beginning of the 20<sup>th</sup> century and promoted during The Week of Modern Art that occurred in 1922 in Sao Paulo. This movement initiated the combination of modern art techniques from Europe and traditional art from pre-colonial Brazil in order to make art for the new age that became specifically Brazilian. The result became known as Primitivism, which mimicked traditional Aztec cave paintings and was influenced by Cubism (The week of modern art, 1922, 2014). This influence is reflected in the empty image and geometric form, which is still apparent in human representation in this warning sign (Figure 8).



Figure 11. Intercultural examples. From left to right: Japan, Russia, Brazil.

## CHAPTER 5. LIMITATIONS AND CONCLUSION

A limitation of this research was the small sample size. Understandably, one sign is not a true representative of an entire culture. Additionally, this paper attempted to get a range of signs that were more likely to abide by international standards to some degree; however, it is likely that not every sign was regulated, and some images might be already very localized depending on the company that designed them.

### Conclusion

Overall, warning labels possess varied degrees of cultural influences. While the ultimate goal is to produce symbols that exceed the limitations of language, warnings do reflect cultural differences. By nature, the reflection is going to do so as long as humans design them. Traffic and way-finding signs became important in Europe during this time because of the ease of travel between countries and the budding economy that allowed for many more people to travel. Thus, a need for a universal pictorial language became evident. Neurath created modern interpretations of men in the 1920s through his designs of Isotype. The practicality of the images influenced other applications of the simple silhouettes throughout the early 20<sup>th</sup> century. Modley, a student of Neurath's, adapted the style of Isotype and introduced it to the United States in favor of localized design before Dreyfuss implemented the designs onto labels for international usability of machinery parts and traffic signs. The practicality of a visual language became evident for technical documents and warning labels that came about as a result of WWII. The significance of identifying the cultural implications in the warning labels stems from the need to identify how effective they are based on their ability to convey an appropriate level of abstraction.

Arnheim's theory of abstraction can aid designers to create effective designs that communicate cross-culturally based on a system of symbols, signs and pictures. Abstraction identifies two extremes: highly realistic and highly abstract images. The range of abstraction is evident in hybrid warnings that employ both symbols and pictures. Historical uses of warning labels have been subtly reshaped over the years, from highly modernized images to ones that implement symbolic images to aid context and an understanding of the risk. To analyze the way culture shapes the warnings, vending machine warnings were analyzed to understand how context affects the abstraction. Finally, a selection of wet floor signs was analyzed for the cultural influences. Prominent art movements during the 20<sup>th</sup> century often uncovered links between the designs of the warnings and their current usage, regardless of standardization.

While standardization is the surest way to represent ideas across all audiences, the images analyzed in this paper demonstrate that designers of warnings take liberties in design. Very few of the images remained constant between signs that demonstrate the same warnings, which suggests that viewers are responding well to localization and less abstract visuals.

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