

Is a Sign a Sign:

The iconicity of Road Signage in the U.S. and Japan

Alisa Q. Lim

Submitted for the Bachelor of Arts in Linguistics

University of Tennessee, Knoxville

May 2020

Table of Contents

List of Figures:	3
Chapter 1: Scope of Thesis	4
Introduction:	4
Questions:	4
Organization of Thesis:	5
Chapter 2: Literature Review	7
The linguistic sign:	7
What is semiotics:	8
Types of linguistic signs:	8
Visual and social semiotics:	10
Iconicity of RIS:	12
Practicality of road signage:	15
Chapter 3: Study	17
Methods:	18
Results:	19
Discussion:	22
Chapter 4: Comparison of Results with RIS Systems	27
Review of Study Data:	27
Comparison of Systems:	30
Chapter 5: Conclusion	37
Impacts:	38
Limitations:	40
Further Research:	40
Bibliography:	42
Appendix:	43

List of Figures:

Table 3.1 Number of types of responses received from the participants; does not include “no idea” and “no response” as answer varieties.....19

Image 3.2 Number of each type of answer for “low clearance” sorted by gender...20

Image 3.3 Number of each type of answer for “low clearance” sorted by years of driving experience.....21

Table 3.4 Number of types of responses received from the participants; does not include “no idea”, “no response” and “other” as answer varieties.....22

Image 4.1 U.S. Regulatory RIS.....30

Image 4.2 Japan regulatory RIS.....30

Image 4.3 Japan vehicle regulatory RIS.....32

Image 4.4 U.S. vehicle regulatory RIS.....32

Chapter 1: Scope of Thesis

Introduction:

Language is present all around people in various forms: spoken language, posters, signs, street performers, and more. These forms interact with people through language discourse and, at times, require specific contexts and situations for the forms to be properly interpreted. As described by Scollon and Scollon (2003), discourses with signs are ones that occur “in place” and some are more specifically legal discourses (14). Discourses in place are thus called because a sign-maker has to design and make the sign while someone else takes it and puts the sign in a specific place. These signs can only hold a discourse with the listener in that one spot, resulting in it “being in place”. Examples of these discourses are road signs, movie posters, and shop logos. In these discourses, the viewer takes on social or psychological positions in relation to others who are present in the same space. Of the examples provided above, one that shows this relation between viewers in the same space is road signs. Road signs are designed by government authorities to communicate with motorists on the road and ensure they drive in a manner that is safe for them and others around them. For clear communication purposes, road signs will be referred as Road Instructional Signs (RIS) from here on out so that they would not be confused with other signs.

Questions:

Such discourses are not unique to one country but rather occur all around the world. As technology has advanced, the audience of the discourses has broadened to include international audiences. With increased travel between countries, an international driver’s license is available for those who hold a driver’s license in their home country to drive in countries that they visit. In such cases, do the international drivers understand the discourses around them? RIS is

developed and approved by the governments of each respective country. However, most European countries signed the Convention of Paris of 1909 as a step towards the regulated road traffic while the Convention of Road Signs 1971 was the leading step, internationally. As a result, RIS is one of the few unique systems that is applied in countries such that a certain degree of coherence is maintained so that international drivers' licenses can be used without too many issues of comprehension (Wagner 200:315-316). Although there are claims that RIS are universal, does this apply to systems of two extremely different cultures such as the U.S. and Japan? The claim leaves room for one to wonder the extent to which RIS can be universal when the language between the locales is entirely different such that someone from the U.S. who has no experience with written Japanese would have difficulty reading signs in that language. It also raises the question of what aspects of the RIS are universal and whether drivers in the U.S. are able to recognize the common aspects of the RIS based on their knowledge from their home country. Such features would be considered iconic features in that the features have completely embodied the meaning even though the link between the two. If there are common iconic features between two different RIS systems, there may also be features that are iconic for one meaning in one system which bear different meanings in the other system. However, how many of the linguistic features of the U.S. system are iconic and what is the extent of the difference of the intended meanings? These are the questions that this thesis will seek to answer.

Organization of Thesis:

With the scope of this thesis laid out, the following will explain the format of this paper. Chapter 2 discusses past literature that will help understand the scope of this thesis. It discusses the characteristics of the linguistic sign and their uses, the processes of signs, and semiotics which is the analysis of these processes. It then dives into the types of linguistic signs and

deeper into iconic signs, visual and social semiotics as they relate to RIS, the iconicity of RIS, and the practicality of road signage. Chapter 3 then presents the research study that was conducted to understand the iconicity of RIS in the U.S. and in Japan. It reviews Ward et al. (2004) as the basis for the study of this paper. Then, it presents the methods, the findings of the study, and the discussion of the results. Chapter 4 analyses the findings from Chapter 3 and compares them with the U.S. and Japanese RIS systems. During the comparison, it evaluates the participants' responses from the study based on the intended meanings of the RIS and determine the linguistic features of the RIS that have become iconic. Chapter 5 concludes this paper with reviewing the overall findings of this paper. It also discusses the impacts that these findings have on society and how they can be used to help increase understanding of RIS. Lastly, this chapter evaluates the limitations of the study and briefly discusses further research that can be conducted in relation to this paper.

Chapter 2: Literature Review

The linguistic sign:

The smallest part of linguistics on which studies on the meaning of language has been built on is the linguistic sign. As described by Sebeok (1920), Peirce (1991), and Hall (2012), a linguistic sign can range from any mark, symbol, token, bodily movement, and is used to indicate meaning and convey things such as thoughts, information, commands, and etc. (Sebeok 1920:xi). In other words, the linguistic sign is what humans use for thoughts and communication. Signs have three characteristics: material quality, “some real connection with the thing it signifies”, and “pure demonstrative application” (Peirce 1991:141). The material quality of a sign is the description of the sign such as its color, shape, etc. The “real connection with the thing it signifies” characteristic of a sign is the real connection between the sign and its object. A linguistic sign cannot exist without the object which it is trying to show. An example that Peirce (1991) gave is that of a weathercock (141). A weathercock is a sign of the direction of the wind, but it cannot represent it if the wind is not present. A sign’s “pure demonstrative application” is the thing that the sign is trying to convey to the observer. Additionally, he writes that an idea is a sign of the thing that it signifies (1991:142). In other words, an idea is an object, and it represents that object. Furthermore, signs are not isolated; they cannot function separately from what gives them meaning. Similar to the characteristics that Peirce provided, Hall (2012) describes them as being dependent on the following for their meaning: their organizing structures and the contexts in which they occur and are understood. In the case of humans, the organizing structures and contexts of signs are shaped by sources and resources that are used to make them, formed by cultural structures into which they are woven, communicated through a series of diverse channels, and understood in terms of the nature of the societies that created them (5-8).

What is semiotics:

Semiotics is the analytical study of signs which investigates the processes of signs: what gives them the meaning that they have, how are they linked to the specific idea that they are representing, etc. As Robert Hodge and Gunther Kress (1988) put it, semiotics provides the analytic practice through which people of different disciplines can deal with issues of social meaning and describe and explain the processes and structures through which meaning is constituted (2). The questions that semiotics answers with regards to signs is what their characteristics are and what is true of them in all cases (Liszka 1996:1). According to Liszka (1996), semiotics wants to show that independent of how a sign is manifested (sound, picture, thought, feeling, etc.), the formal conditions that make something a sign would be present (2).

Liszka draws on Peirce's concept of semiotics in its concern with truth in three regards: sign's grammar, logic, and rhetoric. Grammar is the study of formal features of the sign and its mode of expression. Logic is the study of the manner in which signs can be used to discern truth. Rhetoric is the investigation into the manner in which signs are used to communicate and express claims within a community. These regards define the branches of semiotics which are more commonly known today as syntax, semantics, and pragmatics (Liszka 1996:9-10). In a broader sense, Hall (2012) states, "Semiotics is about the tools, processes, structures, and contexts that human beings have for creating, interpreting, and understanding meaning in a variety of different ways." (5). Semiotics analyzes linguistic signs based on what is used, when the sign is used, and how it is used.

Types of linguistic signs:

To further understand how semiotics analyzes linguistic signs, it is important to note the types of signs. Peirce (1991) divides signs into three types which both Sebeok (1994) and Hall

(2012) build off of: icon, index, and symbol. Peirce defines an icon to be a sign which would possess the character which renders it significant, even though its object had no existence such as a lead-pencil-streak representing a geometric line. The other types of sign, index and symbol, are signs that would lose their character, or meaning, if their object or interpretant was not present respectively (Peirce 1991:239-240). An index such a bullet hole in a wall would not be interpreted as a shot had been fired if not for the hole while a symbol such a Chinese character would not be interpreted for its meaning without someone who knows its meaning. Sebeok quotes Wallis (1973) as he states that “an iconic sign or an independent conventional sign represents its representatum (meaning) but not vice versa” (Sebeok 1994:29). He elaborates on this, writing that an icon embodies sign-relations which are in the natural mode. When a sign serves as an icon, it represents the meaning that it carries but the meaning does not take on the icon. He also quotes Peirce in that icons can be images (pictures), diagrams (drawings), and metaphors. Hall (2012) writes that signs have two sources of meaning, natural and cultural, and three ways of meaning, literal, analogical, and metaphorical. Literal meanings are ones that are straightforward and generally do not leave room for confusion such as in an instruction manual while analogical ones draw out likenesses between things. Metaphorical meanings, on the other hand, “draw out connections between ideas, concepts, objects, images, texts, events, and processes that seem quite tenuous on the surface” and “insist that one thing is another” (2012:12). Hall further elaborates that with a metaphor, there is an implied comparison between two similar or dissimilar things that share a certain quality. To put it in an equation aspect x is y . Additionally, metaphors work through a process of transference in which x does not literally have certain properties but can still have them metaphorically. The example that Hall (2012) uses is Chanel’s employment of the model, Carole Bouquet, to signify the qualities that their

perfume is supposed to embody. Because she has the qualities that the company wants to attach to perfume (i.e. beauty and elegance), they use her image and her face with the perfume (Hall 2012:54). The result is that Carole Bouquet often comes to mind when people think of Chanel's perfume even though the link between the two is arbitrary.

Visual and social semiotics:

Considering icons can be objects or images amongst other visual things, visual semiotics analyzes the interaction order that is present in images and signs. Interaction order is how people fulfill the spoken, face-to-face discourses (Scollon and Scollon 2003:82). Since linguistic signs also comprise of visuals, visual semiotics analyzes the discourses that occur through representations. Discourses involve two or more parties, and discourses through visual representations occur in specific contexts since the representations were placed in their location for a specific purpose and to interact with a specific audience. This draws attention to social semiotics which analyzes discourse in conjunction with other disciplines. However, some terms have to be defined specifically for social semiotics. In social semiotics, there is the message, (meaning of a sign), the text (the material realization of systems of signs) and discourse (where social forms of organization engage with systems of signs in the production of texts). Through interactions between people and text, the message/meanings result in discourse (Hodge and Kress 1988:6). Through visual and social semiotics, discourse through representations such as road signage can be analyzed to understand how they function.

Since this thesis is looking at the universality of RIS, it needs to be determined that road signs are linguistic signs. RIS largely consist of signs that use specific shapes, colors, and limited words to convey a certain message. According to Wagner (2006), the Rules of the Road form part of visual semiotics which shows the duties, responsibilities, and prohibitions imposed

on all road users for compliance with the traffic law. She quotes Kress and Van Leeuwen (1996) as she discusses four factors that need to be taken into consideration for the visual and iconographic codification of the rule of the road: the social factor (the accumulated knowledge and experience of the individual humans), the interaction order with visual traffic encoding, the implied discourse of RIS (the meanings and actions implied by the signs), and place semiotics (the location in space and time of the sign equipment) (2006:311-312). She further explains that images are metaphorical vehicles that tend to show the crucial practical and legal concepts of road traffic. As can be seen through the earlier discussions of Peirce (1991), Sebeok (1920, 1994), Lizska (1996), and Hall (2012), RIS falls within the iconic category of signs that operate metaphorically. On the other hand, language has a functional aspect to which Van Leeuwen (2005) quotes Halliday, “Language has evolved to satisfy human needs, and the way it is organized is functional with respect to these needs.” (2005:76). Thus, RIS, which communicates to drivers and others how to utilize the road safely, fulfills a human need of knowing how to drive depending on the country such that people can keep themselves and others safe, a product of the increasing reliance on cars to transport people from Point A to Point B.

Additionally, Van Leeuwen listed seven functions of language, one of which is regulative which uses language to get people to do things for you (2005:76). Since RIS is used around the world, can it be considered universal? Wagner (2006) writes, “The road signage can then be considered as a universal visual semiotics.” She further explains that it can be understood as a means, a mode of expression showing that legal culture is being communicated as expressed by “Law is known by everybody” (313). As such, RIS has to be understood within specific contexts. Going back to Sebeok, he claims that “there exists a diagrammatic correspondence between the signans (the spatial arrangement) and the signatum, (the social A) in a fashion that is

analogous to the isomorphic relation between geographical area and any map that purports to represent it (1994:87). In other words, there is a connection between the group of people and the area or context in which the signs are used.

Iconicity of RIS:

As Hodge and Kress (1988) delved into explaining social semiotics, they revisited Peirce and his classification of linguistic sign, giving the example of RIS for icons. They delved into traffic signs, specifically traffic lights, as they explored the importance of context to the meaning of the signs. Traffic lights consist of three signifiers (red, green, and amber/yellow) and three signified (stop, go, and stop/go). They wrote that considering how these signifiers function in their context, it can be immediately seen that context is a crucial part of their meaning (1988:37). If the signifiers of a traffic light are seen in a different context, they would signify different meanings. But in this specific context, Hodge and Kress writes that red does not simply mean *stop* but carries the meaning of *motorists, stop*. They also write that the traffic lights carry other meanings as part of its mimetic context such as promising to the reader that the behavior of other motorists at other parts of the intersection will be predictable (1988:37).

As mentioned above based on Wagner (2006), RIS falls under visual semiotics in that they convey, to the drivers, information on how to drive safely. The messages conveyed range from speed limits that are projected to be safe to change in road conditions to expectations of what other drivers would do. Additionally, the range of messages are conveyed through signs that range from literal signage (signs that consist of only words) to metaphorical signage. In the U.S., RIS are divided into categories of regulatory, warning, guide, services, construction, recreation, school zone, and incident management (“United States Road Symbol Signs” 2002). Each of these categories are assigned specific colors and shapes. As a result, motorists can look

at the color of a sign and immediately deduce the kind of information that it would provide, such as a green rectangular sign above would convey nearing exits or splits on the interstate.

Furthermore, a motorist could look at a traffic light signaling red but focus on the bottom light which would signal green in anticipation for the message “Go”. At this point, the bottom, green light has taken on the metaphorical meaning and become an icon of “Go” or “Proceed”. This is even displayed through idiomatic speech of “waiting for the green light” which bears the meaning of “waiting for permission for an action”.

However, road signs around the world may not all be categorized the same way or consist of the same colors and shapes for each meaning. For example, the *stop* sign in Japan is an inverted, red triangle. This RIS incorporates aspects of two different U.S. RIS: *stop* and *yield*. In the context of driving, a point of interest that this incorporation would raise is the linguistic feature that is more iconic, the shape or the color. One, if not both, of these features communicates to drivers that they need to stop at a point, meaning that the RIS functions as a linguistic sign. This also means that the shape and the color function as linguistic signs within this specific context since they convey commands. However, from the perspective of the U.S. RIS system, does one convey their meaning more strongly than the other? Additionally, RIS systems have specific designs for each category, and the designs are utilized to convey specific information or command. These designs are used to visually communicate with the drivers on the road, and the drivers respond to them through actions. The discourse that occurs between the two is not spoken but is visual, reiterating Wagner’s (2006) discussion of visual semiotics. This is easier understood by delving a little into the two systems that will later be analyzed more deeply in this paper, that of the U.S. and of Japan.

The first system is the RIS of the U.S. which is sorted into six different color categories: red (stop, yield, do not enter, or wrong way). Yellow (general warning), orange (construction and maintenance warning), black (regulatory, route markers), brown (public recreation areas and parks), green (distance and direction), white (regulatory), and blue (motorist services). In regards to the shapes employed to convey necessary meanings, the drivers' manual shows that an octagon is stop, an inverted triangle is yield, and a right-tilted triangle is no passing. These three shapes are assigned one meaning whereas the following shapes are assigned to a category of meanings: the white, vertical rectangle is regulatory, the diamond is warning of hazard ahead, the circle refers to railroad, the horizontal, rectangle and badge-shape is meant for guiding, the pointed rectangle, a combination of a triangle and a rectangle, is school-related, and the red and white shield represents the interstate (Tennessee Comprehensive Driver License Manual 35). While the first three RIS are the most straightforward ones that do not need much more, the other ones have a variety of designs utilizing the specific shapes to convey the intent for the drivers. Seeing that specific colors and shapes are used for a category of meanings, the questions that remain to be answered are what meanings each linguistic sign is iconic for.

On the other hand, the RIS of Japan are divided into four categories: regulatory, indication, warning, and information. Within these each category, the signs also have specific colors such as blue and red for regulatory RIS, blue for indication, yellow for warning, and white, blue, green, pink and yellow. Additionally, certain categories have certain shapes consisting of squares, rectangles, circles, diamonds, and shapes integrating arrows. Information and indication RIS have square and rectangular shapes while regulatory consists of circular, triangular and rectangular RIS. Similar to U.S. RIS, Japan designed their warning RIS to have diamond shapes with a yellow background (“道路標識の種類と意味” (Types and Meanings of

Road Signs)). Contrasting the U.S. system, Japan's system seems to have more overlap between categories which means the iconicity of the RIS is more dependent on their full design and that there are limits to their iconicity.

Practicality of road signage:

Because road signs are contextually based and occur around the whole world, there is a practicality aspect of the interpretation of signs in a different country. Ward, Wogalter, and Mercer (2004) conducted a study for the Department of Psychology at North Carolina State University in which they tested Americans' ability to comprehend signs from outside of the United States prior to and after instruction on how to interpret the signs. They conducted two tests in which they asked open-ended questions to test whether U.S. drivers could correctly report the meaning and action associated with various international road signs. In the first test, Ward et. al. found that 60% of the responses (across all signs) given were incorrect answers, and only 17 out of 100 signs met the American National Standard Institute (ANSI) criterion of 85% correct. After the training, they found that 82% of the responses (across all signs) given in the second test were correct, and 58 out of 100 signs met the ANSI criterion. Overall, their results indicate that U.S. drivers do not comprehend a relatively large number of the international road signs and would pose a serious safety threat to themselves and others when they drive in other countries (Ward et al. 2004:2107). According to Wagner (2006), even though road signs are said to be universal, they take a diversity of forms following the historical and cultural variability from one country to another, and from the public sphere to the private one (Wagner 2006:322). If so, it is understandable that U.S. drivers had difficulty interpreting international road signs. However, it also raises the question of to what extent are road signs around the world affected by

historical and cultural variables and taking the meaning of the signs in its proper context, are the road signs still universal?

With the questions raised through this review left unanswered, this paper seeks to understand how social constructs influence the designs of road signs. Is it truly impossible for someone to understand RIS from another culture because of the cultural variability, or do the RIS share linguistic features that maintain the possibility that an “outsider”, someone who is not from that culture, can understand the RIS? It also seeks to answer whether people could instinctively understand the meaning of RIS that carry similar meaning through the use of color, even if the shapes are different. Although not everyone has extensive driving experience, those who have it are familiar with the RIS of their country. But is this knowledge limited to their RIS systems or are they able to use the knowledge of what is familiar to them to understand RIS that they are unfamiliar with? Because of the scope of this paper, the sample of people is limited to those who learned to drive in the U.S. Through this, the paper will understand the extent to which the meanings of RIS are universal, the extent to which these RIS are iconic, and what features of the designs are iconic.

Chapter 3: Study

Background:

This study is to understand whether people would use their knowledge of road signs from their country and seeks to replicate Ward et al. (2004) with some modifications which will be discussed later at the end of this section, after explaining Ward et al.'s study. Ward indicated that comprehension is one of the most important ways to measure sign adequacy and if the signs are conveying their meanings well. In terms of sign design, Ward et al. quoted Shinar et al. (2003) as they listed the recommended standardized, ergonomic design principles: spatial compatibility (direction of road sign maps with the direction given by sign components), representation that has physical similarities to actual objects, and familiarity (2004:2104). An RIS is considered familiar when they are understood by the persons viewing them. The focus of Ward et. al. is to figure out how to improve people's sign comprehension. Thus, they conducted two tests, one prior to and one after a 5-minute training session.

For the study, they had 100 international road signs that were selected from AAA (The American Automobile Association) and Auto Europe websites and from the Department of Transport Highway Code. They reproduced the signs electronically so that they all retained the same colors, symbols, and shapes. The signs were separated into 2 sets of 50 signs that were assigned randomly to two groups. The signs were printed and applied to 4x6 inch white index cards, with numbers randomly assigned to each sign and printed onto the card. One set of cards would have the meaning of the sign on the other side while the rest of the cards were blank. Prior to each testing session, the cards were shuffled, and the participants were given 20 seconds to answer two questions for each sign: 1) what do you think this sign means? and 2) what action would you take in response to each sign? (Ward et al. 2004:2105). The set of cards that had no

referent or description was handed to the participants, and they were notified when to move on to the next sign through a sequence of auditory tones. They had to match the number on the card to the number on the answer sheet provided to them. After the initial test, the participants were given the same signs that they had before but with the referent on the other side so that they could actively study the signs. The post-test consisted of the same procedures as the initial test. In summary, their results showed that the responses given were only 40% correct the first time and increased to 82% after instruction.

Since the results showed that only 40% of the signs were correctly identified prior to instruction and indicated the difficulty that U.S. drivers had with identifying signs, this study seeks to compare their interpretation of U.S. RIS with those from different countries. Because of the scope of this paper, the signs used in this study are limited to that of two countries, the U.S. and Japan, and consists of both RIS and signs consistently seen in both countries (i.e. immigration sign in an airport, McDonalds, and no pets allowed). RIS utilizes specific colors, shapes, and distributions of elements on them. With research indicating the possibility of RIS functioning as linguistic signs such that the signs carry a specific meaning that is elicited without regard to certain elements, this study seeks to understand what elements of the road signs allow them to function as linguistic signs. For example, if there are no words and if the shape of the RIS is different, would the color that the RIS share draw out one singular meaning? Thus, this study uses a survey with free-response questions asking the participants for their interpretations of the signs provided for each question.

Methods:

This study was administered through a self-administered, online survey in which the participants were provided signs to which they were asked to provide their interpretations. Posts

with the link to the survey inviting people to take the survey were uploaded onto social media platforms Facebook, Reddit, and Instagram. The requirements that the posts listed for taking the survey is that the participants are 18 years old and above and that they learned how to drive in the U.S. The survey, which was created through Google Forms, consisted of a total of 30 signs: 10 signs from Japan, 10 from the U.S. and 10 miscellaneous signs as distractor items (see Appendix). These signs were obtained through Google and edited through GIMP 2.10.12 such that words would not be present on the signs. In doing so, the participants would not be influenced by knowledge that the sign is from a non-English-speaking locale, and they would interpret the signs based on the color, the shapes, and the drawings. The survey form was set to randomize the order in which the images appeared such that there would not be any bias to the order. At the end of the survey, the following demographic information was gathered: gender, age, and years of experience driving. There were 81 participants: 68 female, 12 male, and 1 who preferred to not say their gender. Of these participants, 18 were between the ages of 18 and 25, 3 were between the ages of 26 and 30, 35 were between the ages of 30 and 40, and 25 were above the age of 40. 1 participant has 1 to 2 years of driving experience, 9 have 2 to 5 years of driving experience, 11 have 5 to 10 years of driving experience, and 60 participants have more than 10 years of driving experience.

Results:

The survey responses were recorded to see which were common and to see which signs had greater variation in the type of responses received. In the process of recording, the recording for responses were based on the number of females who gave such a response. For example, in the case of the Japanese RIS, “road entry left” (Image 1.5), there were responses such as “on ramp ahead (coming from the left, which is weird)” and “oncoming traffic” which were each

written by only one female. The first response was recorded as “oncoming traffic” since the meaning intended is the same and the difference in response will be discussed later. Females were used as the determiner for recording the responses because the majority of participants are females. The types of responses ranged from 1 to 17 different varieties, not including the ones that were “no response” and “no idea”. The signage with the most variation was the U.S. RIS “low ground clearance” (Image 1.12) while signage with the least variation in the response received were U.S. RIS “stop” and “no parking” (Images 1.14 and 1.17).

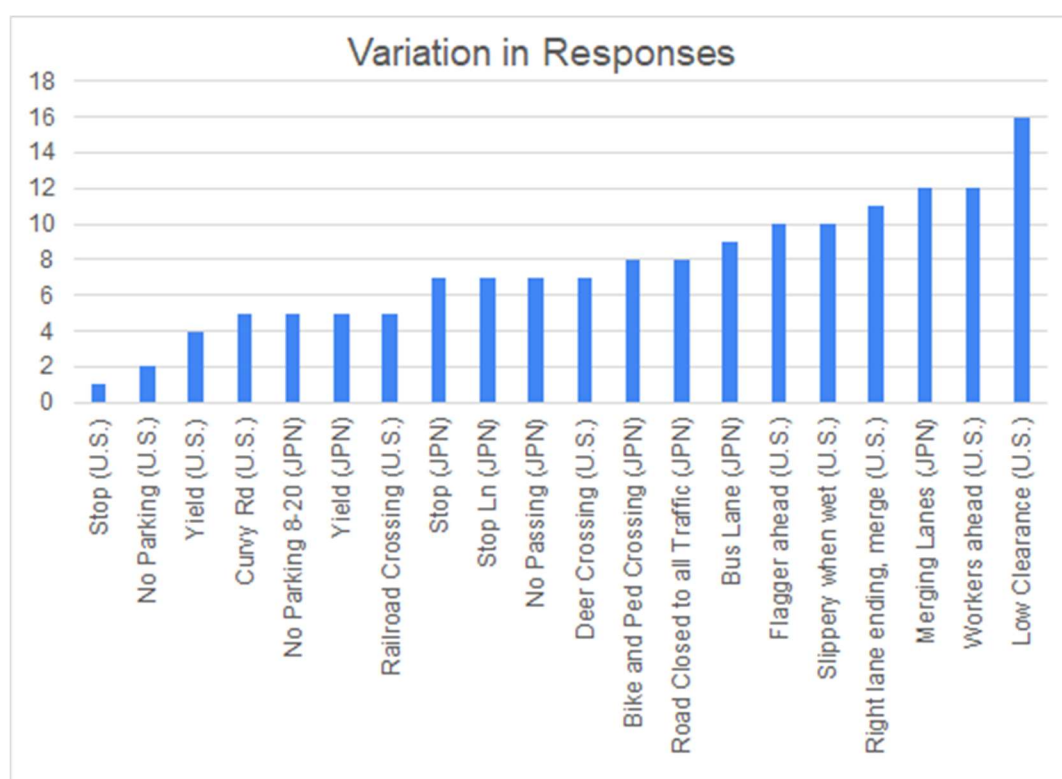


Table 3.1 Number of types of responses received from the participants; does not include “no idea” and “no response” as answer varieties

Additionally, looking at RIS pulled the most types of answers from each category (“customs” from miscellaneous, “low clearance” from the U.S., and “no passing” from Japan) shows that the demographic factors have no relation to the type of answers given and whether they were able to identify the declared meaning of the RIS. Image 1.2 shows the amount of responses each variety

received for “low clearance” as sorted by gender and shows that there is not trend between the type of response and the gender of a person.

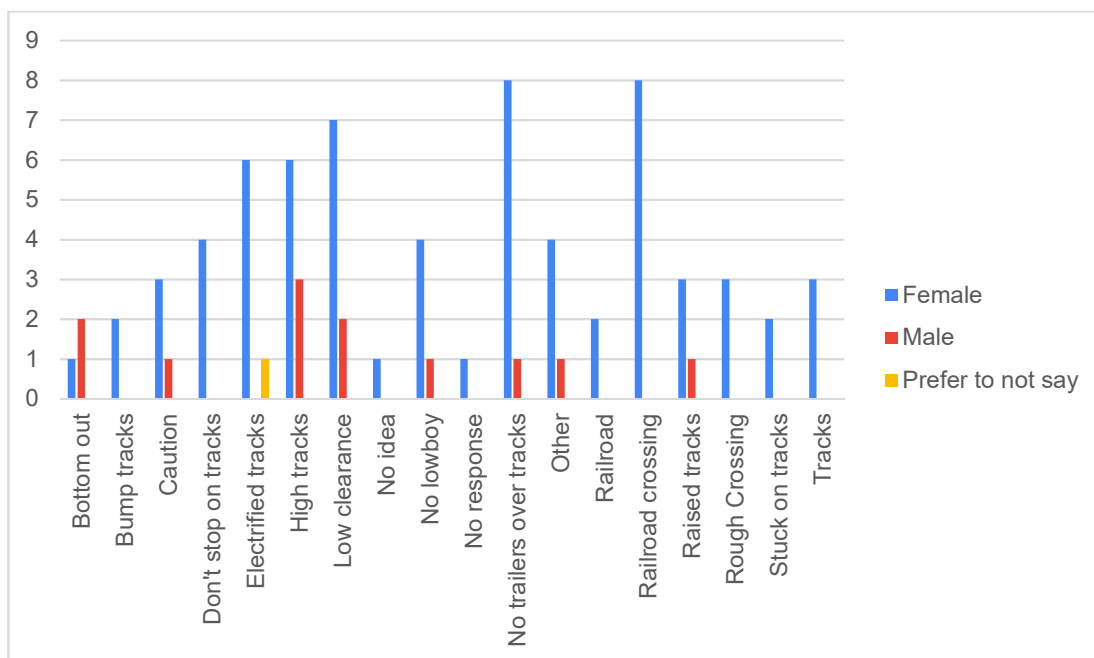


Image 3.2 Number of each type of answer for “low clearance” sorted by gender

The males were not more inclined to give “high tracks” over “no trailers over tracks” or “raised tracks” as a response. Neither were the females inclined to respond with “low clearance” over “caution” and so forth.

Another factor that was of interest in its possible impact on the responses was the years of experience that the participants had in driving and their age. Image 1.3 looks at the same data as Image 1.2 but sorted according to the years of experience that they have in driving. Since the years of driving experience correlated with the participants’ age, only the graph sorting the answers according to the participants’ years of driving experience is provided.

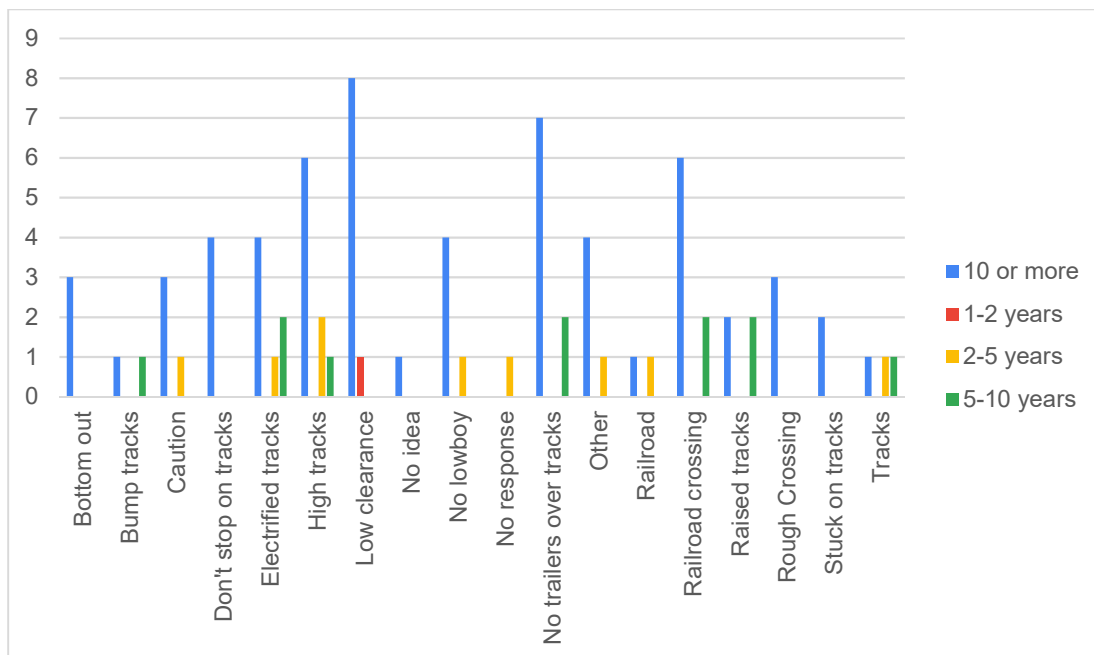


Image 3.3 Number of each type of answer for “low clearance” sorted by years of driving experience

As visible from the above graph, one grouping of participants such as 10 or more years of experience would not interpret the RIS more closely to the meaning as defined by the U.S. Department of Transportation’s Federal Highway Authority than another grouping of participants. Thus, the demographics of the participants do not affect the interpretation of the RIS.

Discussion:

RIS are meant to convey certain meaning for drivers so that they can be safe and maintain the safety of others. Based on the results received, certain RIS have become iconic (“stop”, “no parking”, “yield”, etc.) while drivers simply interpreted the information on other signs based on their knowledge of road signs. In linguistics, iconization happens when a linguistic feature becomes representative of a particular group. While the association between the linguistic feature and the group or, in the case of this study, the meaning is arbitrary, the feature is treated as somehow having a natural and inherent link with the group (Bell 2014:255-256). Thus, for

the U.S. RIS “stop”, the link between its color and its meaning is arbitrary but one automatically assumes that red means *stop*.

One clear picture of the interpretations of the RIS based on their knowledge of road signs is the variability of the answers given in the survey. While there are signs like the Japanese RIS “stop line”, which was displayed as a blue box with a horizontal, white line in its top half, that seemed to have less variability than other RIS like “bus lane” (Image 1.3) or “flagger ahead” (Image 1.11), an aspect of the variety of answers that is not visible is the number of answers that had to be recoded as *other*.

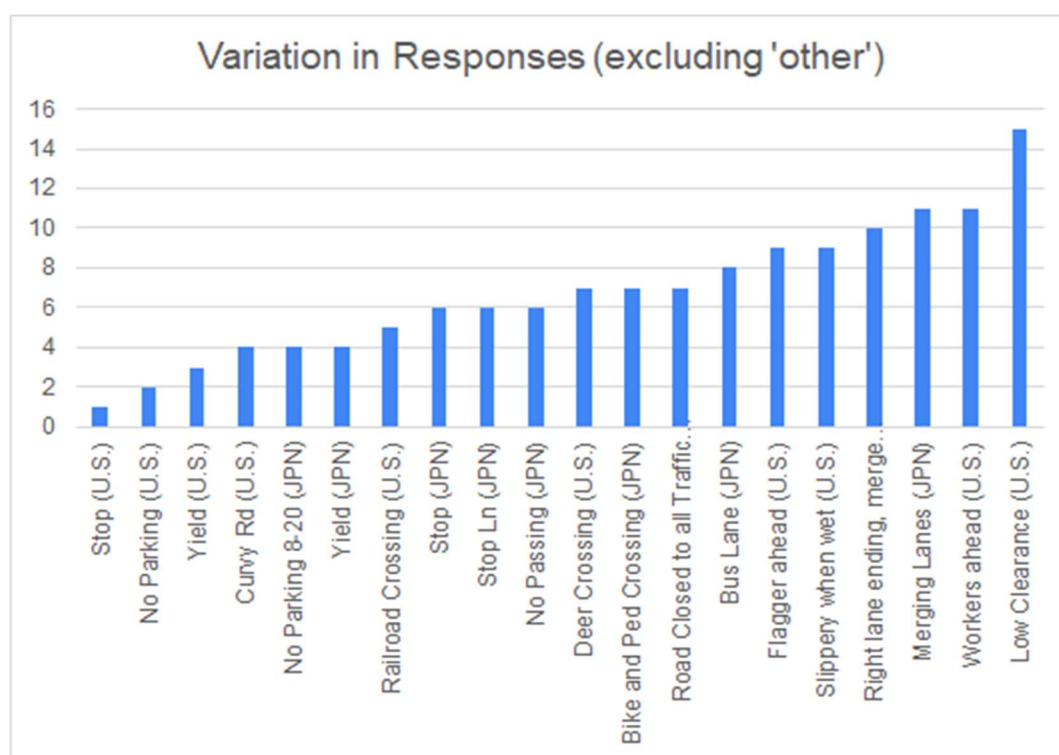


Table 3.4 Number of types of responses received from the participants; does not include “no idea”, “no response” and “other” as answer varieties

In comparing Table 3.1 with Table 3.4, there are no shifts in the rankings of the RIS, but the differences of variation decreased for some signs. For example, Japanese “stop”, “stop line”, and “no passing” have less variation than the U.S. “deer crossing” while U.S. “railroad crossing”

evened out to have the same amount of variation as Japanese “no parking from 8am to 8pm” and “yield” and U.S. “curvy road”. One specific example of the prominence of *other* as a response is evident through Japanese “stop line” (Image 1.4). The top three types of responses for this RIS were *no idea* at 40, *no response* at 12, and *other* at 10. Of the responses given for this sign, the most literal interpretation falls within the last category: *subtraction*. Other answers varied from *police* and *emergency call box*, to informative interpretations like *information* and *businesses at an exit*. For the latter two interpretations, it is reasonable to deduce that they were made based on the color of the sign. According to Tennessee’s Comprehensive Driver License Manual, RIS with blue as the background color represent informational signage about motorist services. Specific examples that were provided in the explanation were *police services*, *rest areas*, and *emergency route marker* (Tennessee Comprehensive Driver License Manual 2020:35). Furthermore, the signs that U.S. drivers see as they drive past nearing exits on the interstate see blue RIS with the exit number and the type of businesses on the top and the logo for the businesses which are available at a specific exit. Thus, the participants interpreted this ambiguous sign more as an informational sign of the services available.

Similarly, U.S. RIS, “low ground clearance on track” (Image 1.12), and Japanese RIS, “no passing” (Image 1.9), seemed to be pretty ambiguous since they yield the biggest variety of answers. “Low ground clearance” consisted of a yellow background and a truck pulling a lowboy over railroad tracks with three bolts shooting out of the lowboy. 27% of the respondents interpreted the RIS to indicate *high/raised tracks* and *low clearance* while others interpreted it as a warning of getting stuck on the tracks. There was a wide variation of answers indicating the warning interpretation such as *trailers might bottom out*, *tracks are too high for some vehicles*, *low-riding trailers may become stuck on the tracks*, and etc. 17% of the participants interpreted

it to indicate *no trailers/lowboys*. For a more literal interpretation, about 9% said the signage meant that the drivers could get electrified from the tracks. As such, there is much ambiguity as to what the drivers are supposed to interpret from the RIS except that it is related to railroad tracks. For “no passing”, it was less ambiguous than “low clearance”, and it consists of a white background, two blue arrows (a smaller one and a longer one going around the smaller arrow), and a red with a slash going through the arrows. The top three responses were *no passing* with 29 responses, *no passing on right* with 21, and *no idea* with 12. With 68% of the respondents interpreting the RIS correctly, other varieties of responses that were less on target were *don't go straight* and *no turning*, while some were categorized as *other* such as *no gas emissions*, *do not enter* and *left lane ends and right lane deviates*. This sign is less ambiguous because people understand that a red circle with a slash going through it represents the prohibition of something.

In contrast to the above RIS which have varying levels of ambiguity, two RIS that seemed to be the least ambiguous are U.S. RIS “stop” (Image 1.14) and “no parking” (Image 1.17) which yielded the least variety of answers. The design of “stop” consisted of a red octagon, and 100% of the responses for “stop” were *stop*. For “no parking”, the design consists of a black “P” under a red circle with a slash, all over a white background. While all but one response for this RIS was *no parking*, the one response that was different was *no passing*. The red circle with a slash going through it was the one common element between U.S. RIS “no parking” and Japan RIS “no passing”. With this in mind, it is understandable how the participants interpreted the prohibition nature of the RIS “no passing”. The third, least ambiguous RIS is U.S. “yield” (Image 1.20). This sign appears as an inverted triangle with a white background and a thick, red border. 86% of the responses were accurate while 2% said interpreted it as either *caution* or *caution and yield*. Specific responses that were entirely

different were *hazard* and *slow down prepare to stop*. In looking at these three RIS, all of which are from the U.S. system, it can be concluded that they are the ones that U.S. drivers are most familiar with.

With these results, the aspects of the RIS that have become iconic are apparent. However, the sample of Japanese RIS is only a small percentage of the signs that motorists would encounter when they are there. In the next chapter, the two RIS systems will be compared with the results of this study to determine what aspects of the RIS can predict how successful U.S. drivers would be in interpreting the Japanese RIS.

Chapter 4: Comparison of Results with RIS Systems

As was seen through the research study, people interpret signs based on the color and the drawings. Certain colors have specific meanings, but how do the people know what meanings the RIS have? Another thing that was seen through the study is the different use of shapes and colors for the same or similar meanings of RIS. Since the participants were from the U.S., the designs of the RIS of both countries draw different interpretations and appear to not have universal meanings. However, different cultures have different representations for the same thing because the significance of a shape or color in one culture is different in another. From the *stop* RIS of both countries alone, one common trait that the two RIS share is the color red which was also a common response for the two RIS by a few participants of the survey. Thus, the similarities and differences of the signs need to be taken into account to understand the reasons for the differences in interpretation. Furthermore, while people grow up seeing words on RIS like *yield* and *stop*, there is no guarantee that all drivers will know how to interpret the RIS or what to do in response to them without some instruction. Thus, the method of teaching the signs is also helpful for understanding the differences. This chapter will review findings from the study, compare them with the designs of the signs, and discuss the areas in which the respondents did well and did not do well in interpreting the RIS from the U.S. and Japan.

Review of Study Data:

While the data showed that there were varying levels of ambiguity of the designs of the RIS, participants identified elements of the RIS that helped them interpret the RIS. For example, those of prohibitory nature (“no passing”, “no parking from 8am-8pm”, and “no parking”) were interpreted by the participants as they saw the red circle with a slash through it (Image 4.1, pg.). Based on RIS “no passing” (Image 1.9) and “no parking 8am-8pm” (Image 1.6), the

answers under *other* show that these signs were unfamiliar. Despite the unfamiliarity, responses such as *do not enter*, *no gas emission*, *no swerving*, etc. for “no passing” and *no blue circles on August 20*, *no stop*, *no lights*, etc. for “no parking 8am-8pm” shows that the participants understood the prohibition nature of the RIS even if they did not know what was not allowed. Similarly, the participants were able to understand “bicycle and pedestrian crossing” (Image 1.1) and “merging lanes” (Image 1.5) from Japan and “flagger ahead” (Image 1.11) and “deer crossing” (Image 1.10) from the U.S. The most unfamiliar RIS out of these four is “bicycles and pedestrian crossing”, but the participants understood that it meant *pedestrian and bicycle crossing*, *pedestrian crossing*, *bicycle/dismounted crossing*, and *crosswalk*. Even if some of them did not indicate who was crossing the road, they understood the crosswalk from the staggered stripes.

Other signs which they understood partially were “workers ahead” (Image 1.15), “slippery when wet” (Image 1.18), and “low ground clearance” (Image 1.12), all of which are RIS from the U.S. “workers ahead” shares the theme of construction with “flagger ahead” (Image 1.11), but it yielded a greater variety in responses with less indication of the presence of people. Answers with such indication were *construction workers ahead* (3), *men at work* (9), and *workers ahead* (11). All other answers referred to construction happening on the road ahead such as *construction ahead* (7), *construction* (13), *road work* (14), and the most literal responses, *digging* (2) and *shoveling* (3). Despite the design of the RIS consisting of a person digging at a mound, only 23 of 81 participants identified the involvement of people. As for “slippery when wet”, most of the participants understood the hazard of the road ahead as indicated by *slide warning* (2), *slippery* (33), and *slick roads* (7). However, fewer people listed the reason for the hazard with responses of *slippery when wet* (17) and *icy* (3) while others interpreted a different

warning as visible from *curvy* (10) and *windy* (3). To some extent, this RIS was confused with “windy road ahead” (Image 1.13) which has similar design elements of the yellow backgrounds and s-curves. The difference of designs will be discussed later in the discussion of where the participants did well and where they did not. Lastly, “low ground clearance” yielded the biggest variety of answers but still showed that the participants had some understanding of the RIS such as *rough crossing* (3), *low clearance* (9), and *high tracks/raised tracks* (13). The interesting responses were *no lowboy/no trailers over tracks* (14) and *don’t stop on tracks* (4) since these bear a prohibitory nature despite the sign not design such element as in “no passing”. However, these interpretations are logical since the design of the RIS displayed a truck pulling a trailer and scratching the tracks as it went over them. Consequently, some participants understand the relation of the RIS with railroads in that they responded with *railroad/tracks/railroad crossing* (13).

On the other hand, there were RIS which the participants struggled with interpreting the intended meaning. Some examples of this are Japanese “stop” (Image 1.8), “road closed to all traffic” (Image 1.7), “stop line” (Image 1.4), and “bus lane” (Image 1.3). For the Japanese “stop”, it is designed as a red, inverted triangle, the same shape as “yield” but with a different color. The most common response was *yield* (32) with other popular answers of *stop and yield* (5) and *stop* (2). However, those who interpreted the *stop* element (7 of 81) show that the difference of the shape overpowered the meaning of the color. Other interpretations that participants provided were *slow*, *caution*, *do not enter*, etc. For “road closed to all traffic”, there were two overall categories of responses: prohibition and railroad. This RIS is designed with a red circle with an *x* over a white background, somewhat similar to “no passing” and “no parking”. Thus, responses such as *no crossing* (12), *no entry* (25), and *no stopping* (2) are

understandable. On the other hand, responses such as *railroad* (3) and *railroad crossing* (8) seem unrelated. Comparing this RIS with the U.S. “railroad crossing” (Image 1.19) RIS, such responses show that the cross is connected with the idea of railroad. Since the next one, “stop line”, was already discussed in the discussion section of the research study, it will be revisited when discussing the design of “bus lane”. This RIS consists of a blue background and a white bus surrounded by two white lines with a downward arrow below the bus. It garnered 11 varieties of responses with the 3 most common being *bus stop* (37), *bus lane* (12), and *bus parking* (10). In terms of design, both RIS have blue backgrounds which are used as informational for motorist services in the U.S. RIS system. This will be discussed in more detail during the comparison of the two RIS systems. However, given the design of the sign, the 7 of 9 categories that incorporate bus shows that this part of the meaning was clearly understood.

Comparison of Systems:

In comparing the two RIS systems that have been described in Chapter 2, three clear differences are the difference representations of the “stop” and “yield” RIS, the number of colors utilized for the signs, and the number of shapes used. In the U.S., the stop and yield RIS have their individual shapes while the Japanese system uses the same shape for both with different color designs, but they are the only RIS that uses the inverted triangle. For the second difference, the U.S. utilizes eight colors while Japan uses five colors for their RIS. In using more colors, the U.S. system has specific meanings for colors as discussed before while the Japanese system has some overlap in the usage of colors. While the U.S. uses orange as the specific color for construction, Japan does not use it at all. Japan also does not differentiate public recreation areas and parks from motorist services as the U.S. does. Instead of separating them with brown signage, they use blue and green signage which is used for information RIS. The last color

difference is the use of black in RIS. The U.S. uses black and white for regulatory signs such as the directions in which cars are supposed to go, but Japan only uses blue, red and white. The third difference, the difference of shapes used, consists of two differences where the U.S. uses four additional shapes. Each shape is used for one specific meaning such as the shield for interstate markers, the right-tilted triangle for “no passing”, or the octagon for “stop”.

With the initial differences between the systems laid out, specific examples can be compared to see the similarities and differences. First will be the comparison of regulatory RIS.



Image 4.1 U.S. Regulatory RIS

Above are examples of U.S. regulatory RIS given in the drivers' manual, and as seen in the above image, the background is white while the details are provided in red and black. On the other hand, the Japanese regulatory RIS (Image 4.2) use blue and red over a white background for some and white or red details over a blue background. The U.S. RIS keep the shapes uniform in using squares and rectangles while Japan RIS uses a mixture of circles, squares, and rectangles.



Image 4.2 Japan regulatory RIS

In comparing the images with the findings from the study, the participants fully understood the prohibitory nature of the signs of both systems despite small differences in color and design. “No passing” and “no parking” both received responses of which most expressed the prohibition nature. Although not everyone could identify the meaning of “no passing”, 72.8% of them expressed at least the prohibitory nature of the sign. Furthermore, 67.9% were able to accurately identify the intended meaning of the sign. Even for “no parking from 8am to 8pm”, while half of the participants could not identify any meaning for the RIS, the other half understood the prohibitory nature of the sign. Some of the responses were recategorized as specifically *prohibition* because the participants simply wrote *no something* or *no...* as their answers. Since this RIS is the furthest of the prohibitory RIS from what the participants are most familiar with in terms of design (red circle with a slash over a blue background), the responses for prohibition still show the iconicity of the red circle with a slash.

Of course, regulatory RIS do not consist of only prohibitions. There are also RIS that regulate where drivers have to stop or yield, where certain vehicles can drive, the speed at which cars can go, and where pedestrians and bicycles can cross. As mentioned before, there is a big

difference between the systems with regards to *stop*. Because of the shape used in Japan, majority of the participants interpreted the RIS as *yield* to which drivers would only slow down. Thus, based on the Japanese *stop*, the shape communicated to the participants more clearly and is, therefore, iconic. For the U.S. system, the RIS that regulate where certain vehicles like semi-trucks can drive simply display such instructions through writing on white signage. On the other hand, the Japanese system uses simple designs to show specific restrictions like in Image 4.3. Such RIS are not used in the U.S. except for those in the bottom, right corner.

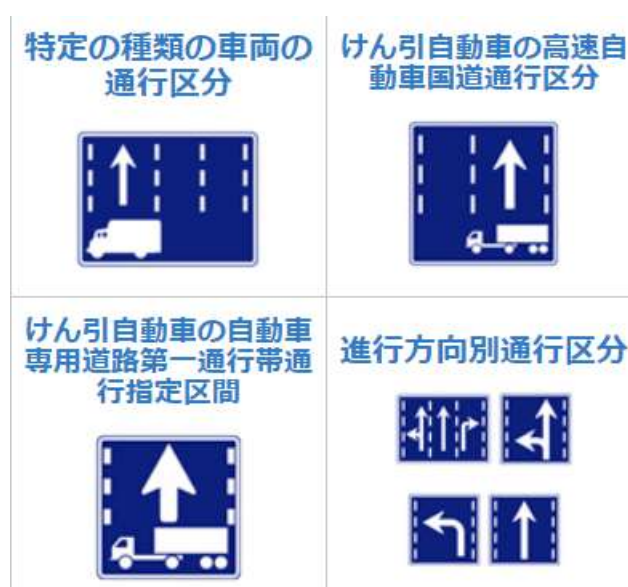


Image 4.3 Japan vehicle regulatory RIS

Even so, such RIS (Image 4.4) would only be used at intersections to inform drivers of the change of lanes at necessary intersections. Because of these, most of the participants did not understand “bus lane”. Rather, their knowledge based on the U.S. system was limited to blue representing informative messages of services available. Thus, responses were overwhelmingly indicative of this: *bus stop* (37), *bus pickup/dropoff* (4), *bus parking* (10), *bus downstairs* (2), and *bus other* (3) consisting of *bus this way* and *bus exit*.



Image 4.4 U.S. vehicle regulatory RIS

Interestingly, the opposite occurred with regards to “bicycle and pedestrian crossing”. As an informative sign indicating where pedestrians and cyclist can cross the street, this is an RIS that U.S. drivers are unfamiliar with. However, 74% were able to identify who the crosswalk is intended, some even specifying that those with bicycles have to dismount to cross the road. While there is not another sign to compare this RIS with to determine if this is iconic or not, the participants were able to identify the meaning from the design of the person and bike on the staggered lines.

Other categories have less differences than regulatory signs which would make it easier to understand while driving abroad. However, the variation in responses for some of the signs that are the same in both systems indicates that, towards the drivers, there is some ambiguity behind the meanings of the signs and some overlap that the respondents did not clearly differentiate. The first comparison for understanding this ambiguity and overlap is that of the U.S., “right lane ending, merge left” (Image 1.16), and of the Japanese, “merging traffic” (Image 1.5). Both of these signs are present in both systems with the direction of the merge matching the respective side on which they drive in those countries. Both of these signs had similar levels of variation, but “merging traffic” had one more type of response than “right lane ending, merge left”. Responses for the RIS did not provide all of the necessary points of the design, but they provided at least one of the two: *lane ending* or *merging*. “Merging traffic”, on the other hand,

received more responses that were off target such as *road entering (from left)* (5), *intersection* (12), and *hidden* (3) (i.e. *hidden intersection* and *blind road/driveway ahead*). Majority of the responses did indicate understanding of the sign. But, the 24.6% of responses that indicate otherwise shows that a proportion of drivers are unfamiliar with this RIS and would not know where to expect it.

As for other categories of RIS from the U.S., the participants, for the most part, understood the meanings of the RIS based on the designs of the drawings. “Winding road ahead”, “deer crossing”, and “railroad crossing” show this clearly. Even though the “deer crossing” (Image 1.10) RIS used is from the Japanese system, the design is the same except for the directions that the deer is facing. Each of these signs were the same color but none of the participants responded with a general category for the sign. Instead, they were able to properly identify the intended meanings, even if they did not match the definition word for word. However, there were several RIS that the participants had a difficult time understanding based on the design. These were “low ground clearance” and “slippery when wet”. Participants interpreted “low ground clearance” as a prohibitory RIS in that trailers are not allowed over the train tracks, as *railroad crossing*, and as an RIS identifying that the train tracks are higher. This serves as a warning for those who crossing to beware of going over the hump too quickly and of scratching the bottom of their trailer that has a low bottom. It does not prohibit trailers but simply warns drivers to drive over the tracks slowly. Based on these interpretations, the intended meaning of the RIS is not being conveyed clearly. Alternatively, “slippery when wet” had less variation with two clear types of interpretations: weather conditions and road conditions. Most understood that the intended meaning of slippery roads while some did not understand this and interpreted it as indicating a curvy road. Although fewer than those who provided the prior

responses, some participants understood the RIS to indicate that weather conditions would affect this particular portion of the road. One of the reasons for the interpretation of *curvy road* is the RIS's similarity to "winding road ahead". For the design of both RIS, s-shaped curves are incorporated, the prior incorporating them under the car and the latter incorporating one curve with an arrow. These responses show that the participants were unable to properly and fully interpret the intended meanings of the RIS, and a factor of that is its design.

While most of the RIS were interpreted based on the designs, one pair of signs showed that the RIS may be interpretable by color. As discussed before, "flagger ahead" and "workers ahead" were both identified as construction type RIS. These two share the same color, orange, and the same shape, diamond. They also have similar designs incorporating people, but one was associated with the presence of people more than the latter. For "flagger ahead", 24 of the 42 participants who responded a category other than *flagger ahead* identified the presence of people. "Workers ahead" received the opposite kind of responses in that most of them noted that the road ahead is a construction zone. While construction zones may imply that there are people in the vicinity for some people, there is the chance that people would only think of the obstructions set up and the need to be careful of the obstructions. Based on the responses, it seems like the participants have replaced "workers ahead" with "construction zone" which consists of a different design.

Chapter 5: Conclusion

Iconicity exists not only in colors and shapes of RIS but also in the designs. The common interpretations of signs from two different RIS systems of two, completely different cultures showed the commonalities of the RIS designs and the features of the signs that are iconic, regardless of culture. Red is iconic for prohibited actions and items when used as a circle with a slash and *stop* when used on an octagon. Orange seemed to be iconic for construction. Shape can hold more power than color in terms of iconicity since the red, inverted triangle (Japanese “stop”) was associated more often with *yield*. Two lines meeting are also strongly associated with the concept of lanes merging. A cross and tracks bear some iconicity for trains while a deer on a yellow diamond is iconic for a warning of deer crossing the road. On the other hand, the comparison of interpretations also revealed iconic features that are specific to the U.S. The clearest indicator of this is the use of blue for the background of informational RIS that show drivers what services are available and where. Thus, in the specific context of driving, colors can be directly associated to a specific meaning even though they do not actually have a direct connection to it. Additionally, these iconic features allow people to understand signs that are unfamiliar to them to some extent but also causes them to misinterpret some unfamiliar signs (i.e. blue for *bus lane*).

Alternatively, misinterpretations and partial interpretations of RIS show the linguistic features that are not iconic. They also show how such cases are not limited to those that people are mostly unfamiliar with but also include those of the U.S., which the participants are most familiar with. This leaves room for improvement in several ways such as redesigning the RIS for the U.S. or redesigning the method of explaining the signs. Not fully understanding the meanings of the RIS has several implications. Misinterpretations indicate that the RIS is not

clear enough and that while the drivers have an idea of what the sign means, their idea of the meaning of the sign could be partially or entirely off. For example, “merging traffic” indicates that the oncoming car (Car A) only has a short distance for it to merge onto the interstate or the road. The car already on the interstate or road (Car B) has to prepare by either slowing down or by shifting to the left lane so that that Car A can merge within the distance provided and at the proper speed so that they would not disrupt traffic. However, if the driver of Car B does not understand the implications of “merging traffic”, Car A would have to give way and potentially disrupt the flow of traffic, increasing the risk of accidents. To prevent such cases and further lack of understanding of RIS, improvements should be considered and evaluated. Following will be a discussion of the impacts that the findings of this study has for society, the limitations of such findings, and further research that can be conducted.

Impacts:

Just as each culture has its good points and downfalls, RIS systems are the same. Based on the findings in this study alone, some of the RIS in the U.S. could be redesigned to convey the meanings more accurately. Ones that showed this need are “low ground clearance”, “slippery when wet”, and designs for designated lanes. The most common misinterpretation of “low ground clearance” (Image 1.12) is that trailers are not allowed over the tracks, but there is no sign of prohibition incorporated. This RIS serves to warn drivers that 1) the train tracks are higher, in the form of a bump and 2) those driving trailers with low bottoms may get stuck or may scratch against the tracks. Since the intended meaning appears to not be conveyed well, alterations should be made. The first intended meaning was recognized only by 16% of the participants which means that the bump of the raised tracks should be emphasized more for drivers to understand the second intended meaning. This would be done by increasing the angle

of the lines representing the road over the tracks. Another change to consider is the use of electric bolts to signify getting stuck or scratching the tracks. A category of answers identified the meaning to be *electrified tracks* because of the bolts. Altering the angles at which the trailer hits the tracks may decrease this misinterpretation, so people's interpretation of the altered sign should be checked prior to altering the bolts to another simple illustration for impact like a partial curvy line (Appendix, Image 2.1).

Another RIS that would be more accurately interpreted if altered is "slippery when wet" which was more commonly interpreted as *slippery*. Weather conditions affect the conditions of the road making it more dangerous to drive on. If someone were to drive the same road continuously while interpreting the RIS as *slippery* without regard to weather conditions, they might ignore the effects of weather because they are used to that road. If officials want the message to be conveyed more clearly, adding clouds or water puddles would clearly communicate the weather conditions during which the warning is needed. For the last option, RIS for lane designations from the U.S. were not included in the survey since they are usually written out. Thus, more research should be done to verify the redesign would improve understanding of the RIS. If regulatory RIS for lanes in the U.S. is redesigned such that it is similar to those of other countries, it would decrease lack of understanding of non-U.S. RIS. Additionally, it might be easier to comprehend an illustration. More research would need to be conducted to ensure that this would be proper alteration.

On the other hand, some RIS cannot be changed much since the design incorporates the elements but the interpretations seem to ignore an element of the designs. An example of this is "workers ahead". The first one seems to have taken on the meaning of a different RIS. "Construction zone" is usually written out on an orange diamond, but "workers ahead" received

more interpretations of the prior RIS. Not considering the presence and proximity of people to the road would increase the risk of fatal accidents. Since the design cannot be changed, testing methods should be improved to ensure that drivers pay attention to the nuances of the RIS. An improvement would be incorporating signs that are similar into the paper tests that people have to take prior to learning how to drive. During the test, participants would have to pick the right answer out of four meanings for similar RIS. This would motivate the learners to properly learn the meanings of the RIS and be more familiar with them so that they can drive safely.

Limitations:

The conclusions of this study does not come about without limitations. One possible factor that was not investigated in the research study is the impact of international travels on people's interpretations of RIS from outside of the U.S. Depending on how much attention people pay to their surroundings, they might notice signs that are unfamiliar and ask locals about them. Certainly, such experiences does not guarantee that people would recall such situations when taking the survey. However, some of the participants had indicated their assumption that some of the non-U.S. RIS were European variants. Thus, the factor of international travel should still be considered. Another possible factor that was not included in the study is people's experience of driving outside of the U.S. More than the first factor, people understand and remember something better if they were do act according to the RIS. Thus, if a respondent had experience with driving abroad, it would have increased the chances that they would be familiar with non-U.S. RIS and might also affect their interpretations of U.S. RIS.

Further Research:

More investigations can be made with regards to the iconicity of the colors of signs. Taking "workers ahead" and "flagger ahead" in consideration, both received responses with the

theme of construction, but the latter received more responses for its intended meaning. If the design for both RIS were excluded leaving the orange background, would people still connect it with construction, and would the same consideration apply to other colors? In addition to this, more research can be done on the iconicity of the designs (deer, lane merge, etc.) by altering the background color of the RIS. The findings of these studies would deepen understanding of the conclusions of this paper. Another point of cross-cultural visual semiotics that can be investigated is the rate at which a visual representation is interpreted versus a written RIS. Just as Japan uses visual illustrations (Image 4.3) to communicate lane designations, would those be easier to process than RIS that are written out like in Image 4.4? If so, this would reiterate the point of improvement made above in the “Impacts” section. These investigations would also deepen understanding of visual semiotics and its relation with RIS.

Bibliography:

- Hall, Sean. 2012. *This Means This, This Means That: A user's guide to semiotics*, Laurence King Publishing.
- Hodge, Robert & Kress, Gunther. 1988. *Social Semiotics*, Polity Press.
- Leeuwen, Theo V. 2005. *Introducing Social Semiotics*, U.S.A, Canada, Routledge.
- Liszka, James J. 1996. *General Introduction of the Semeiotic of Charles Sanders Peirce*, Bloomington and Indianapolis, Indiana University Press.
- Peirce, Charles S. 1991. *Peirce on Signs: writings on semiotic*, The University of North Carolina Press.
- Scollon, Ron. & Scollon, Suzie W. 2003. *Discourses in Place: Language in the Material World*, Routledge.
- Sebeok, Thomas A. 1994. *Signs: An Introduction to Semiotics*, Toronto, University of Toronto Press.
2002. “United States Road Symbol Signs”, U.S. Department of Transportation: Federal Highway Administration.
- Wagner, Anne 2006. The Rules of The Road, A Universal Visual Semiotics. *International Journal for the Semiotics of Law*, 19, 311-324.
- Ward, Shanna J., Wogalter, Micheal S. & Mercer, Andrew W. 2004. Comprehension and Training of International Road Signs. *Proceedings of the Human Factors and Ergonomics Society*, 2104-2108.
2011. “道路標識の種類と意味 (Types and Meanings of Road Signs)”. <https://menkyo-web.com/hyoshiki/>

Appendix:



Image 1.1 Japan RIS: 'Pedestrian and bicycle crosswalk'

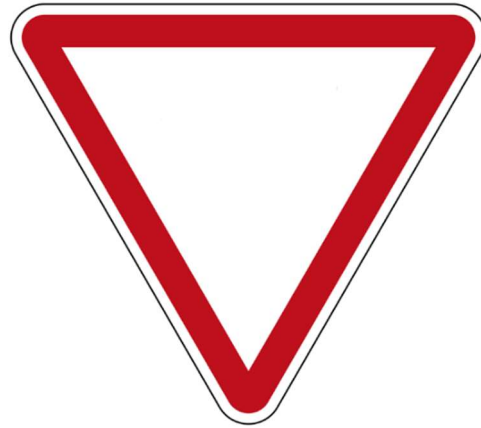


Image 1.2: Japan RIS: 'Yield'



Image 1.3 Japan RIS: 'Bus Lane'



Image 1.4 Japan RIS: 'Stop Line'



Image 1.5 Japan RIS: 'Merging traffic'



Image 1.6 Japan RIS: 'No parking from 8am to 8pm'



Image 1.7 Japan RIS: 'Road closed to all traffic'



Image 1.8 Japan RIS: 'Stop'



Image 1.9 Japan RIS: 'No passing'



Image 1.10 Japan RIS: 'Deer crossing'



Image 1.11 U.S. RIS: 'Flagger ahead'



Image 1.12 U.S. RIS: 'Low ground clearance'



Image 1.13 U.S. RIS 'Winding road ahead'

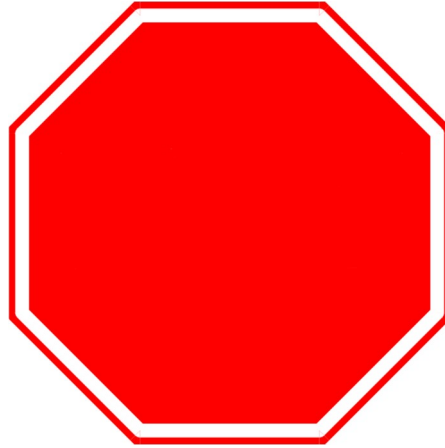


Image 1.14 U.S. RIS: 'Stop'



Image 1.15 U.S. RIS: 'Workers ahead'

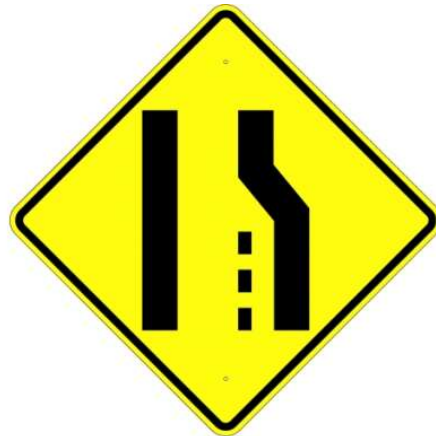


Image 1.16 U.S. RIS: 'Lane ending'



Image 1.17 U.S. RIS: 'No parking'



Image 1.18 U.S. RIS 'Slippery when wet'



Image 1.19 U.S. RIS: 'Railroad crossing'

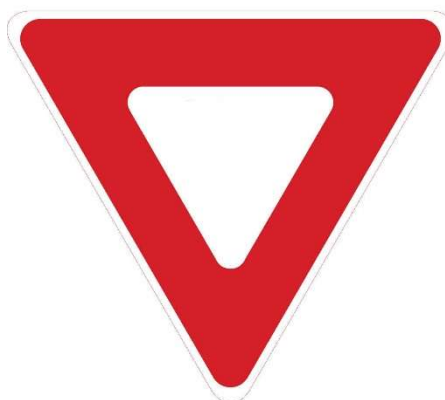


Image 1.20 U.S. RIS: 'Yield'



Image 1.21 Distractor: 'Arrivals'



Image 1.22 Distractor: 'Baggage Claim'



Image 1.23 Distractor: 'First Floor; Exit located here'



Image 1.24 Distractor: 'Restaurants ahead'



Image 1.25 Distractor: 'Immigration'



Image 1.26 Distractor: 'McDonald's'



Image 1.27 Distractor: 'Taco Bell'



Image 1.28 Distractor: 'No aliens'



Image 1.29 Distractor: 'No pets'

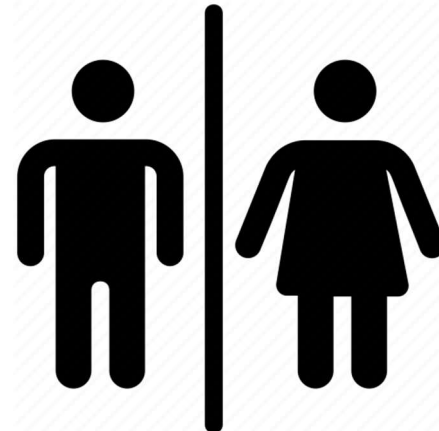


Image 1.30 Distractor: 'Restroom'

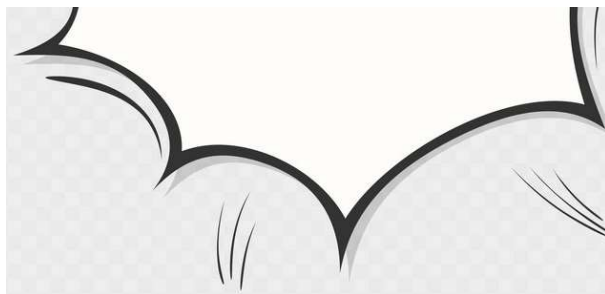


Image 2.1: Illustration of Impact