

Sex Symbols

A Pilot Study Examining the Effects of a Content Analysis of Gendered Visual Imagery in Cross Cultural Road Signs

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Abstract

Despite the general global consistency of road signs, the depicted human icons possess varying degrees and types of gender by country. This paper proposes that greater gender typing in road signs communicates greater inequality in a cultures' attitude towards women. Leveraging theoretical concepts from semiotics and Bandura's social cognitive theory, this pilot study creates and measures a visual gender scale and completes a content and semiotic analysis, providing the requisite foundation for investigating the effects of gender presentation. Results highlight the absence of gender neutral icons, internal validity of the gender scale, and pilot outcomes. A full scale study is warranted to formally measure degree of visual gender and social effect. Limitations include the novelty of a gender scale and inhibited ability to discuss effects theoretically as a result of small sample size.

Keywords: *intercultural, gender, content analysis, stereotypes, visual, semiotics, social learning*

1. Introduction

As businesses and universities continue to expand programs and interact globally the opportunities to travel, work and/or study abroad flourish. Female professionals, students and even holiday travelers, face incremental risks over their male counterparts arising from varying cultural attitudes towards women. These differing attitudes promulgate from varying gender stereotypes, or cultural constructs of sex. Gender stereotypes visible in mass media include symbols and images. Symbolic communication and observational learning represents a distinctly human capability central to Bandura's (1986) social cognitive theory of mass communication, enabling people to quickly assess and adapt to a situation. While meta-analysis highlights the prevalence of gender stereotyping (Einsend 2010), researchers call for more investigation into the impact of underrepresentation and typecasting in media (Collins 2011) and imagery on gender awareness (Yasin, Hamid, Othman, Bakar, Hashim, & Mohti 2012). Since cross-cultural variation exists in gender role construction, and this intersects with categories like job, age, or education (Eckert 2014), the corresponding effect analysis should minimize visual complexity. Road signs provide a consistent and simplistic symbolic basis for a visual gender cross-cultural analysis.

Road signs are part of a global visual system that symbolically describe a rule or guideline through the universal language of icons (van Leeuwen & Jewitt 2001). Three common cross-cultural roads signs which typically include human icon(s) signify pedestrian crossing, school crossing, and workers. However, the human symbols vary in the degree they embed masculine, feminine and gender neutral characteristics by country. Using semiotic and social cognitive theory elements, this pilot study replicates and extends research by creating and evaluating a visual gender scale, performing a (male/female/neutral) content analysis, evaluating the semiotic storylines, and most importantly, relating the scalar output with cultural gender inequality. Finally, feasibility of a full study is measured against several items from the Van Teijlingen and Hundley (2001) pilot list; development and testing of an instrument, identification of logistical or other problems, estimate data variability, and preliminary data collection.

Visual symbols carry a learned message. In the case of a road sign, the imagery reflects one or more humans performing some traffic-relevant activity. Surprisingly, even though the road signs remain relatively consistent across developed countries, the human symbols vary from very "masculine" to highly "feminine". Given this cross-cultural social communication consistency, along with symbolized gender role inconsistency, road sign icons present a viable starting point for a cross-cultural visual imagery analysis and comparison.

2. Theoretical Framework

Four steps are essential to accomplish the ultimate objective of analyzing the relationship, if any, between symbolic communication and social effects. First, objects within icons need to be linked to gender, creating both categorical and scalar results. Second, a content analysis is imperative to understand alignment with historical research and generate a quantitative count. Third, using content analysis quantity results plus social narratives from sign connotations translates imagery into social messages. Finally, the ultimate objective correlates cross-cultural gender scalar data with social effects.

These four steps are reviewed using a two phase pilot approach incorporating elements of semiotic and social cognitive theories. The first phase emphasizes elements of semiotics. Linking imagery to output involves connecting the appropriate objects with gender. Semiotics investigates two fundamental visual communication questions, (a) what do the images represent and how and (b) what do they stand for by evaluating the individual pieces of the image, the “lexis” or “vocabulary” of the image (Van Leeuwen & Jewitt 2001:92). Visual imagery is deconstructed, and analyzed, like text, to understand, evaluate, question and/or critique (Callow 2005). Semiotics layers meaning from objects generating meaning (object-signifiers), the first layer is “denotation” (what or who is depicted) and the second is “connotation” (what ideas and values are expressed) (Van Leeuwen & Jewitt 2001). In the case of road signs evaluated in this study, the objects denote humans. Connotation explores the meaning of the image as expressed by object-identifiers, or objects that assign value.

The outcomes from this first phase are both quantitative and qualitative. The first outcome requires identifying and utilizing appropriate research-based, object-identifiers to create an *effective* visual gender scale. *Effective* means internally valid, replicable, and usable. Ideally, gender should reflect the fluid social construct rather than dichotomous biological sex. Thus, the first requisite test and report, while not a formal research question, expresses the internal validity of a new visual gender measure reporting category and scale.

Next, employing this systematic gender assignment provides an opportunity to discuss cultural and gender narratives. The content analysis overlaps both phases, as quantities emphasizing narratives and comparative hypothesis. The social and cultural gender messages, or themes, are shared in phase one reporting, relevant to the research question presented later in the paper. Therefore, phase one discusses internal validity and outcomes of the measure as well as the research question.

The second phase incorporates a content analysis and responds to linking media representation with social outcomes, later presented as the two hypotheses. Researchers’ key criticism of content analysis, summarized by Rudy, Popova, and Linz (2010), is its ability to only provide a methodology while understanding the effect(s) contributes the greater value. Collins (2011) and Fitzpatrick & McPherson (2010) suggest social, observational learning, via stereotypes, plays a role in gender behavior formation. Rudy, et al, 2010, confirm Bandura’s social cognitive theory as one of the widely cited rationales.

Social cognitive theory (Bandura 1986), an agentic theory, proposes three reciprocal causes for learning/behavior; personal, behavioral, and environmental determinants (Bandura 1994). Bandura further explains that people both produce and are products of the triadic and interacting determinants using several uniquely human guiding capabilities; symbolization, vicarious, forethought, self-regulation, and self-reflection (Bandura 1994; Bandura 1996; Bussey & Bandura 1999).

The symbolization and vicarious characteristics play key roles in creating, learning and interpreting visual imagery. Symbolic communication allows people to assign meaning to experience, reinforce learning, and transmit information on behavior (Bandura 1971; Bandura 1994). Two major benefits of symbolic messages include reaching vast audiences and producing affect (Bandura 1996). Humans possess vicarious characteristics that enable them to both intentionally or inadvertently model, learn, generate and adapt behavioral rules from others (Bandura 1996).

While road signs in highly developed countries are equally salient, prevalent, accessible, and functional - features necessary for observational learning - the exemplified human differs by region. For example, the school crossing sign from Chile illustrates a female girl in a dress whereas the same sign from Israel includes two male figures, possibly a father and son. These signs also differ in the degree of feminine/masculine traits with some illustrating generic human symbols (i.e., UK pedestrian) and other detailed and realistic renditions (i.e., Switzerland pedestrian).

Culture, representing the “collective agent” in this research, is an interpretative frame shared by a group (Dahl 2003; Markus & Kitayama 1991). Cross-cultural analysis fits well with both semiotics and social cognitive theory.

A culture shares a national ideology and, aligned with Bandura's theory, assigns a weight to the collective as to how much emphasis it holds on influencing personal behaviors. Similarly, semiotics treats culture as shared foundation activated by the image; a reflection of society. These are frames; people use culturally provided knowledge to construct and interpret visual information.

3. Social Roles within Cultures

Culture is largely the, "selection, the rearrangement, the tracing of patterns upon, and the stylizing of...ideas" (Lippman 1922: p. 16). Language is learned; it is comprised of linguistic and sociolinguistic accuracy which express power, status, and relationship (Arnaiz 2006; Liddicoat 2006; Yu 2005) based on culturally rooted norms evident in verbal language. Cultural ideologies not only impact language, syntactic structure, and word meaning (Lim 2002; Ogiermann 2009), but extend to nontraditional nonverbal examples like highway systems (Hall 1969), philosophies defining appropriateness (Hall 1973), objects (Wardaugh 1998), and social roles or interactions (Arnaiz 2006; Bernstein 1972; Markus & Kitayama 1991). Learning one's place in society involves learning and reinforcement of cultural communicative rules. Bernstein (1972:473-474) describes this learning process as:

Individuals come to learn their social roles through the process of communication. A social role from this point of view is a constellation of shared, learned meanings through which individuals are able to enter stable, consistent, and publically recognized forms of interaction with others. A social role can then be considered as a complex coding activity controlling both the creation and organization of specific meanings and the conditions for their transmission and reception.

One of the foundational markers in any cultural human classification system is gender (Lorber & Farrell 1991), aptly defined as the, "cultural correlates of sex" (Guthrie 2007:15). Gender stereotypes and related research provide insight to the requisite object-identifiers for evaluating gender in symbols. Visual communication contributes to the level of in/equality via gender stereotypes by assigning reflecting and reinforcing socially constructed roles.

4. Visual Communication and Gender Stereotypes

Gender stereotypes assign attributes from socially learning, "what others have reported and what we can imagine" (Lippmann 1922:79) relative to biological sex. The gender construction process involves lifelong interactions and continual reinforcement through informal (i.e., peer) and formal (i.e., right to vote) outcomes which result in sex-determined roles, rights and responsibilities, (Lorber & Farrell 1991). The United Nations (UN) evaluates equality using the gender inequality index which ranks countries in ascending order based on, "inequality in achievement between women and men in three dimensions: reproductive health, empowerment and the labour market" (United Nations Development Programme 2013). Examples of inequality resulting in unjust, discriminatory practices against women include: violence (rape, torture, domestic), forced marriage and "harmful traditional practices" (i.e. – genital mutilation), abuse of power (law enforcement perpetrates or condones), lack of states prevention, investigation, prosecution and assistance measures, and (5) access to health care (United Nations 2010).

Stereotypes exist in masculine and feminine forms. Prior research on gender representation in media highlights overall underrepresentation of women, as well as gender typification in institutional and relational contexts (Collins 2011; Guthrie 2007; Matud, Rodriguez & Espinoza 2011; Yasin, Hamid, Othman, Bakar, Hashim, & Mohti 2012). Men are visualized as public, official, leading, and independent while women are visualized as domestic, dependent, or childlike. Simple road sign icons are likely no exception to the extensive historical research. Male imagery is expected to be more prevalent than female imagery. In addition, female imagery is anticipated to appear in dependent roles (represented with a second icon on a sign) compared to male imagery in independent roles (single icon on a sign). To avoid the dichotomous approach to gender, a gender neutral category is incorporated into this study. Therefore, hypothesis 1 tests:

Hypothesis 1a: Overall, male gendered icons exceed female gendered and gender neutral icons.

Hypothesis 1b: Of the independent, ungrouped, icons, male gendered icons outnumber individual female and/or individual gender neutral icons. Of the grouped icons, greater equality exists in male, female and neutral representation.

Visual representations of cultural (including gender) attributes, such as role, clothes, or hair, and physical characteristics (Eisend 2010; Fitzpatrick & McPherson 2010; Van Leeuwen & Jewitt 2001) express stereotypes.

Furthermore, the greater the stereotypical characteristics overshadow the general image the more that image⁴ represents a type (Van Leeuwen & Jewitt 2001). Despite variations in the degree of inequality in different cultures and countries, the global social system ranks men above women when all other human classifying elements (e.g., race, class) are equal (Lorber & Farrell 1991). These stereotypes perpetuate and reinforce, through social cognition elements of symbolic communication and observational learning, culturally defined social roles forming the second hypothesis:

Hypothesis 2: Use of gender on road sign icons correlates with gender inequality. Though images convey meaning, the message construction and interpretation is driven by societal rules (Berger 2014). As a result, imagery in the road signs embodies part of the gender construction process; creating, reflecting, and reinforcing the social attitudes of the culture. Simultaneously, road signs provide critical road and pathway navigation information that must be easily, almost instantaneously, interpreted by local and potentially foreign drivers, pedestrians, and cyclists to promote a safe environment. The signs included in this study contain human symbol(s) – symbols which play a key role in communicating cultural attitudes on gender, resulting in the following research question:

Research question: What gender themes emerge from semiotic and content analysis overall, by sign, and by country?

Researchers call for more insight on the impact of visual imagery and stereotyping. Sufficient awareness exists supporting the difference in prevalence and presentation of men and women, understanding the outcome(s) on society is critical. Thus, this paper investigates how each symbol reflects and reinforces information about the culture by producing meaning, transmitting information on behavior, and conveying behavioral rules (Bandura 1971; Bandura 1994; Bandura 1996).

5. Methods

5.1 Sample

A random sample of the 49 countries categorized as “Very High HDI [Human Development Index]” was listed in Excel and then selecting every 5:th country. In addition, the best (most equal) and worst (least equal) ranking country in gender inequality were chosen from the original 49 countries. Next, the United States was added as a point of reference. This process resulted in 12 countries. No information was found for four countries, Slovenia, Slovakia, Estonia, and Latvia. Since Slovenia was selected for its rank, it was replaced by the second ranking country, Switzerland. The remaining three substitutions incorporated the only two South American countries, Argentina and Chile, and Central American country, Cuba, to better round out the sample. Only data from non-regulatory bodies, a driving school, a personal interest website, and a sign making vendor was found for three of the countries, Cyprus, Poland, and Belgium, respectively. As secondary (or greater) source websites, the signs were possibly outdated or inaccurate and therefore removed to preserve high data quality. With nine remaining, validly sourced, countries’ data, a last country, Japan, was included to round the sample to ten countries and incorporate an Asian country. The final sample consists of 41 human icons on 31 signs from 10 countries; three from Europe, Germany, UK, and Switzerland, two from the Middle East, Qatar and Israel, two from South America, Chile and Argentina, one from Asia, Japan, one from Central America, Cuba, and one from North America, United States. (See Appendix 1, Table 1).

5.2 Procedure

Online searches using keywords such as, “road signs”, “driver”, “road”, “sign”, in English and/or native tongue of the country via Google Translate, resulted in pedestrian crossing, worker, and school crossing road signs collected from regulatory/government websites. Each sign and icon received a label indicating the icon number, sign name and country number. (See Appendix 2, Road Signs). For example, worker sign from Cuba is “Worker 6 – icon 37”. The three-step data collection process requires (1) recording the number of icons on each sign, (2) evaluating degree of gender, and (3) categorizing into nominal groups (male, female, neutral).

5.2.1 Number of icons

Data collection occurs at the sign and icon level. If the image is the only icon on a sign, its respective “individual” box is marked “1”. Alternately, if the image shares a sign with another icon, the “group” box is marked “1”. In the example below, the “individual” box is marked “1” because it is the only human icon on the sign.

Step 1: Number of icons coding example

Coding Example



Road Sign	Icon	Toilet Test	Clothing	Accessories	Hair Style	Physical Stature	Total Pts	Gender Category			Individual	Group
								Neutral	Male	Female		
Example 1	Example 1										1	

5.2.2 Degree of gender coding

The four stereotypical components of gender stereotype analysis include trait descriptors, physical characteristics, role behavior, and occupation (Eisend 2010). Scoring degrees of gender presents a challenge because it intersects with class, varies in norm by culture (Eckert 2014) and associated masculine-feminine trait perceptions change over time (Hoffman & Borders 2001). However, van Leeuwen & Jewitt (2001) remark that visual stereotyping, expressed by physical characteristics, cultural traits and/or outer appearance, increases in typification with increasing prominence in visual expression over the central figure. Therefore, the degree of gender scale definition reflects increasing gender feature prominence. It does not assess quantity or quality of female versus male gender.

5.2.2.a Toilet test

All signs were reviewed to assess both potential gender characteristics and prior research classification methods. Yasin, Hamid, Othman, Bakar, Hashim, & Mohti (2012) and Fitzpatrick and McPherson (2010) methodically classify binary gender using clothing, hair style, and facial attributes with Yasin, et al, adding one more category, physical stature. Modelling those, but incorporating a scale of 0 – 4, this research employs four, one point, criteria: (a) toilet test, (b) clothing, (c) clothing accessories and hair style, and (d) physical stature. The toilet test acts as a commonly understood gender benchmark; every human, every coder, from a highly developed country understands how to select a public toilet. Hair was combined with accessories because hair was only identified in feminine styles (i.e., ponytail) and appeared to oppose the masculine version of hat rather than a male gendered hairdo.

The first step is to evaluate gender neutrality. “Goffman emphasized that the gender binary is maintained by the continued ‘doing’ of gender –every time a person uses a single-sex restroom, he or she is reproducing that binary.” (Eckert 2014:530). Globally, people use public toilets, typically assigned by biological sex. If the road sign icon provides enough information for the coder to determine which sex would use a toilet with that icon, then the image receives 1 point, is categorized as male or female (“1” in corresponding gender box), and the coder continues through the process. If the coder cannot identify which toilet the icon would use, the image is categorized as gender neutral (“1” in neutral box), with no points assigned under the toilet test, and evaluation for that particular image is complete. Images of toilet signs from a few countries are provided as a point of reference. In the example below, the icon on the road sign, compared to the toilet signs, would use the men’s toilet, thus, receives 1 point for the “toilet test”, a “1” under the “male” category, and proceeds through the remainder of the analysis.

Step 2: Toilet test coding example

Note: Photos of toilet signs taken by author at locations noted.

Road Sign



Men's Toilet Signs

Left: Panama City
Right: Amsterdam – VanGogh Museum.

Women's Toilet Signs

Left to right: Munich, Panama City, Amsterdam – VanGogh Museum, Tokyo

Coding Example

Road Sign	Icon	Toilet Test	Clothing	Accessories	Hair Style	Physical Stature	Total Pts	Gender Category					
								Neutral	Male	Female	Individual	Group	
Example 1	Example 1	1					1		1			1	

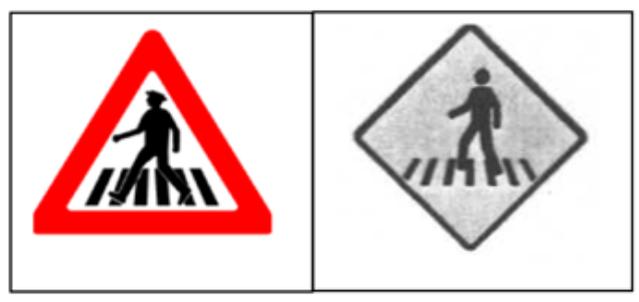
5.2.2.b Clothing

If the icon appears to wear gender specific clothing, one point is marked under “clothing”, otherwise, a zero is assigned. Male clothing is defined as perception of a suit, slacks, pants, male tunic, shorts, shirt/pant dividing line. Female clothing is defined as perception of a dress or skirt outline. This is similar to Yasin, et al (2012) and Fitzpatrick & McPherson (2010) referencing trousers/pants and dresses or frilly clothing for men and women, respectively. This code extends to perception of clothing, which is more subjective, since images are typically solid figures.

Irrespective of point assignment, after the toilet test, the remainder of the coding must be completed. Continuing with our initial example, since the pedestrian is walking outside, with evidence of a hat and possibly shoes, the assumption is the pedestrian is human and thus, is wearing pants rather than nothing at all. In comparison, while the second image would pass the “toilet test”, it appears less human because it has no feet, hands, or other accessories, suggesting that clothing is irrelevant. The second image would not receive a point.

Step 3: Clothing coding example

Road Sign Example:



5.2.2.c Clothing accessories and hair

One point is assigned to “accessories/hair” if the icon wears gendered accessories or hairdo. Male accessories consist of hats (e.g., hard hats, fedoras, top hats, fez, brimmed, postman-style, military-style) and briefcases, typically represented by a larger square than a woman’s purse. Female accessories include hairdo, hats and hair decoration (e.g., bows, visors, fluffy/rounded hat, ponytail) and purses, typically represented by a small square. Fitzpatrick & McPherson (2010) and Yasin, et al (2012) reference using hair accessories for women and short hair for men. Proceeding with the example, the icon is wearing a brimmed hat, resulting in a point assignment in “accessories”.

Road Sign Example:



Coding Example

Road Sign	Icon	Toilet Test	Clothing	Accessories	Hair Style	Physical Stature	Total Pts	Gender Category			Individual	Group
								Neutral	Male	Female		
Example 1	Example 1	1	1	1			3		1		1	

5.2.2.d Physical stature

Fitzpatrick & McPherson (2010) comment male possess larger stature than female characters. Eckert (2014) references the hegemonic feminine and masculine characteristics as small, delicate and strong, physically powerful, respectively. Ricciardelli, Clow, & White (2010) present a hegemonic male with strength and size and found visual magazine representations using muscles and fashionable dress. In summary, male characteristics include large, strong (i.e., muscles), and dressed appropriately while female characteristics include small and delicate frames.

5.2.3 Nominal gender group coding

The coding criteria for male stature are defined as any one of the following characteristics; muscular, large frame, large/muscular arms, wide legs, straight back, and broad shoulders or chest. The coding criteria for female stature are defined as any one of the following characteristics; thin waist or legs, small frame, shapely legs (i.e., calf muscles), and breasts. Since the categorical decision of gender was made during the toilet test, another way to assess stature is by reflecting on how closely this figure resembles a man/woman in consideration of the fact it is an icon. If it closely resembles its sex-based, live counterpart, the score is 1, otherwise, zero. In our example, the icon resembles a man, has a broad chest and broad (no curve in) waist.

Step 5: Final step – Physical stature coding example

Road Sign Example:



Coding Example

Road Sign	Icon	Toilet Test	Clothing	Accessories	Hair Style	Physical Stature	Total Pts	Gender Category			Individual	Group
								Neutral	Male	Female		
Example 1	Example 1	1	1	1			3		1		1	

The three-step data collection process for the Research Example Sign results in one icon on the sign (individual), four points for degree of gender, and a categorical classification of male.

6. Results

6.1 Phase One

Phase one questioned the effectiveness of a visual gender scale and called for discussion on gender roles. The scale based on object-identifiers produced excellent agreement beyond chance. However, the process produced zero gender neutral icons.

6.1.1 Internal Reliability

Following the recommended process for gender relevant content analysis, two internal validity tests were performed; a random sample of 20% of the icons and a final, comprehensive reliability test (Neuendorf 2010). One biological, gender affiliating male and female participated in coding. Cohen's kappa (κ) was calculated (N = 41): toilet test ($\kappa = 1.00$), clothing ($\kappa = .80$), accessories/hair ($\kappa = .90$), physical stature ($\kappa = .81$), gender ($\kappa = .80$), and number of icons ($\kappa = 1.00$). The final sample of total scaled gender points (toilet test + clothing + accessories/hair + physical stature) resulted in a strong two-tailed correlation ($r = .923, p < .001$). The resulting kappa scores indicate excellent agreement beyond chance (Neuendorf 2010).

6.1.2 Research Question

The research question explored themes. Three signs were analyzed; school crossing, pedestrian, and worker. (See Appendix 1, Table 3). School crossing consisted of nine (90%) group and one (10%) individual signs. The group signs included 13 male (68.4%) and 6 female (31.6%) icons, representing the highest proportion of female imagery in all three categories.

Given that school crossing signs alert the public of younger pedestrians (children), the icon age (adult/child) and relationship (parent/child, siblings) was assessed. In the dyadic signs, parent-child was differentiated from older-younger sibling by comparative size difference. The individual female image counted as a child due to the absence of a waist. The ten signs included 2 (20%) father-son, 2 (20%) older brother-younger brother, 4 (40%) older brother-younger sister, 1 (10%) older sister-younger brother, and 1 (10%) female child. Overall, there were 2 adults (10.5%) and 17 children (89.5%). Of this, the 2 adults (10.5%) and 11 children (57.9%) were male while 0 adults and 6 children (31.6%) were female. With regards to the 9 dyads, 8 (88.9%) and 1 (11.1%) presented males and females as the older party, respectively. The individual sign depicted the only independent female icon of the entire 41 icons; a female child.

Overall, the pedestrians are predominantly (91.9%) illustrated as individual icons rather than group (9.1%) with male icons representing most (83.3%) of the pedestrian imagery. Since Japan uses two pedestrian signs, this category consists of eleven total signs. Pedestrian signs include only one group sign, from Japan, illustrating a pair of females, seemingly a mother and daughter. In contrast, the ten individual icons consist of entirely male characters. Finally, the worker signs were 100% male and individual.

In summary, 22 (53.7%) adult males, 1 (2.4%) adult female, 11 (26.8%) male children, and 7 (17.1%) female children were represented by the icons. Of the 10 group signs, 8 (80%) presented males while 2 (20%) presented females as the older person. Of the 21 individual signs, 20 (95.2%) depicted adult males while 1 (4.8%) depicted a female child.

Ten countries were analyzed from the very high HDI United Nations list ranging from inequality scores of .03 thru .524. (See Appendix 1, Table 4). Japan (UN score = .138, UN rank = 25) had the highest female image presence, three of six (50%) of its images, and the highest degree of gender, 4.0, tied with Switzerland (UN score = .030, UN rank = 2). Argentina (UN score = .381, UN rank = 74) had the only individual female presence. United Kingdom (UN score = .193, UN rank = 35) depicted the only female leading a sibling, school crossing, dyad. Germany (UN score = .046, UN rank = 3), Israel (UN score = .101, UN rank = 17), Chile (UN score = .355, UN rank = 68), and Qatar (UN score = .524, UN rank = 113), used exclusively male icons, but degree of gender varied; 1.5, 3.25, 2.0, and 3.5, respectively.

6.2 Phase Two

The second phase tests gender and outcomes through hypothesis one and two. Hypothesis 1a proposed a greater overall presence of male icons while 1b suggested a greater overall presence of male icons for individual rather than group images. (See Appendix 1, Table 2). All icons passed the toilet test producing zero icons classified as gender neutral. Of the total 41 images, 33 (80.5%) and 8 (19.5%) represented male and female figures, respectively. Chi-square test finds a significant difference, supporting hypothesis 1a: $\chi^2(1, N = 41) = 15.24, p < .05$. Male and female gendered imagery accounted for 65% and 35% of group images, respectively, as opposed to 95% and 5% of individual images, respectively. Chi-square calculations revealed group icons presented no significant difference, $\chi^2(1, N = 20) = 1.80, p > .05$ while individual icons presented significant difference, $\chi^2(1, N = 21) = 17.19, p < .05$, supporting hypothesis 1b.

The second hypothesis suggests that greater use of gender on road sign icons correlates with greater gender inequality. One-tailed tests of the correlations reveal a nonsignificant negative relationship, $r(39) = -.186, p > .05$ between UN Gender Inequality and gender scale. No support for the hypothesis exists.

7. Discussion

Earlier, this pilot study noted a two phase approach for discussing the results relevant to four objectives. Phase one responds to the ability to create an effective visual gender scale in addition to exploring a research question on qualitative narratives driven by semiotic concepts and content. Phase two replicates and extends prior research via a content analysis and examines societal effects, respectively. Finally, the pilot study outcomes are measured against pre-defined success benchmarks to assess feasibility of a full scale study.

7.1 Phase One

The visual gender scale, grounded in prior research for labeling object-identifiers, demonstrates internal validity, replicability and worthwhile. The most interesting outcome is that every icon passed the toilet test, resulting in a dichotomous, nominal classification with absolutely no use of the gender neutral category. Human social training currently dichotomizes gender, male *or* female. Eckert (2014) mentions the significance of erasure, iconization, and fractal recursivity in dichotomous gender construction; erasing the intra-sex and focusing on between-sex differences, defining gender through icons, and associating terms with the feminine and masculine. While the toilet test provides a coding benchmark, it may be overly saturated in, *and only in*, the binary. Researchers should question what a truly gender neutral sign would look like. Gender neutral toilet signs often reflect the image of a toilet rather than a human fe/male. Perhaps images unrelated to gender, such as a school house, shovel and pile, and feet/shoes might represent school crossing, workers, and pedestrians, respectively, without diluting the message.

After assigning gender to the symbol, the research question explored gender narratives. Four comparisons warranting discussion include independent/relational, protector/chaperone, adult/child, and cultural presentation. The first three themes apply universally to the countries and symbols included in this pilot study.

7.1.1 Independent/Relational

Consistent with research (Collins 2011; Guthrie 2007) women and men are portrayed in relational and independent roles, respectively. The school sign icons, predominantly dyadic, present more equitable gender representation than worker or pedestrian. In every country, except one, the school crossing signs employ dyadic, relational pairs. The worker and pedestrian icons, wholly and predominantly independent, respectively, represent nearly entirely male symbols. The only exception to the independent, male icon on the pedestrian signs is a mother-daughter pair; a relational pair. In contrast, both the second (same country) pedestrian sign as well as the nine other countries' signs, utilize independent males. Thematically, females serve as a function of another whereas men operate independently, actively and at work.

7.1.2 Protector/Chaperoned

In addition to relational representation, female symbols also feature prominently relative role they play. Generally speaking, an older (male) brother typically guards a younger (female) sister in the school signs. This supports findings depicting men as leading, dominant (Yasin, et al, 2012) and higher ranking (Matud, et al, 2011) than women. Men lead through protecting the safety of and governing the cautiously kept female. The pedestrian and worker symbolically protect self and/or family since each independent icon takes the risk and responsibility of venturing out in the world and conceivably providing some resource (i.e., a paycheck). Conversely, in the countries examined, it appears adult women never leave home alone or unchaperoned.

7.1.3 Adult/Child

Females are overwhelmingly depicted as children; carefree, sheltered, and guarded. The one and only adult female - out of forty-one icons - serves as guard, or mother, for the one and only child pedestrian, also female. Like earlier themes, the childlike visual representation of women supports earlier research (Fitzpatrick & McPherson 2010). This symbolism reinforces the role of relational functionality and necessary supervision. During the entire study the only adult, independent, female icons identified were in the toilet icons reference materials in the coding scheme. Given the global presentation of women as dependent beings, it is nothing short of a miracle that women are even portrayed as capable of independently visiting the toilet.

7.1.4 Cultural Presentation

While the gender themes apply to all the countries, there are two interesting cross-cultural points that may represent attempts at more equitable representation. First, three countries stand out among the ten relative to female imagery, Argentina, Japan, and the United Kingdom. Argentina depicts an independent, female character, albeit a child. Japan equally illustrates male and female icons. The United Kingdom portrays the only female leader in a dyadic school crossing sign. None of the three countries stand out as significantly ranked on the UN equality scoreboard. These may represent cultural characterizations or alternately, attempts at improving equitable imagery through increased or differing female representation.

Second, four countries exclusively use male icons, Germany, Israel, Qatar, and Chile, with varying UN gender inequality rankings, visual gender fluidity scores (the employed measure), and human development ranks. A possible explanation may include use of lower-male-gendered icons as an attempt at gender neutrality. Focusing on intra versus inter gender differences signifies an opportunity to limit variables and better measure effects. Additionally, overall UN human development score may be a possible variable in the equation.

7.2 Phase Two

The critical factors of phase two include replicating prior content analysis and research using categorical gender to assess visual stereotypes (e.g., Fitzpatrick & McPherson, Yasin, et al) and responding to calls for measuring social effects (e.g., Collins). Although gender neutral was recognized as an important category for content and scalar analysis, no imagery fit the profile. When assessing gender as a nominal category, findings align with prior research; a significantly greater male gender presence, particularly in individual versus grouped expressing consistent presentation of men as independent, protecting, adults and women as relational, childlike and dependent (Collins 2011; Guthrie 2007; Matud, et al 2011; Yasin, et al 2012). Holistically, the results support Lorber and Farrell's (1991) remark that the global social system ranks men above women when all other human classifying elements (e.g., race, class) are equal.

The steps in the process lead to one critical topic - defining a potential relationship between gendered imagery and cultural gender inequality outcomes. This study demonstrates a small inverse relationship between degree of gendered imagery on road signs and UN gender inequality scores, albeit likely a result of chance. However, two reasons the first hypothesis does not reach significance may be an inadequate scale or low sample size. Pilot studies purposefully employ small samples to work through issues like measurement and procedural effectiveness before investing time and resources in the larger study. The trade-off includes low power resulting from small sample size. Therefore, testing effects of Bandura, specifically, observational learning and symbolic communication is possible. Unfortunately, the outcome from such a small sample is unreliable and difficult to discuss with any degree of confidence.

7.3 Pilot Study Measure of Success

This paper prescribed four measures from Van Teijlingen and Hundley (2001) as criteria for success in determining the feasibility of a full study; the development and testing of an instrument, identification of logistical or other problems, estimate data variability, and preliminary data collection. The latter two items represent feasibility questions. The pilot indicates variability and collectability; countries use differing amounts of visual gender and data is available.

The first two items require elaboration. First, the visual gender scale instrument offers excellent internal reliability and replicability. While the "toilet test" benchmarks gender neutrality, the lack of any neutral icons may indicate too much reliance on intergender differences. Eckert (2010) provides one solution; focusing on intragender differences. This may be better managed by reducing variables to "male" gender only.

Second, the two most notable procedural problems include finding optimal data and defining gender neutrality. The vastness of the Internet and multitude of languages and characters required to search and vet data demanded a

significant time commitment. Preliminary data collection points to reducing variables in the full scale study¹ for example, using only independent icon signs. This may provide a more consistent basis for comparison. Like all research, this project has limitations.

7.4 Limitations & Future Research

There are three primary limitations to this study; gender scale, narrow feedback on effects relative to social cognitive theory, and small sample size. The latter two are interrelated. First, the visual gender scale reflects a pilot scale derived from dichotomous gender research. Despite excellent intercoder reliability, the scale novelty signifies opportunities for improvement. Further research, expanding on visual gender as a fluid measure, is imperative for driving discourse. Second, results from a small sample, pilot study inhibit the ability to thoughtfully apply Bandura's theory. A larger scale test, focusing on intra over inter gender icon differences by using only "male" icons, might reduce variables and provide a better measure of effect. Significant time was invested securing the best, rather than the most, data from validly sourced sites, often in foreign languages. Future researchers are welcome to use the pilot data; all signs and icons are available in the Appendix 2, Road Signs. These limitations reinforce the critical need for more investigations promoting dialogue on our symbolic environments.

8. Conclusion

Road signs, for very highly developed countries, represent a universal visual language portraying gendered icons. However, these may embody a more universal attitude towards women; underrepresented, relational, needing a chaperone, and childlike. Conversely, men are universally drawn as independent, protectors, and adults. No symbols demonstrate wholly gender neutral characteristics. Summarized from a cross-cultural analysis perspective, female symbols appear universally less valuable than men. Unfortunately, this represents a larger global issue rather than explaining variability among countries and/or regions. The effects on a given society are indeterminable due to the small sample size but measureable using the visual gender scale. These outcomes, along with the other findings, emphasize the need for a full scale study.

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Appendix 1 - Tables

Table 1: Countries included in the sample including HDI and Gender Inequality (GI) rank and GI score, along with sample number and region assignment

Picture #	HDI Rank	Country	Gender Inequality Score	Gender Inequality Rank	Region
1	5	United States	.262	47	NA
2	6	Germany	.046	3	EU
3	14	United Kingdom	.193	35	EU
4	19	Israel	.101	17	ME
5	31	Qatar	.524	113	ME

6	44	Cuba	.350	66	14 CA
7	39	Argentina	.381	74	SA
8	41	Chile	.355	68	SA
9	3	Switzerland	.030	2	EU
10	17	Japan	.138	25	ASIA

Source: United Nations (UN) 2013 Human Development (HDI) and Gender Inequality Index. Regional codes used ASIA = Asia, CA = Central America, EU = Europe, ME = Middle East, NA = North America, SA = South America

Table 2: Number of male and female gendered icons by group, individual and total presence

	Male	Female	Total
Group	13	7	20
Percent of Total	65%	35%	100%
Individual	20	1	21
Percent of Total	95%	5%	100%
Total	33	8	41
Percent of Total	80.5%	19.5%	100%

Table 3: Number of group/individual signs and male/female icons, by sign type, and total, in absolute value and percent of total.

Sign Type	Number of Signs				Number of Icons			
	Group		Individual		Male		Female	
School	9	90.0%	1	10.0%	13	68.4%	6	31.6%
Pedestrian	1	9.1%	10	90.9%	10	83.3%	2	16.7%
Worker	0	0.0%	10	100.0%	10	100.0%	0	0.0%
Total	10	32.3%	21	67.7%	33	80.5%	8	19.5%

Table 4: Male and female gendered icons by country, UN (2013) HDI Place, UN (2013) gender inequality score, UN (2013) gender inequality rank and scaled gender score

HDI Place	Country	Gender Inequality Score	Gender Inequality Rank	Region	Male	Female	Gender Score
5	United States	.262	47	NA	3	1	1.50
6	Germany	.046	3	EU	4	0	1.50

14	United Kingdom	.193	35	EU	3	1	2.50 ¹⁵
19	Israel	.101	17	ME	4	0	3.25
31	Qatar	.524	113	ME	4	0	3.50
44	Cuba	.350	66	CA	3	1	2.00
39	Argentina	.381	74	SA	2	1	2.00
41	Chile	.355	68	SA	4	0	2.00
3	Switzerland	.030	2	EU	3	1	4.00
17	Japan	.138	25	ASIA	3	3	4.00

Appendix 2 – Road Signs

School 1 – icon 2 and 1



School 9 – Icon 17¹⁸ and 16



School 5 – icon 9 and 10



School 2 – Children Crossing – icon 4 and 3



School 6 – Children – icon 11 and 12



School 10 – Icon 18 and 19



School 3 – icon 6 and 5



School 7 – icon 13



School 4 – icon 8 and 7



School 8 – icon 15 and 14



Pedestrian 1 – icon 20



Pedestrian 4 – icon 23



Pedestrian 8 – icon 27



Pedestrian 2 – icon 21

133



Pedestrian 5 – icon 24



Pedestrian 9 – icon 28



Pedestrian 3 – icon 22



Pedestrian 6 – icon 25



Pedestrian 10 – 2 signs noted (29, 30, 31)



Pedestrian 7 – icon 26



Worker 1 – icon 32



Worker 4 – icon 35



Worker 8 – icon 39 ¹⁸



Worker 2 – icon 33

123



Worker 5 - Edited for contrast – icon 36



Worker 9 – icon 40



Worker 3 – icon 34



Worker 6 – icon 37



Worker 10 – icon 41



Worker 7 – icon 38



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