

A Semiotic Analysis of Biotechnology and Food Safety Photographs in Time,
Newsweek, and U.S. News & World Report

Jennifer Lynn Norwood-Tolbert
Graduate Student
104 Old Gin Cove
Madison, MS 39110-7037
jtolbert@jackson.gannett.com
Phone: 979-255-5852

Tracy A. Rutherford, Ph.D.
125 Scoates Hall TAMU 2116
Texas A&M University
College Station, TX 77843-2116
trutherford@tamu.edu
Phone: 979-458-2744
Fax: 979-845-6296

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Abstract

This study evaluated photographs used in *Time, Newsweek, and U.S. News & World Report* in stories about biotechnology and food safety issues in 2000 and 2001. Semiotic theory provided a framework for a quantitative methodology to determine the messages conveyed by photographs and to group the photos by subject matter. Through an evaluation of 45 images, this research found that the news magazines had relatively balanced coverage of the issues. Five categories of images were determined to be used by the news magazines. These results are consistent with research in journalism about the use of images to create perceptions and support stereotypes.

Based on the results of this study, agricultural communications and journalism programs should emphasize visual media literacy. Media literacy is also important for media outlets generating or providing agricultural photos. It is also important for news outlets to evaluate their use of photographs as supporting stereotypes or influencing public perception rather than providing objective information.

Key Words: biotechnology, food safety, visual literacy, semiotics, agriculture, and mass media

Photographers capture images to communicate agricultural issues to the American public. Research in agricultural communications has shown that the treatment of agricultural issues by the popular press is lacking and that there is a difference in the sources used by agricultural and popular press magazines (Whaley and Doerfert, 2003; Whitaker and Dyer, 2000). However, the photographs used to supplement these stories have not been examined in previous research.

This study examined how photographs were used by the popular press in stories about biotechnology and food safety and will conduct an analysis, framed by semiotic theory, to determine the types of messages the photographs may suggest about the agricultural topics of biotechnology and food safety.

When combined with text, images dominate words and are processed in the brain to create perceptions about the subject (Barry, 1997). The purpose of this study is to identify what messages the visual content of *Time*, *Newsweek*, and *U.S. News & World Report* could be communicating to the public through a semiotic analysis.

Frick, Birkenholz, and Machtmes (1995) found that inner-city high school students from the Midwestern states were significantly less knowledgeable about agriculture than their rural counterparts. Both respondent groups were reported to have a positive perception of agriculture; however, the urban population's perception was based on something other than knowledge of the subject. The urban population, which does not have experiences to compare the messages to, must rely and trust solely, the information that the media presents. Understanding this relationship is important when considering how to educate and develop an agriculturally-literate audience.

Semiotics is an ancient methodology used to decode a photograph through examination of the signs within the photograph. Signs are indications of how the message is communicated to

the reader and are classified into three different types. An iconic sign represents what the object is. For example, a photograph of a car would represent the actual vehicle. An indexical sign represents a meaning that is implied through the photographed object. For example, an expensive car would indicate that the owner was wealthy. A symbolic sign is when an image represents another object or idea. The same expensive car could represent luxury or wealth.

Statement of the Problem

This study will evaluate if a difference exists in the quantity and nature of photographs used by the popular press magazines: *Time*, *Newsweek*, and *U.S. News & World Report*. This study was guided by two objectives: to determine what types of messages are conveyed through the photographs used in biotechnology and food safety stories in *Time*, *Newsweek*, and *U.S. News & World Report* and to compare the messages conveyed through photographs used in food safety and biotechnology by the three news magazines.

Review of Literature

Research in agricultural communications has examined the treatment of agricultural issues in the popular press. Whitaker and Dyer (2000) examined articles in *Time*, *Newsweek*, and *U.S. News & World Report*, and the top three circulated agricultural magazines—*Farm Journal*, *Progressive Farmer*, and *Successful Farming*. The study sought to determine if the sources used in a news story affect the balance of the story. The researchers found that the highest percentage of environmental and food safety stories were reported in news magazines (62.1%) and that both the news magazines and the agricultural publications used sources in educational and governmental roles. However, agricultural publications used agricultural sources and did not have any activist sources, whereas data showed that news magazine sources used activist sources, revealing a contrast in the way the two industries report news.

Whaley and Doerfert (2003) sought to quantify the nature of food safety coverage by *Time*, *Newsweek*, *U.S. News & World Report*, and *Business Week*, using content analysis. This study found that stories about food-borne illnesses appeared most frequently in the magazines, and stories about technological advances, second. The most quoted sources were governmental officials.

Whaley and Doerfert (2003) wrote

Understanding how a major mass media channel such as news magazines reports food safety and related risks can enhance the ability of agricultural communicators and university specialists to support the news industry and increase coverage of food safety-related university research (p.18).

These studies showed that different news organizations seek different sources and choose different angles when presenting agricultural news stories. These studies illustrate a need to monitor how the popular press reports agricultural news.

Stringer (1999) found that when surveying managing editors and reporters employed at Pennsylvania newspapers, over 70% of those surveyed considered food safety and human health as agricultural topics, among other topics such as pest and disease control, farmland development, and gardening. Over 90% of those surveyed indicated that they considered environment, business, and water quality to be agricultural topics.

Zillmann, Gibson, and Sargent (1999) found that one-sided photographs were more influential than neutral photographs when a population was exposed to a number of photographs and their perceptions of issues were measured. The populace recalled the compelling photographs more easily.

These studies verify that agriculturally-related stories should be examined for bias and to evaluate journalists' proficiency at relaying these stories to audiences. Grunig, Nelson, Richburg, and White (1988) concluded that agricultural audiences actively seek helpful information and are in turn educating themselves. Frick, Kahler, and Miller (1991) defined agricultural literacy as "the understanding and knowledge necessary to synthesize, and analyze, and communicate basic information about agriculture" (p. 54). There is a need to determine if how information is presented accomplishes the purpose of informing and educating the consumer.

Studies conducted about the nature of agricultural topics in popular press demonstrate a need for further research concerning agriculture in the news media. The lack of visual studies found in agriculture communications indicates a gap in the research.

Lester (1995) quoted Walter Lippmann as saying: "Whether right or wrong...imagination is shaped by pictures seen...consequently they can lead to stereotypes that are hard to shake" (p.100).

To fully understand how images create stereotypes, it is important to understand how media create messages and how one becomes media literate.

Potter (2001) wrote that people exist not only within the physical world, but also within a media world and must therefore understand this second world in which they live. He defined the media literate individual as one who actively interprets media messages and can therefore control the meaning of the message and effects the messages can have in one's life.

The process of interpreting messages is an active process. Lester (1995) wrote that in order to find meaning within a photograph, the viewer must actively concentrate on the subject of the photograph rather than just observing the photograph.

Griffin (2004) examined *Time*, *Newsweek*, and *U.S. News & World Report* to compare the photographic coverage of the Gulf War, the War in Afghanistan, and the War in Iraq. He found that the most frequently used photographs were of the military and that those photographs aligned with the government's position and did not offer fresh perspectives to the viewing audience.

Trumbo (2000) called attention to the importance of researching the visual images used to communicate scientific information, based on research that indicated few people have an understanding of basic scientific facts despite Americans viewing a significant amount of scientific media.

Huxford (2001) wrote that the claims of objectivity by the media were not supported by the evidence in his analysis of visual media used by the press. He found that the media needed to prove stories through the inclusion of pictorial representations. This need drives news media professionals to create photographs, even when the subject does not lend itself to visual portrayal.

Taylor (2000) wrote that the nature of news will keep the public from having an accurate visual portrayal because pictures are used to provide sensationalized images rather than the documentary style photographs that were once highly valued.

Singletary and Lamb (1984) found, through an analysis of National Press Photographers Association winning news photographs that images containing emotion and feature photographs depicting hardship were most frequently chosen as the winning photographs. The researchers concluded that photographs cannot be seen as reality because an expectation of what a photographer should capture exists. In order to become an award-winning photographer, news photographers must be able to capture emotionally charged, negative images of violence, crime,

and disasters, and feature photographers must be able to capture positive images of triumph and courage.

The NPPA code of ethics is to “promote the highest quality in all forms of photojournalism.” The code commits photojournalist professionals to capture accurate and balanced images (www.nppa.org), suggesting that consumers of mass media should be able to view the images as accurate portrayals of reality.

Semiotic theory is one of the many ways the messages of images are evaluated to determine if they portray reality. Chandler (1994) wrote that the shortest definition of semiotics is simply “the study of signs” (para. 1). F. de Saussure and C.S. Pierce are credited with the innovation of semiotics; while Roland Barthes is well known for his work in the semiotic field and credited with bringing the concepts to the visual communication field.

Saussure (1959) wrote that a person lives in a world shaped by decoded signs found in images, actions, words, and more that he or she has encountered. The purpose of semiotics is to become aware of the construction of reality created by those signs (Chandler, 1994). In doing this, the researcher is able to understand how the audience will decode the message, create that reality, and give insight into the culture (Bignell, 2002).

Chandler (1994) wrote that understanding messages reveals the equality of the messages that create that reality, and Moriaty (1997) wrote that using the semiotic methodology in visual communications is ideal because the cognitive processes and interpretive processes are parallel.

Danesi (2002) found that the semiotician is concerned with what a certain structure means, how it is able to represent what it means, and why it means what it means. In image-based research, identifying these signs within a photograph gives insight into the meaning of the photograph and what that photograph will mean to the average viewer.

Bignell (2002) explained the concept with the example of a Rolls-Royce. The car is a material signifier, a symbol that not only communicates the make of the car, but also communicates a mental concept of wealth and luxury. When the average viewer sees a photograph of this car, several messages are being communicated through this single image. Each of these messages is a different sign.

As shown in Figure 1 there are three types of signs in semiotic methodology: symbolic, iconic, and indexical. An image can be classified as one or more of these signs.

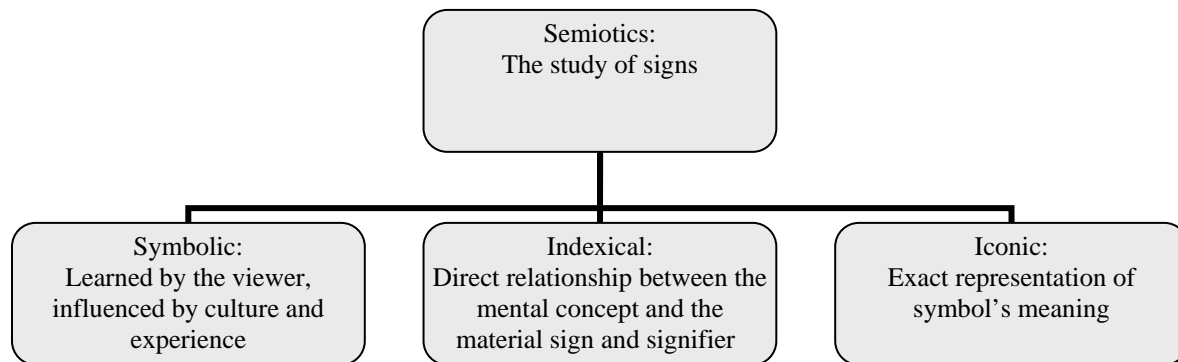


Figure 1 Diagram of Semiotic framework

Chandler (1994) wrote that a symbolic sign is learned by the viewer, as the signified and signifier do not directly resemble each other making them difficult to determine. In Bignell's example of the Rolls Royce, the car is a symbolic sign of luxury or wealth.

Bignell (2002) wrote that indexical signs have a direct relationship between the signified and the signifier. The viewer could draw the conclusion of the indexical sign that the owner was a wealthy person. Iconic signs are the easiest to discern. An iconic sign represents exactly what the sign is and can generally be easily determined, and agreed upon, by the audience. The Rolls Royce used in the example represents an automobile; therefore the iconic sign is an automobile. It is possible to have all three signs, symbolic, indexical, and iconic, in one image.

Deprawt (2002) used semiotics to analyze the photographic representations of the Japanese during the attack on Pearl Harbor and the representation of terrorists after September 11, 2001, in the *Washington Post* and the *New York Times*. He found that the media played a role in developing the perception of the enemy. His findings indicated using semiotic methodology provided researchers with information about the content of the images and an understanding of how the audience would interpret the image and the effect it could have on building perceptions. He reported that the news media work with power structures to create an image of “otherness” about an adversary of the United States. Therefore, just as Deprawt uncovered the perceptions that media can create about other cultures, it is important to understand how images concerning biotechnology and food safety shape public opinion.

Methods

This study employed descriptive methodology and quantitative content analysis methods to analyze the photographs in the 2000 and 2001 issues of *Time* ($n=10$), *Newsweek* ($n=16$), and *U.S. News & World Report* ($n=19$). A semiotic analysis was employed to meet the research objectives. Bignell (2002, p. 11) wrote: “The same principles underlie the semiotic study of visual sign and linguistic signs. In each case, there is a material signifier, which expresses the sign, and a mental concept, a signified, which immediately accompanies it.”

A photograph is both an indexical and iconic symbol and includes such codes as genre, camerawork, editing, lighting, and color (Chandler, 1994). All messages were interpreted based on the United States culture, since in order to read a photograph it is important that the researcher understands the culture of the photograph (Chandler, 1994).

Codes are the rules and constraints that guide the researcher in the meaning making task, as they are used in production of the meaning as well as its interpretation (Chandler, 1994).

Intra-coder reliability was established through repeated measures (Leeuwen and Jewitt, 2001). The coder classified the symbols based on relevant variables and repeated the classification one week later with 90% agreement.

The results of this study are not generalizable to all popular press photographic coverage of biotechnology and food safety. Semiotic theory recognizes that different researchers will interpret signs differently based on their background, culture, and experiences. Therefore the decoding of meaning may vary from the intended or encoded meaning of the image (McQuail, 2005).

The population for this study was all published issues of three national general interest news magazines: *Time*, *Newsweek*, and *U.S. News & World Report*. All three publications are weeklies, distributed on Monday, with circulations of 4,109, 962 (*Time*), 3,125,151 (*Newsweek*) and 2,201,351 (*U.S. News & World Report*) (Bacon's, 2004). *Time*, *Newsweek*, and *U.S. News & World Report* were chosen due to their circulation and previous usage in the Whaley and Doerfert (2003) study and the Whitaker and Dyer (2000) study.

Photographs for inclusion in the study were hand-selected by an expert committee after reviewing the contents of the population. Stories were identified as biotechnology or food safety by committee consensus. The usable sample included 45 images: 10 in *Time*, 16 in *Newsweek*, and 19 in *U.S. News & World Report*.

Once a story was located within the publication, the story was examined for photographic content. If it contained photographic images, the pages were scanned into the computer and saved in Adobe Photoshop; the photographs were extracted from the story and saved in a separate folder. Only photographs were considered and other visual elements such as illustrations, graphs, and charts were not included in the study.

Photographs that appeared to be stock images were excluded from the sample. This specifically included images provided by family members of people that had died of mad cow disease. These photos were not taken with the intended purpose of illustrating a magazine article; therefore while they offered insight into image choice they were not compatible with the objectives of this study.

The photographs were classified into categories according to the main subject of the photograph. This provided a numerical description of the biotechnology and food safety photographs used in the magazines.

The researcher used the semiotic methodology in order to gain insight into messages these photographs could communicate to viewers by looking for signs that would communicate a message to the United States populace.

Results

Although captions and headlines can sway the meaning of a photograph, this study looked only at photographic content.

Table 1 depicts the types of message that the three magazines *Time*, *Newsweek*, and *U.S. News & World Report* used in their 2000 and 2001 stories about biotechnology and food safety. *Time* and *U.S. News & World Report* used a majority of positive pictures while *Newsweek* used a majority of negative photographs.

Table 1

Messages Portrayed in Biotechnology and Food Safety Photographs

Source	<i>Time</i>		<i>Newsweek</i>		<i>U.S. News & World Report</i>	
	<i>n</i>	<i>P</i>	<i>n</i>	<i>P</i>	<i>n</i>	<i>P</i>
Positive	6	60	6	40	9	47.4
Negative	1	10	8	53.3	6	31.6

Neutral	3	30	1	0.06	4	19
Total pictures	10		16		19	

The researcher looked for iconic, indexical, and symbolic signs within the photographs to determine how the United States public would interpret the photograph to compare the messages. Through examination of each photograph, certain signs were detected and common themes emerged.

The photographs were classified into five categories based on the main subject: food, animals, scientists/food industry workers, producers, and foreign. The total number of photographs is greater than 45 because some photographs were included in more than one category.

Food

There were ten photographs of food in all forms: processed, raw, and cooked. Many of these photographs were positive, based on their healthful appearance. Healthful appearance could be interpreted as an indexical sign meaning the food is safe to eat. Photographs such as Figure 2 captured fresh, safely packaged tomatoes that indicating a healthy product to the viewer. This photograph could trigger a positive response from the viewer about the subject before the article is read. Likewise, Figure 3 is a close-up shot of what appears to be fresh hamburger meat in a clean environment. The meat does not have discoloration or any other visual signs that would indicate to a viewer that the meat would be unsafe to eat.



Figure 2: Positive representation of tomatoes

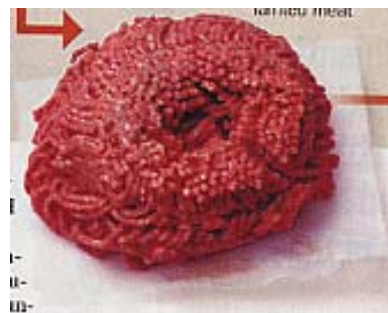


Figure 3: Positive representation of ground beef

Figure 4 indicates a different message. The Porterhouse steak is on a clean stainless steel surface, which would be an indexical sign indicating to the viewer the meat is in a sanitary environment. However it is wrapped in yellow caution tape with the words: caution do not eat. To the reader, this is symbolic of a dangerous situation, which indicates that the meat, although healthy in appearance, should not be eaten.



Figure 4: Negative representation of steak

Animals

Photographs classified as animal photographs included animals both alive and dead. These 15 photographs included people, but the subject of the photograph was the animal.

These photographs included positive and negative classifications. Photographs such as chickens, a shepherd, and sheep without grass are examples of this observation. Figure 5 shows caged chickens with their heads out of the cage. The large number of chickens in the small amount of space is an indexical symbol that would indicate to the viewer that the chickens are in tight quarters and are uncomfortable. Based on cultural propaganda, American viewers may decode this as ill treatment of the chickens.

Likewise, there were photographs of well-cared-for animals, such as Figure 6. These photographs such as doctor with pig and man holding lamb show the animal being held by a person. People hold things that are important or purposeful; therefore it is an indexical sign that the animal is important and is being cared for because it is important to that person.



Figure 5: Example of a negative animal photograph



Figure 6: Example of positive animal photographs

Other photographs showed animals in unnatural situations, such as being used in science experiments. The indexical signs of wires attached to the crab shown in Figure 7 lead the reader to draw the conclusion that this crab is not in its usual environment and is being used in an experiment. The photograph of the scientist with bobcat depicts a woman smiling as she holds a hissing bobcat. The hissing of the bobcat, in Figure 8, is an indexical sign that the animal is in an uncomfortable situation. The leash is a symbolic for a domesticated animal in captivity.



Figure 7: Example of a crab used in experimentation



Figure 8: Example of a negative portrayal of an animal used in science

Scientists/Food Industry Workers

This category included six photographs that involved scientists and food industry workers. The symbol of a white coat indicates to the viewer that the individual has a high amount of education. Generally, professions that require white coats are highly respected and affiliated with medicine.

This prevalent sign was in the majority of the photographs. This is a symbol, in Figure 9, that consistently distinguishes a person working in a science industry.

The photograph of the man leaning over the counter, Figure 10, makes it difficult to determine his role. Although he may be a scientist or in a field of science as indicated by the iconic symbols in the background, not having a white coat, he does not immediately gain the viewers' respect. A viewer may also not immediately trust his information or knowledge.



Figure 9: Scientist holding tomatoes

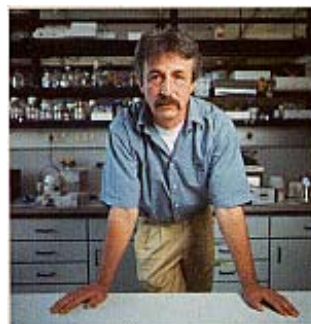


Figure 10: Man leaning over counter

The workers in the meat industry were wearing white coats, but were also wearing protective items such as hairnets, gloves, and safety glasses. This is an indexical sign that would indicate to a viewer that they must be extremely cautious when handling food products. These photographs are considered positive because the safety items would be reassuring to a viewer questioning the safety of the food supply.

Another observation was that the photographs of food safety workers were action shots captured while they performed their jobs inspecting food, as in Figure 11. The photographs of scientists tended to be portrait-style photographs, as in Figures 9 and 10. While this does not directly relate to the determination of the positive or negative value of the photograph, it could be a code to a viewer about what was of greater importance--the individual in the photograph or the action that is taking place.



Figure 11: Example of a food industry worker photograph

Producers

Photographs in the category of producers included agricultural producers. In all three pictures of American producers, the subjects were white, older males, and the photographs were always taken with either an animal or a crop. Each of the subjects was dressed in familiar “farmer” attire. Figure 12 illustrates an example of a producer photograph.

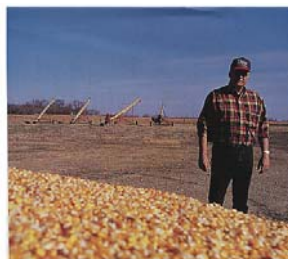


Figure 12: Example of a producer photograph

Foreign

Foreign photographs were classified based on qualities indicating that the photographs were taken in a different country. In these five pictures, the dress and living conditions of the people indicate a low socio-economic status. For example a photograph of the children smiling, an iconic sign indicates they are happy. However, there are holes in their clothes, which is an indexical sign that a viewer would link with not having a lot of money. They are standing in a tall, green field, which is an indexical sign that they could have a good harvest that year. The photographs classified as foreign in general show the people doing manual labor, such as Figure 13, which symbolizes to the reader that they are not wealthy.



Figure 13: Example of a picture in foreign category

Positive and Negative

The researcher used signs within the photograph to judge whether the message was positive, negative, or neutral toward agriculture to measure objective two. A positive photograph was one in which the subject is captured to make the viewer feel positively toward the subject of biotechnology and food safety. Positive photographs in this study included healthy, well-cared-for animals, fresh meats and vegetables, and individuals with positive expressions. An example of a positive photograph is shown in Figure 14.

Negative photographs include such things as protestors, animals in poor conditions, and frightening pictures of piles of burning beef carcasses and Figure 15. These photographs shock, scare, and sadden the reader with the negative messages.

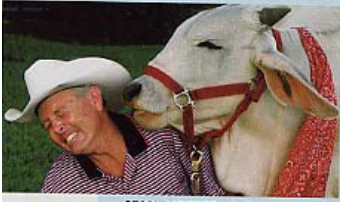


Figure 14: Example of a positive photograph



Figure 15: Example of a negative photograph

Neutral photos do not communicate a message due to a lack of signs or convey both positive and negative emotions. The best example of a neutral photograph is Figure 16. This merely depicts the size difference in the two salmon, but does not portray one as better than the other.

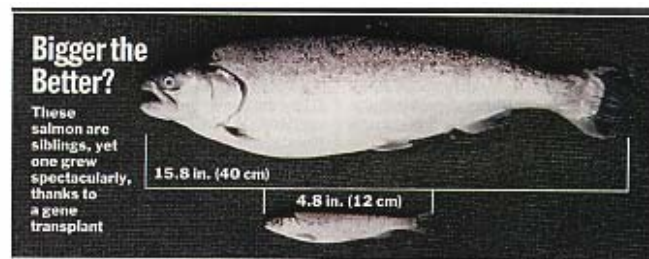


Figure 16: Example of a neutral photograph

Discussion

This study found that although *Newsweek* had more negative photographs, while *U. S. News and World Report* and *Time* leaned more toward the positive side, all three publications were close to having balanced coverage. This is a desirable since balanced news coverage is a value of the news industry. However, the number of positive and negative photographs does not completely reflect the treatment of agricultural issues through photographs or give insight into what messages these images are communicating to the viewers.

Five categories emerged from the semiotic analysis: food, animals, scientists/food industry workers, agricultural producers, and foreign nations. The majority of the photographs fit into one or more of these categories. The small number of categories indicates that

photographers are taking the same types of photographs and capturing the same types of images for biotechnology and food safety stories. Consequently, the media world that is created through the photographs introduced or reinforces stereotypes (Potter, 2001) about agriculture, especially biotechnology and food safety issues.

For example, because of the time frame of this study and the topic of food safety, an abundance of photographs was used with stories about mad cow disease. These photographs were of such things as burning beef carcasses, a headless cow being moved by a pallet jack, and a motherless family. These photographs are graphic and call for an emotional response from the reader. The photographs consistently communicate the same messages about mad cow disease before the viewer reads the article.

The Zillmann, Gibson, and Sargent (1999) study found that compelling photographs are more easily recalled and shape viewers perception more so than non-compelling photographs. The use of negative photographs will shape viewers perceptions more so than neutral or positive photographs. Therefore, the messages of the photographs are the primary indicator of the messages that shape the viewer's perceptions.

This research agrees with Trumbo (2000) that it is important to research visual images used in stories about scientific information. Photographs are encoded to elicit a response from the reader. The decoding of the message, without corresponding factual information, may result in misinterpretation of the image. Therefore photographers and designers must be aware of the possible messages available within their images.

Another observation in this research was the semiotic signs used in the photographs. Iconic, indexical, and symbolic signs were found from among the photographs and utilized to

create images categories. These signs communicated messages to the audience about the agricultural issues.

Although some would say that meaning is made from a photograph only if the viewer is actively reading it (Lester 1995), this research found obvious signs emerge in many of the photographs that convey an obvious message without seeking for a meaning.

The best example of this is seen in the steak with caution tape around it, shown previously in Figure 4. This photograph obviously conveys the message to the reader that eating beef is harmful through the use of the symbolic caution tape. The viewer would obviously know that the message of that photograph indicates that the steak, an indexical sign for beef, is unsafe.

Another example of a negative photograph is the photographs of the forklift moving the dead cow, shown in Figure 15. This photograph, although unusual, illustrates the mad cow epidemic in a very disturbing way. Unlike the photograph of the steak, the forklift photograph captured an actual occurrence and communicates factual information, even though the information is negative. This information would have the most impact on the reader and, as the Zillmann, Gibson, and Sargent (1999) study found, be what the viewer remembers and uses to form their opinions.

These findings show that even though numerically the photographic content is considered balanced, stereotypes and symbols show that photographs could still have negative consequences. The messages that these photographs convey may have a much greater impact on the viewer's perceptions.

Based on the result of this study programmatic and research recommendations can be made. This study found that there is a need for photographers to have more knowledge about the subjects that they are shooting. Their knowledge of the subject may directly impact the ability to

foresee the messages created in their photographs. Therefore, it would benefit the agricultural industry if students were trained in photographic technique and could take magazine-quality photographs to accompany their own materials.

Consumers need to become aware of how to read a photograph. Becoming visually literate will allow individuals to understand how photographs impact their perception of issues

Services that provide agricultural news or train future journalists, in their effort to educate the public, should be aware of image choice and the perceptions and stereotypes these images could create.

News magazines should examine the messages of agricultural photographs. Stereotypes are being created or reinforced through visual content used in the news magazines. In order to communicate agricultural information without bias and accurately, news magazines should closely examine the photographs they use. Photographers should also examine themselves for prejudices and bias in considering shot selection.

Future research should continue to fill the gap in agricultural communications image-based research. This study dealt with the subject of agricultural biotechnology and food safety, but other agricultural topics and issues could yield different results. Controversial and non-controversial issues could yield different results in the messages of the photographs. Research should also examine the images produced by agricultural magazines and news sources, because this is where agricultural journalists have the most input into messages. Agricultural publications and popular press should be compared to determine if there is a difference in the treatment of a subject by the two groups.

Additional research needs to be done to determine the direct effect these images have on perceptions. Viewers interpret messages of photographs based on their own experiences, prior

messages, and stereotypes. The research community would benefit from determining how different groups interpret the messages of photographs.

This study examined solely the photographs to determine if perceptions could be created and information communicated without written word. It is important to understand the stand-alone message of photographs because magazines are generally not read cover-to-cover, but skimmed over a longer period of time.

In our effort to produce a more agriculturally-literate society, this study found that in the sample of food safety and biotechnology photographs used in this study, stereotypical photographs or photograph taken of the same types of images reinforce existing positive and negative stereotypes about agricultural issues.

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