Recognition and Denotation of Photographic Manipulation

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Preface

Supporting mental and physical health has always been a value of mine, as well as an important issue across the world. Body composition and self-esteem is becoming an increasingly sensitive subject with the onset of the United States’ obesity epidemic compared to the portrayal of bodies in the media. According to the Center for Disease Control, American society is larger than ever before. However, the media maintains its use of what has been called “the thin ideal,” or the use of models with slender body types, possibly because of the negative associations consumers have with larger models; namely, that they are less popular, less outgoing, less intelligent, and lazier (Molloy & Herzberger, 1998)(Stephens, Hill, & Hanson, 1994).

The media has come under fire for creating an environment than compounds low self-esteem, particularly because of the use of Photoshop or other editing programs to make models appear inhumanly slim, symmetrical, or otherwise more attractive. The idea sparking outrage is that the media has created an unrealistic beauty standard that is not achievable by any woman, causing low self-esteem and a false impression of what is normal.

While research on the influence these images have on body image and self-esteem was readily available, I found little to no research on the prevalence of image manipulation or viewers’ ability to identify it. The speculation is that consumers are accepting these images as truth, causing mental discord, but there is no research to support this claim.

This was the founding point of my investigation. By testing the media literacy of consumers, a need for transparency in photographic manipulation could be confirmed or denied. Should it be confirmed, the research would provide a base for further development to improve media literacy and facilitate a resolution to an increasingly important issue in health and design.
Abstract

The media is often blamed for poor body image and low self-esteem due to its use of Photoshop and other editing programs to create a beauty ideal that many consider unrealistic and unattainable. Previous research has shown that an understanding of manipulation used in these images tempers the negative effects, but no research has been done to determine the average level of media literacy when viewing manipulated photographs. This study surveys a college-aged audience to determine their ability to identify photographic manipulation and their acceptance of different levels of editing, and determine whether or not a photographic denotation system indicating manipulation is needed in the industry. The results showed that positive identification of manipulated images was consistently beneath 50%, with accurate positive identification falling beneath 30%. This confirms the need for a denotation system. The research suggests marking images that cross the threshold of acceptable edits, which survey participants identified as the presence of changes to models’ bodily composition. Adopting a marking system that identifies photos that modify models’ body composition could improve media literacy and reduce the negative effects of viewing manipulated images.
Chapter 1: The Problem

Photoshop and photo retouching are often blamed for poor body image and related complications, such as eating disorders, depression, and low self-esteem because people often use media images as upward comparison targets (Thompson et al, 2005)(Rosenberg, Schooler, & Schoenbach, 1989). This is particularly a problem for high-internalizers, who are more likely to view media images as social attractiveness norms and feel inferior for not looking that way themselves (Yamamiya et al, 2011). According to the National Association of Anorexia Nervosa and Associated Disorders, approximately 70% of girls aged 11–18 reported magazine images as influential in their idyllic perfect body. However, there is little hard data suggesting that media images cause eating disorders. Colombia Psychiatry’s Dr. Allegra Broft, a psychiatrist in the Eating Disorders Program, did agree that exposure could be a contributing factor to body negativity and disordered eating, but that no causal link had been established (Pearson, 2011).

Causal link or no, the media is being encouraged more and more to take responsibility when it comes to the images and models used. In 2010, UK psychiatrists called for the media to take greater accountability for the influx of eating disorders, saying that the promotion of “unhealthily thin bodies” and the lack of diverse body shapes were contributing to negative body image and low self-esteem. The Royal College of Psychiatrists even suggested using a kitemark symbol (a UK product and service quality certification mark used to identify safety-related products) to denote digitally enhanced photos, specifically those that used airbrushing or other methods to make models “appear more perfect.” This plan was critiqued as being too difficult to implement as there were no standards introduced alongside the kitemark proposal laying out what would and would not qualify as digital enhancement; certain things, like improving color hue or contrast, are of questionable importance in making the model look closer to perfection (PhD C.P, 2010).
The idea of marking altered images alone is not a bad one. The negative impact caused by unrealistic imagery can be counteracted by having an amount of media literacy — namely, consumers knowing that these images are not true to reality (Smith, 2016). Most people are aware that the industry standard is to retouch and edit editorial images to some degree (Wheeler, 2016), but how able are individuals to identify how much those photos have been edited?

This thesis will evaluate the public’s ability to recognize retouched photos and the degree of retouching via surveys and their acceptance of digital retouching. The goal of this study is to determine a need for a visual marking system and develop suggestions based off findings to improve visual media literacy in terms of digital alteration in magazines. This thesis will investigate existing rating systems and their effectiveness, identification ability, and social acceptance of digital manipulation.
Chapter 2: Research Methods Overview

Research Strategy

The strategy for this investigation includes a review of previously published research about body image, photographic manipulation, and attitudes. This was followed by an online survey which informed the proposals for a marking or label for manipulated images, as well as an investigation into current word/image associations and a review of existing symbols and markings.

Assumptions

The research process began with a list of assumptions, both those of the researcher and those that could be extrapolated from a myriad of online sources including blogs, discussion forums, and social media. Rather than beginning with a single hypothesis, a list of assumptions allows the researcher to tackle a complex problem from multiple angles. These assumptions might be confirmed, disproved, or modified based on previously published information and inform the current research throughout the process.

Every image that we see in the media is Photoshopped.

Photoshopped images promote impossible ideals to young girls.

Photoshop is an issue only for images distributed by the mass media.

There is a strong outcry for images to be less manipulated.

Consumers want to see unretouched photos rather than Photoshopped ones.

Photoshop makes people feel that they are not beautiful the way that they are.

Photoshopping images is deceptive.

The media is at fault for body dissatisfaction.
These images contribute to eating disorders, particularly in young girls.

People can recognize overly manipulated images.

There should be a limit to how much photoshop advertisers are allowed to do.

To best address these assumptions, the researcher split them into several categories: Body Image, Media Practices, and Recognition. These three categories are the foundation for a review of existing literature, which included online news sources, scholarly articles, studies, books, and dissertations. Any pertinent information that did not fall into these three categories was archived for future reference.

**Primary Research**

A web-based survey was the main source of primary research, which was distributed to a college-aged audience (18–25 years old) via social media networks such as Facebook and via email. The majority of respondents are affiliated with Kent State University, but there were also participants from Marquette University as well as some non-university respondents from the Southeast Wisconsin and Northeast Ohio areas. The survey was two parts with ten questions in each section and tested the participants ability to recognize photomanipulation as well as their beliefs on what types of editing are acceptable without being marked as edited.
Body Image and Self Esteem

The media has always been a source of information, both scientific and sociocultural. An understanding of what is attractive, fashionable, or desirable are facilitated by various forms of mass media including television, magazines, and the internet. There are many studies showing a correlation between negative body image, lower self-esteem, and an increased desire for thinness in women and viewing magazines, slides, or websites featuring thin women (Bardone-Cone & Cass, 2007; Tucci & Peters, 2008). There is also evidence showing that women with higher levels of media exposure also feel less socially competent than their peers in addition to higher levels of dissatisfaction with their appearance (Rivadeneyra, Ward & Gordon, 2007).

This phenomenon is not limited to women; men also reported having higher body dissatisfaction and lower self-esteem along with more concern regarding their fitness, weight, and masculinity after viewing images of muscular men (Rivadeneyra et al., 2007; Hobza & Rochlen, 2009; Hobza, Walker, Yakushko, & Peugh, 2007). A study conducted by Nemeroff, Stein, Deihl, and Smilack in 1994 found that appearance-based messages were on the rise in men’s magazines. They pulled their sample selection from three general interest categories and picked options with broad circulation and longevity so that they could gauge the trends over a 12 year period. They found that while women’s magazines contained far more body-oriented articles than the men’s, the frequency of weight loss articles increased over time in men’s magazines and decreased in women’s. Health articles also increased in men’s fashion magazines but not in women’s. They found that out of modern, traditional, and fashion magazine categories fashion magazines were the most body oriented, followed by traditional.

However, women still endure the bulk of appearance (and specifically weight) targeted messages. Anderson and DiDomenco (1992) examined 10 of the most popular women’s
magazines and 10 of the most popular men’s magazines to see whether or not the number of articles focused on dieting and body shape would correlate with the prevalence of eating disorders in the general population. They found that the women’s magazines contained significantly more diet articles and advertisements than the men’s magazines, with a 1:10 ratio. This ratio was identical to the actual men-to-women’s ratio of eating disorders in the general population at the time of the study. These results may be due to a difference in cultural standards of beauty for men and women; men’s appearance articles focused on body shape and “bulking up” and women’s focused on weight management and “slimming down.”

Women’s magazines also tend to put more emphasis on appearance-related messages than men’s magazines. Malkin, Wornian, & Chrisler (1999) ran a content analysis on the covers of 69 women’s magazines and 53 men’s magazines on weight loss or diet messages. 54 of the women’s covers contained a message about bodily appearance, whereas none of the men’s did. The men’s magazine covers focused on the outside world, news, politics, hobbies, and activities whereas the majority of the popular women’s magazines focused on changing and improving one’s self. Specifically, 23 contained messages about diet, 16 about exercise, 4 about cosmetic surgery, 11 an unspecified body image message, and 18 had conflicting messages (most of which were positioned right next to each other). An example of a conflicting message would be featuring decadent cake recipes next to a message of weight loss or diet.

Beyond verbal messages, 94% of the women’s magazine covers featured a thin female model or in-shape celebrity and 50% of the men’s showed thin and young women wearing revealing clothing. Only 3% of women’s magazines showed a male on the cover and 28% of men’s showed a male model or celebrity (Malkin, Wornian, & Chrisler; 1999).

Regardless of gender, some are more susceptible to influence than others — namely, those who have a high awareness of sociocultural standards of appearance and a tendency to internalize them (Lokken Worthy, & Trautmann, 2004). There is also evidence to suggest that those who
have already internalized these sociocultural standards are more likely to turn to magazines for
guidance on how to achieve their body goals (Thomsen, McCoy, Gustafson, & Williams, 2002a;
Thomsen, Weber, & Brown 2002b), thus exacerbating the problem. Magazines are also
increasing the amount of written content related to dieting and exercise (Luff & Gray, 2009),
which may contradict each other or be paired with edited photos, making fitness and thinness
seem like an unachievable goal. Recent years have also seen an influx in “thinspiration” and
“fitspiration,” also referred to as “thinspo” or “fitspo” respectively. Thinspiration generally refers
to photos of thin or fit individuals that serve as motivation or inspiration for the viewer’s body
goals. According to Google Analytics the thinspo seemed to hit its peak in 2012, which may be
due to pro-anorexia online communities using the term when tagging pictures of anorexically thin
men and women.

Magazines are typically the media of choice for studies on body dissatisfaction, despite being
the least frequently used form of media amongst college-aged women when compared to the
internet and television (Bair, Kelly, Serdar, & Mazzeo, 2012). The 2012 Bair et al. study found
that there was no significant correlation between magazines and body dissatisfaction, but the
researchers admit that it might be due to the constant accessibility of television and the internet
compared to the once-monthly release of magazine issues. They also recognize the potential
shortcomings of retroactive, self-reported information that formed the basis for this study. It also
counteracts the findings of the 2003 Tiggemann study that suggests that reading fashion
magazines has a higher correlation with tendencies toward disordered eating than viewing image-
focused television, although there was no comparison against the internet. Generally speaking,
static images (such as those found in magazines and on the internet) are less costly and easier to
manipulate than the moving images found on television, which allow them to be more
constructed and farther from reality.
Some studies claim that the dip in body satisfaction after viewing images of culturally accepted aesthetic perfection is temporary, whilst others show that the media has a lasting impact on the viewer’s drive for thinness and social self-esteem (Ahern et al, 2008; Hargreaves & Tiggemann 2003; Tucci & Peters, 2008). Social self-esteem relates to an individual’s comfort in social situations; for example, speaking to another person versus waiting for others to speak to them first, whereas general self-esteem refers to an individual’s comfort with him or herself. High levels of social and personal self-esteem generally correlate less with media internalization, but Fernandez and Prichard found supporting evidence in their 2012 study that there is a significant relationship between media and a drive for thinness in both men and women, and that higher social self-esteem did not seem to temper the correlation between media exposure and an individual’s drive for thinness (Fernandez & Prichard, 2012).

A study conducted by Dittmar and Howard in 2004 examined the prevalence of women’s internalization of the thin ideal and how likely they were to compare themselves with media imagery. They found that 75% of women fell into one of two categories: low social comparison combined with high internalization of the thin ideal, or high social comparison rates with low levels of thinness internalization.

**Media Practices**

An assumption garnered from a number of online sources such as blogs, news articles, and social media posts is that the use of photographic manipulation in mass media is pervasive and heavy-handed throughout the industry. This perception is encouraged by entertainment news sources, online magazines, and companies who have adopted a “no photoshop” approach to advertising; for example, Buzzfeed (an entertainment website) has posted numerous listicles on magazine Photoshopping fails, and Business Insider posted an article speculating on which magazine covers were altered, sometimes maintaining that an image was Photoshopped even when the original was released (Naik, 2011)(Michalski, 2013).
The most viral instances of ‘Photoshop exposés’ came from Dove, a Unilever owned company that was the first to promote the use of models with body sizes more reflective of the American public as part of its “Dove Campaign for Real Beauty.” The campaign began with a video commercial titled “Evolution,” which shows a model with no makeup under harsh lighting undergoing a hair and makeup transformation before being photographed. The resulting photograph of her is then digitally stretched and warped before appearing on a billboard. The tagline appearing at the end of the commercial reads “No wonder our perception of beauty is distorted” (Staav & Piper, 2006).

Dove also released a video titled “Thought Before Action” which showed the results of a misleading Photoshop action, called “beautify,” that they posted on forums they believed were frequented by art directors, graphic designers, and photo retouchers. A Photoshop action is a pre-recorded set of commands that allows the user to recreate a result with a single click, rather than going through each individual step. The forum post claimed that the action would apply a glow to skin, when in reality the action removed all editing and reverted the image back to the original. It also applied a message from Dove which read “Don’t manipulate our perceptions of real beauty” (Edwards, 2013). While the video was a good marketing tactic, the audience Dove claimed they were trying to reach (art directors, graphic designers, and photo retouchers) voiced concerns with Dove’s understanding of the industry and believed that the stunt was shown to have more of an impact in the video than it did in reality. The video did not reveal how many times the “beautify” action had been downloaded, and while it was was posted to Reddit (the ninth most visited website in the world), it was not posted to any of the major subreddits that would be visited by industry professionals (Souppouris, 2013)(How many people use Reddit?). After the release of the video, photographers at Vox Media tested the Photoshop action and found that it did not undo any edits on multi-layer files. Since manipulations done in Photoshop are usually performed over multiple (sometimes hundreds) of layers, the ineffectiveness of the action combined with the
inability to reach industry professionals indicates that Dove does not actually understand how image manipulation is done. This is a concerning notion when considering that Dove is releasing viral videos intended to educate the greater public on the extent of photographic manipulation in advertising.

Additionally, companies such as magazines that regularly hire photo retouchers are unlikely to select models that require the drastic edits implied in Dove’s campaign and in other viral videos, such as Global Democracy’s 37-second time lapse video depicting an average woman’s body undergoing a complete digital makeover (ABC News, 2013). The professional retouching rate for magazines is around $100 per hour, making it unlikely that a company would book a model that required intense post-production editing (Naik, 2011).

This is supported by a study conducted through The Ohio State University which tested the difference in perceived attractiveness when participants viewed edited versus unedited photographs of fashion models. The study found no statistically significant difference in perceived attractiveness, indicating that edited photos are not portraying humanly impossible, unrealistic beauty ideals but rather that the models themselves are naturally attractive (Gordon, 2013).

To better understand photographic manipulation and how these images are observed and applied in the industry, it’s important to understand how photographic or photorealistic imagery is interpreted in general. Sol Worth and Larry Gross created a strategy for categorizing the interpretation of visual symbols before computerized photography ever existed (Reaves, 1995). They separated “sign-events,” which are words, pictures, or sound that carry meaning, into “natural” and “symbolic” categories. A “natural” picture is one that informative rather than symbolic, and is perceived to portray reality. “Symbolic” sign-events are communicative rather than informative and play on cultural codes to create illustrative meaning. Understanding that not all things fall cleanly into two categories, Worth and Gross created third “ambiguous” category
for the sign-events that were not clearly “natural” or “symbolic.” Photographs in this category force the viewer to assess the context of the image and decide whether the image is real or inventive (Reaves, 1995).

These categories have been used, albeit often not consciously, by the newspaper industry. A theoretical continuum was developed based on Worth and Gross’ categories Editors have no strict rules on what is allowed and what isn’t when it comes to digital manipulation in the photos they run, but industry professionals tend to follow moral guidelines that parallel the continuum. The continuum goes from most realistic to most constructed, beginning with Natural Sign-Events. Natural Sign-Event photos are clearly denotative and include things such as spot news photos, defined as “pictures of unscheduled events for which no advance planning was possible” by the National Press Photographers Association (NPPA). They are unmanipulated and often not even of high technical quality, as they are taken with no time for individual or cultural influences to seep into the composition.

On the other side of the continuum is the Symbolic Sign-Event, which is clearly connotative and includes things like photo illustrations. The NPPA defines these as “photos that combine the limitless possibilities of the drawing with the realism of the photograph; includes editorial, food, and fashion illustrations.” These images are of high technical quality and created through careful composition, lighting, and props.

The third category, falling in the middle, is the Ambiguous Sign-Event, which is, as the name implies, ambiguously denotative/connotative. This category often applies for feature photos which are, according to the NPPA, “usually ‘found’ situation[s] with a strong human interest – a fresh view of the commonplace.” However, these images are not often “found” in the same way as a spot news image; they allow for a certain amount of staging because time is not of the essence when capturing a feature photo. They simply must appear to be a common snapshot (Reaves, 1995).
In 1995 Sheila Reaves conducted a survey of 677 visual editors with a high influence in their places of employment. These editors showed a strong intolerance for digital photo manipulation in spot news images and feature photos because those types of photographs are what are used in what they deemed as “hard news.” There was a bit of leniency in soft news feature photos, but and only for minor edits such as intensifying colors, blurring the background to emphasize a subject, and removing distracting telephone poles, wires, etc. Warping photos, combining photos, or other significant edits were still not widely accepted. However, every type of digital manipulation the researcher asked about was accepted by the majority of those surveyed for images that were to be used as photo illustrations (Reaves, 1995).

Reaves’ research indicates that there is an increasing allowance for photo manipulation in the news industry, which is held to a higher ethical standard than the advertisement and entertainment industries which work exclusively in the realm of editorial photo illustration. The composers of these images are considered artists, and often have significant artistic freedom when creating an image. However, general population viewers may believe these advertisements are held to relatively the same standard as newspaper photos.

One suggestion for image-heavy industries is to begin labeling their photos as digitally altered or modified. There is a particular push for this in the United States, the United Kingdom, and Australia. The American Medical Association has released guidelines discouraging “the altering of photographs in a manner that could promote unrealistic expectations of appropriate body image” and the UK has considered legislation requiring altered photos to be labeled as such (Kee and Farid, 2011). The National Advisory Group on Body Image in Australia released a Voluntary Industry Code of Conduct in 2009 which recommended using a diverse range of models over 16 years old that fell within a “healthy” weight range and to limit the use of digital technology. They also recommended revealing the extent to which images have been digitally altered (Tiggemann, Slater, Bury, Hawkins, & Firth, 2012). Israel has already put what is
nicknamed “the Photoshop Law” into effect, requiring models who walk runways to have a BMI of 18.5 or higher and for any digitally altered print advertisements to be clearly labeled. There are limitations to Israel’s law; there are no set standards on how images must be labeled other than “clearly” and the marking only applies to campaigns that were shot domestically (Knesset Passes “Photoshop Law”). Despite these steps towards a more transparent industry, studies have found mixed results on whether or not labeling retouched photos has a positive effect on body satisfaction.

Some magazines have taken to releasing unretouched photos, but there is debate over whether or not labeling these photos as ‘unretouched’ actually has a positive effect. Heinberg and Thompson (1992) found that female undergraduate students viewed those who were similar to them, such as their peers, more important in terms of self-comparison than celebrities. Since celebrities are still considered more attractive than average, there is concern that labeling photos as “unretouched” will, in a sense, “level the playing field” and make them more relatable comparison targets, which could have the opposite effect on body satisfaction than leaving them in the realm of computer-generated perfection. This theory is supported by Cash, Cash, and Butters’ 1983 study which found that viewing photos of attractive peers led to lower self-body image than viewing the same photos whilst being lead to believe the models were professionals.

A study conducted by Marika Tiggemann, Amy Slater, and Veronica Smyth (2013) sought to test whether or not labeling was effective in tempering any negative effects from viewing manipulated photos. Images for the study were pulled from fashion magazines and then rated by a pool of women and selected on the basis that they were attractive, epitomized the thin ideal, and were credible as an unaltered image.

The study found that there was little difference between the control group and the test group. The two groups (presented with a label and presented without) had no significant difference in age or body mass index between them. Both groups had a slight increase in body dissatisfaction
after viewing the shoots regardless of whether they viewed a labeled image or not. Contrary to the hypothesis, the group that viewed the retouch-free photos did not view the models as more relatable comparison targets. Based on their findings, the researchers found no harm in adding these labels to images, but did note the “small but consistent” negative effects of viewing fashion shoots that idealize thinness (Tiggemann, Slater, & Smyth, 2013).

Some researchers have suggested that a simple labeling system would not be efficient because it would not distinguish between common edits such as cropping and color adjustment and major modifications to the subject’s appearance. One Australian magazine, “Girlfriend,” began using disclaimers on images called “reality check” that would explain the extent of prepping, lighting, and posing done to make a fashion shot possible. However, they only use them on a small number of house produced images, and this label cannot be applied to images from outside sources (e.g. from celebrity publicists or advertisements).

Tiggemann, Slater, and Smyth tested this approach for labeling fashion advertisements. Magazines (particularly fashion magazines) have been used for studies because they epitomize the thin ideal and have been used as “ecologically valid stimuli” in studies that demonstrate the negative effects of media exposure. This study tested two forms of warning label; a ‘generic’ label that stated only that the image had been digitally altered, and a ‘specific’ label which described which parts of the image had been altered (similar to the “Girlfriend” magazine approach). The hypothesis was that more specific labels would be seen as more credible and informative, and will inform the reader that the image is “not real and therefore does not present a realistic, relevant, or appropriate target with which to compare herself” (Tiggemann, Slater, & Smyth, 2013).

The researchers used two different types of advertisement: product images and model-based images. The product images featured accessories whereas the model-based images featured various slender, Caucasian female models who the researchers believe represented the thin ideal.
Labels were clearly visible (size 11pt Calibri font) in either black or white to contrast with the advertisement.

The women were asked to self-rate their self-esteem and predisposition for comparing themselves to other women based on appearance. Women exposed to the model-based images scored higher on body dissatisfaction than those exposed to product images. There was no significant difference between label and non-label or between generic and specific labeling. The change in body dissatisfaction seemed to be particularly true for those with a higher base appearance comparison score and less so for those with a lower base score.

Surprisingly, the labelled conditions resulted in higher feelings of self-relevance and stronger appearance comparison than the no-label condition. Generic and specific labeling did not differ from each other. The researchers propose that the stronger self-relevance may be because the warning label drew greater attention to the model’s body specifically rather than the image as a whole.

A second experiment tested whether or not the labels were noticed by presenting participants with a masked recall task. The majority of participants recalled at least one of the warning labels they had viewed (89.5%), therefore it is unlikely that the results from the experiment on body dissatisfaction were due to a lack of notice. Images in this experiment were also tested for perceived realism. Images with specific warning labels had a lower mean perceived realism score than the general label and the non-label conditions, but the amount was not statistically significant. This may be because the perception of realism in media images is already so low that a label confirming digital manipulation doesn’t provide a strong impact.

These findings contradict findings in other studies, such as Slater et al. (2012) where warning labels seemed to mediate the effects the images had on body dissatisfaction. The researchers propose that this may be due to the difference in source material; the Slater study used editorial
fashion spreads whereas this study used fashion advertisements which viewers may expect to be more constructed and are a generally more artificial context than what viewers perceive as the result of a photo shoot.

Researchers Eric Kee and Hany Farid attempted a metric approach (Kee and Farid, 2011). Kee and Farid believe that by measuring image similarity and the spatial extent of any blurring or sharpening filters they can distill a metric that correlates with perceived photo alteration. Alterations were considered to be anything that affected the integrity of the subject’s appearance, including slimming of the legs, hips, and arms, elongating the neck, improving posture, enlarging the eyes, making faces more symmetrical, altering skin texture or tone, and reducing wrinkles, cellulite, blemishes, freckles, and dark circles.

243 pairs of original and retouched photos were collected from online sources, and then rated by observers as being very similar or very different. Each observer rated 70 pairs of images and test statistics showed that each observer was consistent with his/her individual ratings as well as being consistent with other observers. These scores were then compared against the data from the image analysis program developed by Kee and Farid which measured the spatial extent of the modification.

The study found that there were over and underestimations on the part of the observers. Underestimations tended to happen when there was a large spatial area of retouching but a minimal change in appearance (for example, large amounts of skin smoothing) and overestimations occurred when a small area change caused a large visual difference (such as the addition of a missing tooth)(Kee and Farid, 2011).

Overall, the predicted rating and the observer rating had a strong correlation. However, this study did not test whether or not any adverse effects on body satisfaction were affected by the inclusion of the rating. The primary hope of the researchers was to develop a quick analysis
program that could provide an unbiased rating to publishers without interfering with production schedules.

While Kee and Farid’s approach could be useful towards developing bias-free ratings in the future, there are still some issues in the research that need further testing before this would be a viable option. Many of the “overestimated” photos were manipulated in a way that reveals the digital nature to an observer; for example, overly blurred skin beyond any possibility of reality or contrast and shadowing changes that don’t match the lighting in the photo. These photos were not manipulated more than the others, they were just manipulated poorly. It begs the question whether skillfully manipulated photos fell into the category of underestimation or whether these were accurately gauged.

The study also did not test whether or not these ratings would be accurate had the observer had to rate how manipulated they assumed a photo to be without any reference, rather than seeing the two images side by side. There is no proof that a numeric scale would be meaningful without a reference. A rating of two on a five point scale may not be universally understood to represent a certain level of manipulation without seeing a reference to determine how much change a rating of two constitutes.

**Attitudes on Manipulation**

A previous assumption was that there is a very negative attitude towards photographic manipulation. Based on published literature, this seems to be confirmed. In one study, twenty five Midwestern undergraduate students (fifteen women and ten men) participated in research regarding their attitudes towards manipulated photos in magazines (Reaves, Bush Hitchon, Park and Yun, 2004). Participants completed two individual questionnaires and then took part in a group discussion regarding side-by-side comparative images (one as-found in the magazine, the other digitally “restored” to normal proportions/skin tone).
Selected images were full-page depictions of female models who the researchers saw as extremely thin, elongated (particularly in the legs), or had darkened skin. These images were then “restored” to match a more average representation of the featured model. Restoration involved using Adobe Photoshop to recreate what the researchers believed was an accurate original photo. Success in manipulation was based on a seven point systematic differential scale with categorical end points, such as fat/thin, long-limbed/short-limbed, and light skinned/dark skinned.

Awareness of digital manipulation was tested by asking whether the viewer noticed a difference between the paired photos on a seven point semantic differential scale, with 1 being no difference and 7 being a lot of difference. They were also asked if they noticed that the models were digitally altered, with 1 being not at all and 7 being noticed a lot. Testing revealed that the subjects did notice a difference between the original and restored photos (average of 5.88 on the seven point scale), and also had a high level of recognition that the images were digitally altered (average of 5.96 on the seven point scale).

Attitude towards the models’ attractiveness shifted when viewing the “restored” images. In general, the reported level of attractiveness declined on the restored photo. Darker coloring and a slimmer figure were deemed more attractive than the lightened skin and wider figures represented in photos manipulated by the researcher. However, when presented side by side, subjects reported preferring the restored versions by a significant margin.

When asked if they agreed or disagreed with digitally altering photos to enhance thinness and lighten skin, participants leaned towards disagreement (a mean of 3.07 where 1=strongly disagree and 7=strongly agree). Semantic differential tests revealed that the participants generally felt that this form of photographic manipulation was “unfair,” “dishonest,” and “unethical.” While participants showed disapproval for manipulating models to achieve these results, other studies indicate that it is not the result itself that viewers are unhappy with. Research conducted by Khale and Homer showed consumers’ strong preference for thin models in advertisements
compared to average or larger models (Khale & Homer, 1985). Participants were most accepting of removing wrinkles and blemishes, relatively neutral on skin color changes, and most critical on making models thinner. Open ended questions about the participant’s reactions to the digital manipulation of body structure and racial characteristics were generally negative in nature, with many participants citing “natural beauty,” stating that digital manipulation removed the model’s unique qualities and compromised the image either ethically or aesthetically (Reaves, Bush Hitchon, Park and Yun, 2004).

In a group discussion, participants were asked about the changing of skin color and why advertisers might darken skin tones. Interestingly, the group cited artistic freedom and aesthetic improvement, believing that darker skin tones gave the illusion of being thinner, healthier, and more active, as well as hiding blemishes on Caucasian models. None of the participants suggested that the skin tones were altered to cater to the magazine’s target market or to match a brand aesthetic (e.g., using tanner models for a swimwear company ad and paler models for an alternative or gothic clothing line).

Although this research gives some insight into the everyday person’s attitudes, there were some issues that lower the validity of this research. First, it is impossible to “restore” a digitally altered image without the original. The use of editing software results in further manipulation that perhaps is farther from the truth than what was presented in the magazine; without seeing the model firsthand any attempt to restore the model to a more natural state is entirely subjective on the part of the researcher, who may or may not be proficient in using the aforementioned software.

Second, the research mentioned that models who were plumped up still fell on the thin side of the thin/fat differential in order to keep the integrity of the model (in the sense that models are typically thinner than the average woman), but made no note of the expansion percentage of the
models’ waistlines or if it was standardized from photo to photo. Additionally, only four photos were used in this experiment, which is a small number on which to base any generalizations.

Finally, the restored photos ranked nearly a 6 on the seven point differential scale where the high end (noticeably digitally altered) was a 7. The researchers did not use this same scale for the original photos, which by their own assumption were digitally altered. Without a control group rating, it is difficult to tell whether the participants simply have a keen ability to detect altered photos or if the restored photos were not skillfully manipulated.

Another study conducted by David S. Waller from the University of Technology Sydney provided a content analysis of blog posts in regards to decisions made by the National Advertising Division of the Council of Better Business Bureaus (NAD) to pull certain advertisements on the grounds of “excessive photoshopping.” One of these advertisements was produced by CoverGirl Cosmetics, a US based company owned by Procter and Gamble, for CoverGirl’s Nature Luxe Mousse Mascara. The advertisement showed singer Taylor Swift and claimed that the mascara was “20 per cent lighter” than competing mascaras and would give lashes “2x more volume” (Waller, 2011). At the bottom of the image the company printed a disclaimer that read “lashes enhanced in post-production” in fine print.

The NAD reviewed the ad after complaints and Proctor and Gamble agreed to retract the advertisement. While there were claims that the ad was banned for an excessive use of Photoshop, the official reason appears to be false advertisement. Andrea Levine, the director of the NAD, was quoted as saying “You can’t use a photograph to demonstrate how a cosmetic will look after it is applied to a woman’s face and then – in the mice type – have a disclosure that says ‘okay, not really’” (Levine, 2011). The recall of the CoverGirl ad made worldwide news, giving Waller a large database of blog comments to analyze.
Out of ten clear coding categories, the most common topic was the model herself, Taylor Swift. Other comments that were non-pertinent to the issue with the advertisement were discussions on ads for other products and governmental critique. Of the comments that related directly to the NAD’s decision the majority were in support (63%), although 20% thought that the NAD was targeting the wrong company since CoverGirl at least put a disclaimer whereas other cosmetic companies, which also use digital enhancement, do not inform the consumer at all. The remainder of the comments regarding the NAD’s decision were neutral. The majority of blog comments in the other categories, which included the product itself, the industry in general, the effect on young girls/children, and Photoshop, were negative or neutral but rarely positive (Waller, 2011). As a whole, Waller’s study appears to confirm some of the assumptions on attitudes towards Photoshop in advertising, particularly that every image that we see in the media is Photoshopped, that there is a strong outcry for images to be less manipulated, Photoshopping images is deceptive, and that there should be a limit to how much Photoshop advertisers are allowed to perform.

The Covergirl ad was not the only to be banned. The Advertising Standards Authority (ASA) banned Lancôme and L’Oreal ads (Figures 2.1 & 2.2) in 2011 claiming that they were deceptive in nature and promoted unrealistic beauty standards due to the amount of airbrushing performed on the models (Smith, 2016). In addition to the ASA’s mandate that these ads be removed from circulation, these ads garnered negative attention from consumers for their publishing companies. Advertisements that appear to be overly-edited in order to promote a specific beauty ideal have received negative comments from consumers in the past; for example, Victoria’s Secret’s ‘Perfect Body’ campaign angered shoppers because of the digital alterations made to the models making them all a similar body shape and size with no indication that their bodies had been digitally manipulated (Bahadur, 2014).
Chapter 4: Primary Research

Primary Testing Overview

Testing was done in the form of a two-part survey released through Qualtrics, a web-based survey tool. Although the research is focused on images as we see them in magazines, Qualtrics was the primary option for releasing the survey for several reasons. First, it allowed for a larger distribution and therefore a larger sample, which increased validity of results. Second, Qualtrics produces compiled reports, which reduces any chance of researcher error in response collection. Third, images lose a small amount of quality when they are transferred from digital to print. The truth to whether or not 18-24 year old Americans can recognized manipulated images will be more accurate when displaying them digitally, if only very slightly.

As previously mentioned, the survey was comprised of two parts. The images featured in part one were displayed individually, one per page. The images had varying degrees of manipulation, ranging from nothing (fresh off the camera) to highly manipulated (skin cleaning, body warping, etc). This was done to prevent skewed results based on the chosen photos. If the researcher had released a test using only level 10 photos, which naturally have more editing markers, the results might be skewed towards a high ability to recognize manipulation. However, if the test was released with only level 5 and 6 photos, the test would not show the extent of what can be identified and what cannot. Unedited photos were included as well as a method of control. The survey was released with two unedited photos, three composited photos (the highest level of manipulation), and five photos with varying degrees of manipulation.

The photographs were displayed in a randomly chosen order; however, the researcher did switch two images from the original randomization because two back-to-back images used the same model. Repeated models were selected with caution, meaning selected photos were deemed different enough to prevent the model from being recognizable. Should a participant recognize a
model from a previous photo, he or she might deduce that there MUST be some manipulation because of the changes they saw from one photo to the other, even if he or she would not have otherwise recognized it.

For each image a single question appeared under the photo: “Do you believe the above photo has been manipulated?” If the participant answers “No,” the survey will allow them to move on to the next image. If they respond “Yes,” a second question is presented asking the participant to list the ways in which they feel the image has been edited.

Part 2 allowed the participants to view the same photos that they saw in Part 1, but this time as part of an editing continuum taking the photo from completely unedited through the steps to highly manipulated. The continuums were presented separately from the images in Part 1 as opposed to splicing the spectrums in after their corresponding image in order to get truer results on whether or not participants can identify the manipulated images. Although visual literacy and media education is an end goal of the researcher’s work, educating the participant during the test on what manipulation can look like would skew results. Some participants may not be affected by viewing the complete stages in between individual photos, but others might start to tailor their guesses based on where previous photos fell on the continuum.

Part 2 instructs the participant:

In Part 2 you will view the same photos as you saw in Part 1. However, you will now be able to view them in all of their stages of editing.

Imagine you were viewing these photos in a magazine. Some edits you might consider acceptable (for example, blemish removal), and some you might consider to be "over the line." At what point in the editing process would you feel it's necessary to inform the viewer that the image has been edited?
Please select number corresponding with the FIRST image in the continuum that you feel CROSSES the threshold of acceptable edits. This means that the image you select needs to be labeled as manipulated, but the photo previous to it on the continuum is within the range of acceptable edits.

Instructions were intended to provide context to the research as well as instruct the survey taker. Participants may feel differently about the level of acceptability in magazines than they would about, say, social media posts or newspapers.

Baseline Photos

In order to accurately gauge the level of photo manipulation, the researcher began with completely unedited photos taken by a professional photographer. Volunteer models, both male and female between the ages of 20 and 26 and of all body types, were posed in ways that would allow for easy post-production retouching. Models were instructed to wear relatively form-fitting clothing, preferably without patterns or complicated graphics. Female models were asked to style their makeup as they typically would and to wear their hair down. Some models did not adhere to these standards, primarily the request that they wear form-fitting and pattern-free clothing, but as this request was made to lessen the workload of the researcher in terms of editing and did not affect end quality, their images were still included in the survey.

A variety of profile shots and full-body shots were taken of each model. Photos selected for final testing were chosen by the researcher based off of pose, lighting, and editing possibilities. Photos that allowed for higher levels of editing were chosen over those which were not as flexible in terms of post-production.

It is important to note that the photographs were scaled down for easy transfer from the photographer to the researcher, and were not at full resolution when received and later retouched. The images the researcher received were more than large enough to be considered high resolution.
(generally referring to any image that is 300ppi or higher), but it still may have affected the quality of the more heavily retouched photos, which would not be as noticeable on a full-resolution photo.

**Editing**

All images were edited with Adobe Photoshop CC 2017. Edits included:

1. Blemish Removal
2. Skin Toning
3. Eye Brightening
4. Hair toning
5. Hair Reshaping (flyaways, hairline, etc.)
6. Facial Hair Reshaping (eyebrows, beards, etc.)
7. Facial Shape Warping
8. Body Slimming
9. Body Expansion
10. Compositing Photos (collaging images together)

Edits were done in stages. For example, a model might have seven stages of slimming from mild to extreme. All edits were conducted in the same order listed above on every photograph to preserve the integrity of the continuum. Because photographic editing is visual, there were no hard “levels” that the researcher adhered to. If a model had quite a bit of acne, they might have a photo in their continuum where the acne got removed. However a model with clear skin would not need this step and therefore would not have an “acne removal” image in his or her continuum. However, because edits were always done in the same order (for example, hair toning after blemish removal), the researcher can still tell at what point participants drew the line for marking images even though the edits do not line up perfectly from one model to the next. Some images passed the threshold of obvious editing in the eyes of the researcher (generally on the extreme end) but were left for testing to gauge how heavy the testing participants assumed the manipulation to be. Obvious editing in this sense is defined as having clear markers that an image was retouched (blurry areas in the image, noticeably uneven shadows, etc). Leaving these images in the survey also counteracts comparison bias among viewers; i.e. rating an edited photo as
unretouched because the one previous to it had obvious manipulation markers, so by comparison the photo looks less edited.

**Continuum Images**

The full range of edited images are used in Part 2 of the survey, grouped into continuums. A continuum is comprised of all of the stages of an edited photo placed side-by-side for easy comparison by the viewer. They are labeled and begin at “0,” which is completely unedited on every continuum. The final photo ends at “10,” or very manipulated. The participant can then select which photo in the continuum they feel passes the “manipulation threshold” and needs to be labeled.

As previously mentioned, the researcher realizes that not all images require the same manipulations and that this will affect the universality of a numerical score (40lbs of visual weight removal will result in several stages of body slimming, whereas 10lbs might only constitute one or two steps). However, since the researcher has complete control over the photography, they can still determine what stage in the editing process the participants rated as “unacceptable.”

Potential issues with this method is that while the participant can view all the stages at once, they may not be able to pick up on subtler changes between photos. When images are directly overlaid the differences are obvious, but the testing format did not allow for overlaid images that could be toggled on and off by the participant. If participants cannot tell the difference between two images on the threshold, they may pick one at random which would skew the results.

Additionally, the need to present all the photos at once lead to a loss of quality. When large, high-resolution photos are shrunk down and displayed at 72ppi, the standard resolution for screen display, there no way to avoid a loss of resolution. While the changes are still visible from one stage to the next, the more minute details (such as blemish removal) become harder to see.
Chapter 5: Results

Respondents spent an average of 8:54 minutes on this survey (Figure 3.1) when extreme outliers were removed\(^1\), or 19-27 seconds per question depending on whether or not the conditional questions were displayed (Part I: If [yes] then [in what way?]). According to Survey Monkey’s analysis of approximately 100,000 survey duration times, the typical amount of time spent per question for a survey with a comparable number of questions is 20 seconds (C.B, 2015). Since respondents spent the average amount of time or more per question, it is safe to assume that responses were reasonably considered by the participants and results carry a high level of validity.

Demographics

After being released to 300 Marquette University students, 900 Kent State University Students, and an unknown number of non-university affiliated Northeastern Ohio and Southeastern Wisconsin residents within the 18-25 age range the survey garnered 61 responses. Respondents were 68% female, 31% male, and 1% non-gender or otherwise identifying. 86% of respondents were white (constituting the vast majority) but respondents also identified as Black, Asian, Native Hawaiian/Pacific Islander, and Hispanic (all represented under 5%).

Survey Results: Part I

The results of the individual images feature a “True Accuracy” percentage, which is the number of responses that correctly identified any present manipulation divided by the total number of responses. While the True Accuracy percentage gives a more precise idea of the number of participants who were truly able to identify photographic manipulation, it is not without flaws. Any response that could be deemed correct (even if it was ambiguous) as well as responses that listed incorrect identifications along with correct ones were included in the
accuracy score. The True Accuracy score for unedited photographs is identical to the percentage of participants who correctly identified the image as unmanipulated.

**Photograph 1: Unmanipulated (Figure 4.1)**

Despite not being manipulated, a third of respondents believed that the photo had indeed been edited. Nearly 70% of those who felt that the image had been manipulated believed that the model’s body size had been altered in some way; 26% thought that the model had been slimmed down (particularly in the waist and arms), 16% thought that the model’s hips had been made wider, and the remainder did not specify whether they thought the model had been made larger or smaller, only that they thought that the model had been altered because her shape was “too perfect” or her hand placement felt unnatural. Others believed that the model’s skin had been retouched, her facial features enlarged, or her teeth whitened.

True Accuracy: 67.21%

**Photograph 2: Heavily Manipulated & Composited (Figure 4.2)**

This photo was heavily manipulated and the end result was created from three different models. 49% of respondents felt this photo was manipulated, with the other 51% believing that the photo had been unretouched. However, many could not identify exactly what they felt was changed. This photo received a variety of responses, ranging from the model having been made taller, slimmed down, made wider, made longer, or having been given a hat. Overall there was no general consensus on what had been changed, although nearly half of those who thought the photo was manipulated listed something to do with the head/neck/hat, which shows that while they may not know exactly what was changed a significant number of respondents are focusing on the most manipulated part of the image. Only two respondents cited technical reasons for believing that the image was photoshopped; one listed the tonal differences between the skin on
the face and neck and the other responded that blurred areas were the reason they felt the image had been manipulated.

True Accuracy: 21.3%

**Photograph 3: Full Manipulation, Non-Extreme Warping (Figure 4.3)**

Although this photo was manipulated on every level outlined in the testing conditions, changes to body size was visually mild. 72% of participants reported that the photo was unmanipulated. The 28% who believed that the image had been altered cited things like a lack of fly-away hairs, blemishes, and wrinkles in the clothing. However, respondents also cited the model’s arm width, hand placement, and arm veins as things they felt were manipulated. The model in Photograph 3 is a naturally slender male with prominent veins and joints and these things were not changed beyond standard blemish removal and shadow contouring.

True Accuracy: 11.5%

**Photograph 4: Full Manipulation, Extreme Warping (Figure 4.4)**

Despite the heavy level of warping the model sustained in this photo, 67% of participants felt that this photo had not been manipulated. The model was slimmed significantly in the photo displayed in the survey, but less than half of those who believed the image to be manipulated listed slimming as one of the ways they felt the image was changed. Other responses included leg shaping, eye enlarging, and enlarged breasts.

True Accuracy: 24.6%

**Photograph 5: Level V Manipulation with Mild Body Warp (Figure 4.5)**

This image featured a very slender model. While 50% of survey takers correctly identified this image as manipulated, 58% of that group cited the model’s (untouched) thigh gap or legs as the reason they believed it was Photoshopped. The other two consistent reasons respondents listed
besides the model’s legs for marking the image as manipulated were the slenderness of the model’s natural waist and the model’s lack of facial blemishes. Other answers included the vibrancy of the color in the model’s necklace, her hair and makeup, the tilt of her pelvis, and her arm, although the arm was a response given by only a single participant and was followed by a question mark indicating that the respondent was unsure whether anything had been done to the arm (the model’s shoulder was adjusted on the viewer’s left-hand side, but it is unclear whether or not the respondent was referring to this change).

Of the half that believed the photograph was manipulated, only 13% listed something about the image that had actually been retouched by the researcher. The other 87% listed reasons that were mistaken, some of which were echoed by the 13% who made correct identifications. To put these numbers into perspective, that means only 6.5% of respondents both correctly identified manipulation in the photo and cited edits that had actually been performed.

True Accuracy: 6.5%

**Photograph 6: Full Manipulation with Body Extension (Figure 4.6)**

Only 16% of respondents marked this image as manipulated. Body warping in terms of slimming and enlarging was present, but the most significant change to the image was an extension of the model’s legs and torso to make the 5’8” model appear taller. Of those who believed the photo to be manipulated, only one respondent noticed the height adjustment due to a technical issue; the shadow was not adjusted to reflect the new height. Other responses were that the stomach was made smaller, the muscles made bigger, the legs made skinnier, the legs made larger, and an increase in the taper down to the hips.

True Accuracy: 6.5%
Photograph 7: Unedited Model (*Figure 4.7*)

74% of participants correctly identified this photo as having no manipulation. The other 26% were most likely to list the model’s lack of blemishes and asymmetrical facial features, but also noted the lack of flyaway hairs, the uneven kilter of the shoulders and slight difference in arm size, the hairline, and the model’s nose ring which they felt was added.

True Accuracy: 74%

Photograph 8: Full Manipulation with Significant Warping and Compositing (*Figure 4.8*)

The model in Photograph 8 is a little person with achondroplasia, meaning he is short in stature and was born with disproportionately short arms and legs. Warping in this image was significant, but did not quite stretch him to the average person’s proportions. Additionally, the eye area was composites with the eyes and brow line of another model. 48% of participants felt that this image was manipulated. The most popular reasons for believing the photo was manipulated were the brightness of the eyes, cited by 38% of the manipulated group, and the shortness of the arms or torso or the size of the head in proportion to the body, cited by 34%. Although the eyes were mentioned by many of the manipulation group, they do not appear to suspect that the eyes are a composites feature but rather that they were merely digitally brightened. The third most cited reason for believing the image to be edited was the smoothness of the models skin, reported by 20% of participants.

True Accuracy: 32.8%

Photograph 9: Full Manipulation with Compositing (*Figure 4.9*)

Only 26% of participants believed this image was edited, despite being fully manipulated and having composites features pulled from another model. The researcher debated using this image because it featured a model previously used, but heavily manipulated and in a different pose.
Ultimately the researcher decided that the photo was different enough to still be included. However, two respondents who reported feeling that the photograph was edited cited the similarities to the previous model as their reason for believing so; namely, they mentioned the black t-shirt and blue jeans that the model wore in both photos. One of the respondents felt fairly certain that it was the same model because of this, whereas the other was not completely sure but chose to identify the image as manipulated anyway.

Other reasons for listing the image as manipulated included the hair color (25%), the brightness of the eyes (25%), and the whiteness of the teeth (18%). Single-response answers were that the mustache was artificial, the sleeves were edited, and that his skin was retouched to remove freckles.

True Accuracy: 19.6%

**Photograph 10: Level VII Manipulation (Figure 4.10)**

43% of participants believed this image was manipulated. Level VII Manipulation indicated that there was blemish removal, skin toning, eye brightening, hair toning and reshaping, and face reshaping. On this particular model, the hair on his head was relatively untouched except for removing patches in the beard; however, 62% of those who believed the image was manipulated cited the male model’s long, brown-to-blonde dyed hair as something they felt was digitally added or dyed. Another 12% believed that the model’s hat was photoshopped onto his head, and one person believed that the zip up the model was wearing was digitally placed onto the model.

Additionally, one participant claimed that they had seen this model in a previous photo because they remembered the body type and outfit. Unlike the model in Photograph 9, however, this model was not previously used except for as a very loose base for Photograph 2, which featured a different body type and clothing. Another respondent wrote that “this [image] looks super fake” but they couldn’t put their finger on why.
True Accuracy: 3.3%

Results, Part II

Results for part two were analyzed based on the three most typical mathematical functions: mean, median, and mode. The mean is the average of all the scores received, the median is the middle number when the scores are arranged in numerical order, and the mode is the most common reported score. The hope was that these scores would be relatively similar, which would give a clear indication on each continuum where participants believed the manipulation threshold to be.

Some participants answered inconsistently; for example, answering with very high numbers (7-10) on the majority of continuums and then selecting a 1 for a single set of photos. The researcher tagged the oddities for later analysis. Other participants did not seem to understand what was being asked of them; a “zero” level photograph, which was completely unedited, was included as a base reference but some respondents selected the zero level photograph as needing an editing mark. These answers were also tagged as were the rest of the participants’ rankings (even when they were consistent with other respondents) because a misunderstanding of the instructions invalidates all scores reported by that participant.

The first score listed is the raw score which includes all collected responses. The second score is the result after removing tagged responses. The overall score is the average of the adjusted mean, median, and mode for each continuum. The purpose of creating an overall score is to 1) create a single score to match with editing levels and 2) find the number that accommodates the majority of respondents. If scores are consistent across all three functions, the overall score will be reflected as such. However, if an inconsistency is present the averaged score will skew towards the number reported by the majority of respondents without discounting the scores of the minority. For a full list of accepted and unaccepted edits, refer to Appendix A.
Figure 5.1  Mean: 5.95 | 6.26  Median: 6 | 6  Mode: 10 | 10  Overall: 7.42
Figure 5.2  Mean: 6.47 | 6.56  Median: 8 | 8  Mode: 8 | 8  Overall: 7.52
Figure 5.3  Mean: 4.61 | 4.94   Median: 5 | 5   Mode: 5 | 5   Overall: 4.98
Figure 5.4  
Mean: 5.57 | 5.98  
Median: 5 | 6  
Mode: 5 | 5  
Overall: 5.66
Figure 5.5

Mean: 5.34 | 5.72
Median: 5 | 5
Mode: 4 | 4
Overall: 4.91
Figure 5.6  Mean: 5.92 | 6.3  Median: 6 | 7  Mode: 9 | 9  Overall: 7.43
Figure 5.7  Mean: 6.03 | 6.81  Median: 6 | 7  Mode: 8 | 8  Overall: 7.27
Figure 5.8  Mean: 4.92 | 5.34  Median: 5 | 5  Mode: 5 | 5  Overall: 5.11
Figure 5.9  
Mean: 4.87 | 5.23  
Median: 5 | 5  
Mode: 5 | 5  
Overall: 5.08
Analysis

Based on the results of the test, it would appear that the tested population are not particularly skilled at identifying manipulated photos. Every manipulated image presented in the test was identified by less than 50% of respondents except for Photograph 5, although this high percentage becomes almost invalid when considering that the manipulation was only accurately identified by 6.5%, shown by the photo’s True Accuracy score.

The True Accuracy percentage on manipulated photos ranged from 3.3% to 32.8%, which at first glance appears to be a wide range with no statistical significance until it is compared with the amount of manipulation in each photo. These percentages have a positive correlation with the amount of manipulation, meaning as the level of manipulation increased so did the percentage of accurate identification. The highest True Accuracy percentages were on images that had composited components and extreme warping, falling in the 20-25% range with one outlier at 32.8%. Images with mild warping and low levels of manipulation generally fell between 3-6.5%, with one outlier at 11.5%.

These percentages might be lower outside of a test setting; 25-30% of respondents claimed that they felt that the images were manipulated on the two unmanipulated photographs. This is around the same percentage reported on photographs that were manipulated. It is likely that some respondents, knowing the premise of the survey, assumed manipulation and reported it without being able to identify it based on sight. Since manipulation is relatively consistent in the media (blemish removal, slimming, etc.) it is possible that participants guessed based on what they have seen done to photographs in Photoshopping exposés. If a participant does this for every presented photo, it is to be expected that on some photos they will correctly identify manipulation when they otherwise would not recognize it.

Part II determined where participants placed the threshold for informing viewers of manipulation. While the majority of participants seemed to accept a wide range of edits, others
were very strict. Those that selected images early on in the continuum tended not to select any image past 3, often choosing 1’s indicating that any edits at all were unacceptable without being marked. The overall scores generally fell between 5 and 8, indicating a general tolerance for low-level edits but a need to be informed at more dramatic levels.

Upon reviewing, it appears that the overall score generally fell on the first image that displayed significant body warping of any kind. This included slimming, changing of one’s facial structure, or changing one’s height. This was not the case for every photo; for the particularly slim female model in Figure 5.4 participants allowed a degree of expansion (up to approximately 15% waist expansion while maintaining the model’s figure), only drawing the line when the model’s thighs were expanded by approximately 25% and her face was expanded and cheeks plumped up.

Another exception was the male model with dwarfism. Significant changes to his proportions were marked as acceptable by the majority of respondents, including torso and arm elongation, changes to the elbow position to re-proportion the model’s arms, and shaving down the browbone to re-curve the forehead (a common effect of achondroplasia is an atypically large forehead). While the image marked as crossing the threshold was not the first to have significant body warping, it was the first to slim the model down.

The responses to these two photos indicate that participants had a higher tolerance for manipulation of non-typical body types. While it would require more testing to confirm, it appears that the respondents accepted manipulations that moved the models’ bodies closer to an average body, but drew the line at manipulations beyond that.

Respondents also had a higher tolerance for manipulation on male models. Responses for female models disallowed any sort of augmentation, whereas for male models edits like muscle enhancement were marked as beneath the threshold. However, this may be due to the amount of
enhancement; most male models featured were slender and muscle enhancement could not be done to an extreme without compositing.
Chapter 6: Further Development

Based on the primary research, there appears to be a point at which the viewers must be informed that a photograph has been manipulated, such as a mark that could be placed onto the image indicating manipulation. However, there are a number of possibilities of what form that mark might take. The researcher began with a review of the three basic categories of semiotic markings: icons, indices, and symbols.

Icons are the most straightforward as an icon physically represents what it stands for. For example, the small image of a printer in the function bar of a document is an icon for the print function. An index is a sign that correlates with or implies the intended meaning. Simply put, an index indicates something else. Examples of indices would be tears indicating sadness or a paw print indicating an animal nearby. Finally, symbols are signs which are culturally learned and have no physical or logical connection to that which they represent. Additionally, symbols operate within the context of a specific location and time period. For example, the dollar sign ($) is a learned sign; there is no physical representation of nor indexical correlation with money, and could easily have been represented by a myriad of other markings. It also is only representative of money in the Americas; other areas use symbols to represent their respective monies such as pounds (£), euros (€), and yen (¥). These categories are not necessarily mutually exclusive; a floppy disk is an icon for the save function on a computer, but for younger individuals who have never seen or used a floppy disk the sign might be purely symbolic.

Because symbols must be learned, it would be most practical to develop an icon or indexical marking that can be readily understood to lessen the adoption period, or to make use of symbols that are already learned (such as letters). The researcher created a list of objects and words associated with photographic manipulation as a launch point for the development process. The list included letters like P for Photoshop, R for retouched, and M for manipulation and objects like a computer mouse, paint brush, and the Photoshop magic wand.
The lettered symbols that the researcher considered were eliminated as possibilities for several reasons. First, a “P” for photoshopped or an “M” for manipulated contained within a circle, (similar to a Copyright or Registered Trademark symbol) are already existing legal marks. ℗ is a symbol used for registered trademarks in audio recordings and ℌ (while it is legally non-obligatory) indicates a mask word protection notice. The “M” enclosed in a circle is also the symbol for ‘motor’ in electrical drawings. Because these markings already have a legal meaning assigned to them, they could easily be misread or misunderstood if they were used to denote photographic manipulation. Additionally, the use of “P” would be unfair to Adobe by calling their product out by name, since Adobe merely provided a product that became industry-standard and have no bearing over how it is used.

Additionally, research done by Ben-Bassat and Shinar in 2006 showed that signs that follow the ergonomic principles set forth by Sanders and McCormick in 1993 are more readily understood by a wide variety of viewers (Sanders & McCormick, 1993)(Ben-Bassat & Shinar, 2006). The ergonomic principles they’re referring to are spatial compatibility (the physical placement of a sign), conceptual compatibility (the extent to which the markings conform to existing associations), physical representation (the similarity of the marking to the reality it represents), familiarity (the amount of exposure a viewer already has to the sign), and standardization (the consistency of color and shape usage). Based on this research, the most effective mark would be one that has some physical representation to photographic editing and carries a pre-existing association with photography or manipulation. Warning signs in the United States are typically diamond-shaped with a yellow background and regulatory signs are rectangular with a white background, codes which, if used for the mark, could lend familiarity and standardization (Institute of Transportation Engineers, 2003).

The researcher also found a quick survey of pre-existing associations to be helpful in informing suggestions for a mark. Google and Bing image searches were used to determine the
top results for “manipulation,” “manipulation symbol,” and “retouching symbol.” Images were only counted if they fell above the “crease” in the webpage, meaning no scrolling was required. This was done due to Google’s continuous scroll mechanism for its image results pages; there is no way to tell what would constitute as first page material and at what point the images would have originally appeared on a second page.

An image search for “manipulation” images returned thirteen front page images on Google and 15 on Bing. Images across both search engines were similar in nature. Both search engines returned four images each showing marionettes. While the marionettes were in the top or second row (indicating a higher priority), the majority of the images were examples of skillful photographic manipulation — eight for Google and ten for Bing. The remaining image on Google was a religious image showing a chess game between an angelic and a devilish hand and the last image on Bing was a cartoon depicting governmental manipulation. While these images may not directly inform a symbol on their own, they do show that the word “manipulation” is heavily tied to photography and edited images which confirms that the researcher is using the correct language for non-industry viewers.

“Manipulation symbols” returned images that generally fell into one of two categories: marionettes or electrical manipulation symbols. The Google search returned more marionette images than electrical, displaying seven and five, respectively. The Bing search was saturated with electrical symbols, showing eighteen compared to only two marionettes. Some images were not considered because of their irrelevance to the research; for example, an image of a sheep being sheared, a hand-drawn Egyptian ankh, and the correct way to write “manipulation” in Chinese.

The phrase “retouching symbol” provided more direct insight into a potential future marking. On Google, seven images featured pencils against either a camera or a version of the recognized symbol for image (Figure 1). Two images featured paint brushes, and four were compilations of
the icons representing the various Photoshop functions. The remaining images were a logo, a vaguely electrical looking symbol, and a vector drawing of a ring. The majority of images returned from the Bing search pertained not to photographic retouching but to grammatical editing. Every image displayed above the crease was a visual chart of copy editing symbols and proofreading marks. However, a few images showing pencils or scissors cutting a film reel were revealed after scrolling.

Based on the associations highlighted by the image search, the researcher created six variations for a potential marking denoting photographic manipulation. Colored variations also have a black and white version for publications printing in grayscale. The researcher feels that the most successful marking is black and white version of suggestion 3, the pencil contained in a rectangle, due to its simplicity, high potential for correct association, and shape which is reminiscent of the image icon (Figure 1.1).
Chapter 7: Discussion

Participants were, as a whole, not skilled at identifying photographic manipulation with positive identification consistently under 50%, and accurate identification under 30%. However, participants seemed more shocked by their inability than outraged at the manipulation. The survey allowed participants to leave additional comments that they felt might be helpful to the researcher after completion. In this section many participants who chose to comment remarked that they were surprised that they did so poorly in Part I of the survey, and that based on what they had learned of Photoshopping in the media that the edits would be far more drastic and noticeable.

Some of the comments read:

*I consider myself fairly savvy, and I looked for telltale signs of "photoshopping" like mangled fabric wrinkles, warped patterns, mismatched shadows, etc. I was shocked how many of my "no" photos had been modified.*

*Some were easier to notice than others. It's interesting seeing how photos can be manipulated without someone noticing.*

*You always hear that magazines photoshopped to where the image isn't really even humanly possible but I felt most of these pictures were perfectly fine pretty far throughout the editing processes.*

The disparity between how well participants felt they did versus the actual results further supports the need for a mark denoting manipulation. If viewers feel confident that they can identify manipulated photos but are, in fact, falsely believing that retouched photos are unmanipulated it could negatively affect their perception of reality and their self-esteem.
Based on Part II of the survey, the researcher suggests that the threshold of acceptability is crossed when edits to an image includes changes to bodily composition, and requires denotation after this point. This was also supported by the comments made by several participants. One such comment reads: *Changes to body structure are where I usually draw the line. This type of photographic deception — unattainable in the real world — not only harms both people's perceptions of (and expectations for) each other but also sets up unrealistic standards for themselves.*

Determining whether or not denotation is required using this threshold is an easily adopted marking system; it leaves no room for question and does not require analysis by a computer program or third party. It also informs viewers of a specific level of editing (changes to body composition), removing the need for the additional clarification that an all-or-nothing or numerical system would require. While the effectiveness of this system has yet to be tested, confirming the need for it and creating a basis are the first steps towards improving media literacy and creating informed consumers.
Figures

**Figure 1.1, Image Icon**

[Image Icon](https://pixabay.com/p-1103595/?no_redirect)

**Figure 2.1, Banned Lancôme Ad**

[Image Banned Lancôme Ad](http://www.dailymail.co.uk/femail/article-2019162/Julia-Roberts-Christy-Turlington-L'oreal- adverts-banned-airbrushing.html#ixzz1TJuuDmVB)
Figure 2.2, Banned L’Oreal Ad

Retrieved from http://www.dailymail.co.uk/femail/article-2019162/Julia-Roberts-Christy-Turlington-L'Oreal-adverts-banned-airbrushing.html#ixzz1TJuuDmVB

Figure 3.1, Survey Duration

◎ = single response
Figure 4.1, Unedited Model
Figure 4.2, Heavily Manipulation & Compositing
Figure 4.3, Full Manipulation with Non-Extreme Warping
Figure 4.4, Full Manipulation with Extreme Warping
Figure 4.5, Level V Manipulation with Corrective Warp
Figure 4.6, Full Manipulation with Body Extension
Figure 4.7, Unedited Model
Figure 4.8, Full Manipulation with Significant Warping and Compositing
Figure 4.9, Full Manipulation with Compositing
Figure 4.10, Level VII Manipulation
Appendix A

Figure 5.1

Accepted:

- Blemish removal
- Beard cleaned & filled
- Hair color enhanced
- Eye color enhanced
- Shirt wrinkles removed
- Shoulders squared
- Arms & torso elongated
- Stomach flattened
- Chest muscles enhanced
- Lowered nose & mouth
- Jawline enhanced
- Browbone shaved
- Elbows lowered

Unaccepted:

- Hips tucked / streamlined
- Restructured jawline
- Nose adjusted
- Facial contour
- Removal of deep lines & harsh shadows
- Composited eyes
Appendix A

Figure 5.2

Accepted:

- Blemish removal
- Teeth whitening
- Eye brightening
- Beard cleaning
- Chin brought higher
- Face made wider
- Mouth thinned
- Beard wisps removed
- Hat bump removed
- Jaw straightened
- Body straightened
- Eye color changed
- Shoulder rounded
- Excess arm fabric removed from zip up
- Body restructured (shoulders aligned, arm muscles evened, waist enhanced)
- Arm muscles enhanced
- Hat pushed farther up forehead

Unaccepted:

- Replaced body / clothing
- Composited neck / lower face
- Hair cut
Appendix A

Figure 5.3

Accepted:

- Blemish Removal
- Flyaway Hairs
- Facial line softening
- Hair color enhancement
- Lip color
- Teeth whitening
- Tooth gap removed
- Straightened shoulders
- Shadowing contour
- Makeup retouched

Unaccepted:

- Reduced lower abdomen
- Facial slimming
- Body slimming
- Added thigh gap
- Breasts lifted
- Crotch lifted
- Collarbone enhanced
- Hands made smaller
- Changed eye color
Appendix A

Figure 5.4

Accepted:

- Blemish removal
- Facial line softening
- Hair color toning/enhancement
- Eyebrow toning / enhancement
- Eye makeup retouch
- Lip color edited
- Eye brightening
- Teeth whitening
- Eye squint reduced
- Shoulders adjusted
- Shirt laces straightened
- Septum piercing straightened
- Face made thinner
- Waist expansion, maintaining figure
- Arms made thicker
- Fat added to cheeks

Unacceptable:

- Expanded thighs
- Waist expanded, reducing curves
- Hips expanded
- Composited lower face
Appendix A

Figure 5.5

Acceptable:

- Blemish Removal
- Eyes balanced
- Facial line softening
- Eye enhancement
- Eyeshadow and eyeliner added
- False eyelashes added
- Lips recolored
- Hair toning / enhancement
- Jawline enhanced

Unacceptable:

- Face made more angular
- Mouth turned into a smile
- Heavy shadowing removed
- Jawline made more V shaped
- Cheeks hollowed
- Body slimming
- Undershirt line removed
- Chest enhanced
- Waist tucked in
- Collarbone enhanced
Appendix A

Figure 5.6

Acceptable:

- Blemish Removal
- Eyebrow cleaning
- Hairline adjustment
- Skin recoloring
- Shadowing on eyes
- Nose shortened
- Muscle expansion (slight)
- Jeans straightened

Unacceptable:

- Jeans recolored
- Skin blurred
- Facial contouring
- Logo removed from shirt
- Shoulders widened and body tapered
- Jaw squared
Appendix A

Figure 5.7

Acceptable:

- Blemish removal
- Teeth whitening
- Skin tone evening
- Eye brightening
- Shadow contouring
- Facial line softening
- Eyebrow cleaning
- Hair toning
- Eyelashes darkened
- Haircut
- Eyes enlarged
- Eyes tilted
- Muscles enhanced
- Broadened shoulders
- Facial structure made more angular

Unacceptable:

- Nose slimmed
- Mustache added
- Hair color changed
- Shirt logo removed
Appendix A

Figure 5.8

Acceptable:

- Blemish removal
- Beard cleaning
- Beard fill
- Eye brightening
- Eyebrow toning & cleaning
- Hair toning
- Eye spacing
- Body slimming
- Pants fitted

Unacceptable:

- Legs extended (made taller)
- Leg muscles enhanced
- Stomach tuck
- Wrinkles smoothed out in jeans
- Leg proportion adjustment
- Shoulders relaxed
- Muscles enhanced
- Jawline squared
- Waist tapered
- Composited eyes and nose
Appendix A

Figure 5.9

Acceptable:

· Blemish removal
· Makeup cleaning
· Facial line softening
· Eye brightening
· Lens glare adjustment
· Hair styling
· Flyaway hairs
· Hair toning
· Makeup removed and redone
· Arm hair removed
· Skin toning
· Shadow contouring
· Eye opening
· Facial slimming
· Smile enhanced
· Eyes evened
· Throat tucked

Unacceptable:

· Body slimming (all degrees)
· Facial slimming
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