

A 360 DEGREE VIEW OF REALITY: CAN 360° IMAGES REDUCE “MANUFACTURED” BIAS IN PHOTOGRAPHY?

Prof. Farhat Basir Khan

Department of Design & Innovation, Jamia Millia Islamia, New Delhi - 110025, India
fbkhan@gmail.com

Dr. Krishna Sankar Kusuma, Javed Sultan

AJKMCRC, Jamia Millia Islamia, New Delhi - 110025, India

ABSTRACT

With the proliferation of the Internet and the growing popularity of social media, the consumption of misinformation and biased content has become increasingly widespread. Although photographs are better representations of the truth, they are not immune to bias. The angle, the composition, the lighting, the mood and the framing of the photograph can heavily influence the message conveyed through it. The advances in photography, especially panoramic imagery, have allowed for 360-degree images. Two groups of participants were surveyed and shown cropped and complete images from 360-degree photographs. There was a 50% variance in perception of messages conveyed through the cropped and the complete 360-degree images. The latter presented a more accurate and complete picture of what was happening and offered more information to the observers. The 360-degree images conveyed the message with 86% accuracy in one image set and with 60% in the other. In comparison, the cropped frames conveyed the message with 35% accuracy in one image set and with zero accuracy in the other. This indicates a massive increase in the accuracy of messaging and reduction in the bias introduced through the photographic technique and editing. 360-degree photography could revolutionize the field of photojournalism by providing more accurate and unbiased representations of incidents, subjects and their environments.

Keywords: Photography, 360-degree photography, visual communication, fake news, photojournalism

1. INTRODUCTION

“A picture is worth a thousand words”, as it is supposed to show what is, as is. However, it is not always the case. Photographs have been manipulated and propagated through social media and other online mediums. New technologies are making it increasingly difficult and almost impossible to tell real images from fake ones (Anderson and Rainie, 2017). This problem is not limited to memes and recreational communication only. Fake, manipulated and doctored images have been increasingly used in news media in the recent past leading to a crisis of credibility in photojournalism (Macdonald, 2015).

The use of photographs in news is important because most people tend to focus on the accompanying photographs and graphics rather than the text when watching or reading the news (Okada et al., 2021). Accompanying photographs lend legitimacy to the stories, even when they are not accurate (Mallonee, 2016). This is problematic as such images not only deceive the consumers of the content but also influence public opinions and actions. There

have been several cases of image manipulation in the news media, however, very limited action has been taken to rectify the malpractice. In 2014, the Associated Press fired their star Pulitzer winning photographer for digitally manipulating an image (Shen et al., 2019).

The nature of manipulation goes beyond editing the images on Photoshop or other editing tools. Photographs can be biased in their very composition through the choice of angles, framing of the shot and the perspective (Khan, 2019). Such tactics have commonly been used in political photography to portray the leaders in a God-like fashion (Waldman and Devitt, 1998). This led Canon Australia to write, “A photograph is shaped more by the person behind the camera than what is in front of it” (Canon Australia, 2015). Altered or posed photographs have also been used to convey misinformation about important global events, which creates a significant problem as photographs, even fake ones, have been proven to affect the memory (Eveleth, 2012). 360-degree images could be the solution to eliminating the camera person's bias from images as it could

eliminate the role of framing, angles and perspective. It is important to understand how audiences interact with images that have not been affected by the photographer's creativity or perspective. While few studies have focused on the impact of manipulated images on the observer, no studies have examined how potentially unmanipulated images on the perception and decision-making in observers.

This study aims to establish whether using 360-degree images can reduce the bias that is introduced by the careful selection of the frame, angle, lighting and colour composition in photography and its editing. In doing so, an attempt is made to understand the impact of selective sharing of information through images on the understanding and opinion-forming of the observers vis-a-vis the impact of sharing a complete and authentic picture of a given event or moment.

2. LITERATURE REVIEW

2.1. 360-degree photography: A brief history

It is understood that advances in 360-degree photography have been accelerated by the rapid advances in digital photography. The most obvious changes that have been brought about by digital photography are related to the time taken to process the images and the ease with which they can be post-processed. 360-degree cameras are the latest in the long list of innovations seen in modern photography (Love et al., 2021).

The idea of 360-degree portrayal of an event or a moment is not a new one. In fact, it is older than photography and can be seen in the panoramas created in the nineteenth century (Oettermann and Bell, 1997; Byrd, 2017). One of the major breakthroughs in 360-degree photography took place in 1900 when Louis Lumière developed the *Périphote*, a device capable of capturing 360-degree images that were later displayed as panoramas (The Photographic Collector, 1982).

From the early twentieth century to the near the end of the century, panoramic photography was made possible through rotating cameras that would take pictures at regular intervals to compose one uniform image on the negative. However, these images could not cover the field beyond 140 degrees.

Digital photography changed the way 360-degree photography was done. Images were stitched using software and algorithms. Google Street View brought in a paradigm shift in 360-

degree photography and its applications were suddenly more useful to the masses (Kroll, 2014). The introduction of panoramic photography on expensive smartphones further commercialised or popularized this form of photography.

Modern 360-degree cameras are however, different as they take all the pictures simultaneously, rather than taking several photos one after another and then stitching them together. This ensures synergy between time and space, ensuring better accuracy and ingenuity of the photography.

2.2. Photographing the 360

360-degree images are photographs where a view in every direction is recorded at the same time (Tustain, 2018). In a 360-degree photo, we can see the action unfolding around the camera as it records its 360-degree environment or we can say space around it. A 360-degree photograph is shot using an omnidirectional camera or a collection of cameras placed in special rigs so that they can capture images around them. Through image stitching, the separate footage of each lens is merged into one, to make a spherical 360 image (Andrews, 2003).

The 360-degree format also allows the viewer to look around the space using a Head-Mounted Device (HMD) or can scroll the space on the display of the phone or a computer (Keodara, 2019). From the first camera capable of taking 360-degree images, patented by M. Garrela in 1857, 360-degree photography has come a long way (Lai et al., 2020). Now 360-degree or spherical photography has become popular with the advent of smartphones and stitching software that allows taking such photographs (Luhmann, 2004).

The immersive media format provides us with the ability to share the experience of the real location as the viewer is present there. 360-image is something similar to Victorian stereoscopic viewing stations like the Kaiser-panorama and hand-held stereoscopes in terms of immersion as the viewer experiences that they are transported there (Azevedo, 2020). While working with 360 and immersive images we have to keep in mind the following (Andrews, 2003):

Placement of the camera

It is another most important aspect as placement of the camera at different positions in relation to the subject gives us different perspectives. We

have to consider 360 cameras as a human being while placing it as someone seeing the picture in HMD will see it as he is seeing through his eyes.

Framing the shot

Framing is very critical in 360 as the viewer has the liberty to turn around so we try to frame the subject or choreograph the action so that it remains in the 180-degree front view of the camera and place some minor actions or movement behind that line so that the viewer also has something secondary to look upon in the peripheries of the main sequence. The aesthetic of 360 images is more related to telling the whole story, as it does not have extreme close ups and montages. In this viewer and subject are placed at a comfortable distance and action unfolds in mid and wide shots. Layering the frame is crucial while filming 360 videos as it gives us different planes to view at which is more appealing to the eyes.

New visual aesthetics

360 images added new aesthetics to the visual communication as we can have various visual effects like tiny planet, orbital hyper-lapse, rabbit hole, bubble cam. Transitions and effects like orbital hyper-lapse, surround me, vertigo effect, drone zoom etc. are very easy to shoot in 360 images as there is no jerk in the movement because we could adjust the keyframe.

Possibilities with 360 films and VR

360 filming has immense possibilities to explore, as it has been transformed from a mode of entertainment to a tool for creating experiences. In 360 films filmmakers concentrated more on creating experiences for its viewer where a viewer can explore the space and could feel present there. Through VR and 360 films, viewers can live the experience as there are two types of placement of the viewers in 360 films, first is one where the viewer is the observer of the scene and the second one is when the viewer is the part of the setting.

Both the forms have their advantages but in form of interactivity and impressiveness, they are more engaging than the regular form of films. Through 360 films we feel much more proximity to the subject of the story as we are present there and it also allows us to live in the world of the film. Through 360 videos and VR, we can live a moment that is passed in time we can experience that point of time that is captured in VR again and again, it's something similar to having trapped a passing moment and being able to relive it. As we can see in Project

Dastan that they are creating experiences for people affected by a partition so that they could feel close to their past memories.

2.3. Objectivity in Photography - Maintaining the Integrity of the Frame

There has been a growing concern regarding inaccurate information distributed as news, especially in the online space (Alcott and Gentzkow, 2017). Fake or manipulated images accompanying text amplify the impact of the stories. While most of the manipulated photographs are not generated by top media houses, they are actually user-generated content (UGC), which sometimes makes its way into news reporting (Calzada and Osterreicher, 2017).

It is particularly worrying since most people cannot tell fake images from real ones (Nightingale et al., 2017). Even observers with high-level, Internet skills or photo-editing experience are unable to detect images portraying inaccuracies (Shen et al., 2019). Earlier, there was an assumption that photographs in the media were not manipulated, however, now that is not the case. People are more cognizant of the existing biases and possibilities of manipulation, even if they can't tell real and fake images apart (Macdonald, 2015).

Apart from digital manipulation, there is bias in photographs that can distort the truth. One of the most common ways of manufacturing truth through photographs is to stage them and it is not a new phenomenon. The first instance of a staged photograph dates back to 1840 where Hippolyte Bayard photographed his drowned dead body (Sapir, 1994). In the photograph titled Self-Portrait as a Drowned Man, Bayard poses as a victim of suicide by drowning, provoked by the unwillingness of the French authorities to place his work in the photographic process on an equal footing as that of Daguerre.

3. METHODS

3.1. Methodology

A survey methodology was employed to carry out this study. A purposive sampling method was used to choose the participants. As this study was done during the COVID-19 pandemic, the survey was done electronically and did not involve any physical interaction with the participants.

Two 360 degree images were selected for observation, one depicting a workshop, while

the other captures a family at a refugee camp. For the purpose of this study, the former is titled “A Window of Opportunity” and the latter is titled “From the Lens of the Observer”. Frames were cropped from both the images to create static images for initial reference. Each cropped image and its corresponding 360-degree image were sent to one group. The cropped image was shown first and responses were recorded. After the 360 image was shown, the same questions were asked and responses were recorded.

3.2. Data Collection

Data was collected through Google forms. Two questionnaires were created and sent to a group of mass communication students. A sample of college-going students from two separate classes were chosen for this study. The first questionnaire, corresponding to “From the Lens of the Observer” was sent to 50 students out of which 30 sent in their responses. The second questionnaire, corresponding to “A Window of Opportunity” was also sent to 50 students, out of which 43 sent in their responses. All the responses were complete and hence included.

3.3. Data Analysis

While the data collected from “A Window of Opportunity” questionnaire was quantitative, the data from the “From the Lens of the Observer” was qualitative. The data from the latter was tabulated, coded and analysed manually in Microsoft Excel. Open and focussed coding was done to quantify responses and find similarities across responses. To ensure the reliability of the data, inter-rater reliability was used. A Kappa Statistic score of 0.98 was obtained, confirming validity of and consistency in the coding.

4. RESULTS

4.1. A Window of Opportunity

After seeing the selective frame of the image, the majority of the respondents (37.2%) perceived “luxury and leisure” and 16.3% of the respondents saw it as a contrast between the miniature boat and the actual boat outside the window. After seeing the 360° image, the majority of the respondents (86%) perceived it as a photograph of a workshop.

Figure 1 charts the distribution of the responses for the first impression or the perception of the respondents when they saw the framed shot and the 360° image.

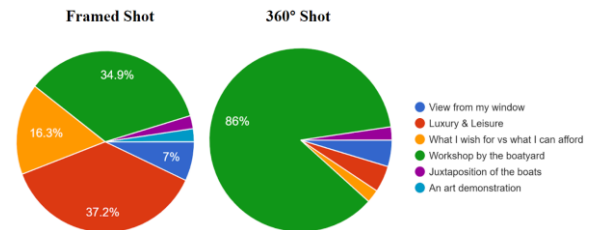


Figure 1: Distribution of responses for observer perceptions after seeing the selective frame and the entire 360-degree image

The primary emotions evoked by the framed shot were creativity (55.8%), and aspiration or inspiration (30.2%). For the 360° image, it was creativity (60.5%) and hard work (37.2%). **Figure 2** depicts the distribution of responses for perceived emotions when looking at the framed shot and the 360° image.

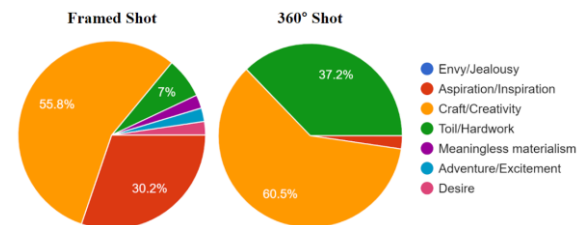


Figure 2: Distribution of responses for emotions that the respondents associated with the framed shot and the 360° image

On the importance of the composition of the photographs, the respondents were asked to rate the importance of the boat visible through the window. 59.5% of the respondents believed that the boat was very important to the composition of the photograph, while 32.6% of the respondents believed the boat to be somewhat important. When the 360° image was shown, 50.8% of the respondents believed that the boat outside was not important to the composition at all. 37.2% believed it to be very important, a drop of 22.3%. **Figure 3** charts the responses on a Likert scale for the framed shot and the 360° image.

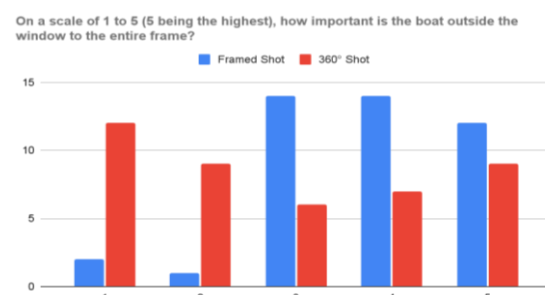


Figure 3: Representation of responses for how important the boat outside the window was to the composition of the photograph on a Likert scale (5 being the most important)

In response to the importance of the miniature boat on the window sill, 76.8% of the respondents believed that the miniature was very important to the composition of the framed shot, while at the same time, 76.7% of the respondents believed it very important for the 360° image. **Figure 4** depicts the responses to the importance of the miniature boat in the frame shot vs the 360° image.

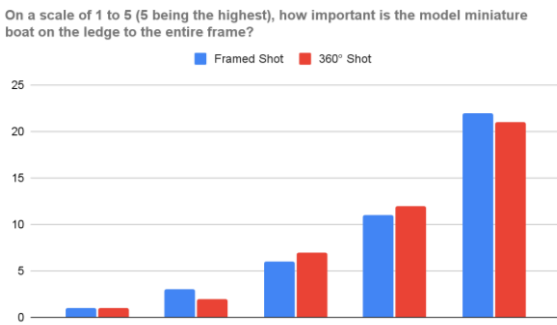


Figure 4: Representation of responses for how important the boat on the window sill was to the composition of the photograph on a Likert scale (5 being the most important)

The most common emotions picked for the framed shot were luxury, wealth, creativity and craft. For the 360° image, the most commonly chosen attributes were craft, creativity, skill and labour. The median for luxury, wealth and aspiration dropped from 41.9% for the framed shot to 11.60% for the 360° image. At the same time, the median for craft, skill and labour went up from 37.2% for the framed shot to 65.1% for the 360° image. **Figure 5** shows the comparison between the most preferred emotions or attributes associated with the framed and the 360° shot.

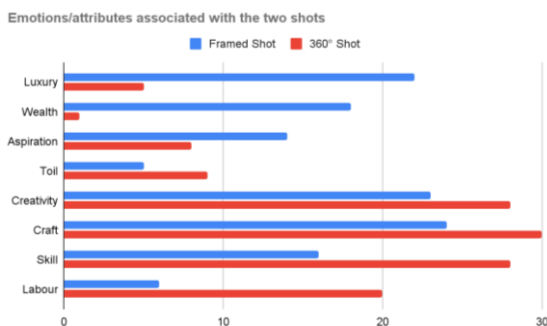


Figure 5: Representation of the comparison of most preferred emotions or attributes for the framed shot vs the 360° image.

4.2. From the Lens of the Observer

The overall sentiment towards the framed shot was mainly positive or somewhat positive with more than 66% respondents finding the shot positive. In comparison, only 6.6% respondents

found the 360° image positive or somewhat positive. 80% of the respondents changed their answers drastically after seeing the 360-degree image. 10% changed their answers marginally, while 10% did not change their answers. **Figure 6** represents the responses for perceived sentiment for the framed and 360° shots.

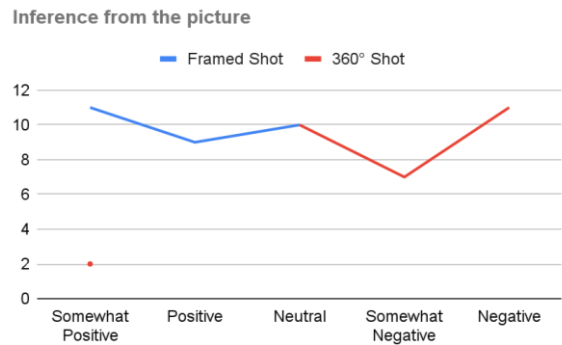


Figure 6: A line chart representation of the responses for perceived sentiment for the framed and 360° shots

The top chosen keywords for the framed shot were fun or playfulness, happiness, nostalgia, generation gap and excitement. For the 360° image, the top keywords were sadness/sorrow/unhappiness, poverty, cramped and chaos. **Table 1** lists down the top keywords chosen by the respondents as associated with the framed and the 360° shots.

Table 1. Top keywords chose

Table 1. Top keywords chosen associated with the framed and the 360° shots.

Rank	Framed shot		360° image	
	Keywords	Times Used	Keywords	Times Used
1	Fun or playfulness	7	Sadness or sorrow or unhappiness	9
2	Happiness	4	Poverty	6
3	Nostalgia	4	Cramped	5
4	Generation Gap	4	Chaos or disorder or unorganized	5
5	Excitement	3	Homelessness	3

5. DISCUSSION

The context of the photograph changes the way people perceive meaning from it. By manufacturing context, the photographer or the picture editor, knowingly or unknowingly, conveys a specific message. Deviations in the angle and composition of the photograph seems to change its context completely, which can influence the observer's perception. By being selective with what the photograph shows, the truth can be altered. This has been supported by multiple studies in the past that indicate that the various characteristics of a photograph, such as

its composition, lighting and angles can determine the way the message of the photo is received or the subject in the photo is perceived (Waldman and Devitt, 1998).

A depiction of an event can completely be changed by selective framing, editing or using a particular angle or perspective to capture the shot. It is seen that with 360-degree images, observers are more prone to understanding the actual message conveyed in comparison to a framed shot. For example, when the respondents in this study saw the framed shot of the workshop, most of them focussed on the boat outside the window as that occupied the most space in the image. The tools in the background were ignored by many despite the obvious cues in the options they had to choose from. But with the 360-degree view, the respondents could easily comprehend that the image was depicting the inside of a workshop.

Similarly, with the other image, most respondents found the setting of the image to be pleasant and it reminded them of family, values, happiness and playfulness. This was because the focus was on the children playing video games on a hand-held device. This is an important factor in compositing a photograph. Not only can a photographer choose what to focus on, he inadvertently decides what the observer will focus on as well.

With the 360-degree shot, almost all respondents perceived the message clearly, not focusing on the children playing the video games. This is why a complete picture of an event or moment is essential to the truth of the same. When respondents have a complete picture, even small anomalies do not distract from the conveyed message.

It can be argued that 360-degree images can reduce bias and manipulation in photojournalism as well. By removing any possibilities for selective framing, angle distortion and scope for editing during post-processing, a 360-degree image does what an image is supposed to do - give the complete and accurate picture of an event, incident or any subject. It would be crucial to reporting and should become a norm, especially with important events.

6. CONCLUSION

The context and the composition of photographs can alter the truth of the incident or event it captures. By selecting the angle, lighting and

adjusting the frame, photographers can introduce their bias to the photograph that can convey wrong information and misinform the observers. This bias can also be introduced at the editing stage, by cropping the images, changing focus and adjusting colours and light in the picture. 360° images, however, eliminate that bias by showing the entire view of the incident or event.

It was found that when 360-degree images are used against framed or edited images of the same event or subject, the truth of the moment is apparent and is hard to manipulate. In comparison, with selective framing and editing, the perspective and the truth can easily be distorted. This, especially in photojournalism, is a dangerous proposition and needs to be addressed.

360° photographs can be used to promote the correct or truthful perspectives. Whether intentional or unintentional, by manufacturing context, a photographer or editor is also manufacturing consent, which can mislead the observer. A photograph, especially used in news, has to be purely objective and is supposed to solely represent a moment truthfully and accurately. 360° images can provide that objectivity and help eliminate any bias that might misinform or mislead. It is recommended to mainstream 360-degree images in photojournalism, especially when important public events are being covered.

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