

The spectacle of stereoscopy: historical analysis and inputs to the creation of a digital archive of analog stereoscopic photography

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Abstract

The erasure of stereoscopic photography from 20th century media history, referred by authors such as Crary and Gunning, had repercussions in other fields. In the main bibliography related to the history of visual effects there are no references to this medium. This paper discusses the foundation of an awe effect as a guideline to the act of seeing, and analyzes the problems arising from the remediation of that effect in the transition from analog to digital. We have found that this image conversion process, necessary to the creation and dissemination of digital files of 19th century stereoscopic photography, is not linear, and that the digital stereoscopic projection cards present a number of difficulties for a proper consistency reproduction of the relief effect. Through the work done for the Stereo Cultural Visual Project supported by the FCT Foundation ref. PTDC / IVC-COM / 5223/2012, it was possible to analyze and carry out the process of transforming an analog stereo archive into a stereo digital archive.

Keywords: stereoscopic photography; digital stereo archive; remediation; visual effects; post-production; film.

Introduction

The rise of stereoscopic photography in the 2nd half of the nineteenth century, its commercial success and diffusion (it is estimated that at the turn of the century tens of millions of stereoscopic cards were sold annually), and its subsequent disappearance from circulation – leading to its erasure from the History of subjects such as Photography or Cinema – has made this technique a widely discussed field of study by the communication sciences (and Media Archeology) in recent decades. We do not intend to engage in discussions about the reasons for its decline or to assign responsibility for it, be it monoscopic photography (Maxwell, 2000), the apparatus necessary for the visualization, the subjectivity of the stereo image (Crary, 1992, p.14), or its use by morally reprehensible industries such as pornography (AA.VV, 2013, p.183).

For the purposes of this article, it is essential to consider the relationship established between stereo photography and the cinema of attractions, as has been addressed by Leon Gurevich (2013, p.83). We share the author's view that stereoscopy is not a stand-alone medium, but a

technique applied to many media throughout history and a technique whose main characteristic is a spectacularization of the act of seeing, transforming this act into an event in itself and introducing new forms of access and portability of the spectacle as a passive act of vision. The relationships that stereoscopy establishes with the world of visual media appear to be those of intensification of the spectacle, increase of immersion in the experience that already exists and introduction of a new (three-dimensional) world.

It is only at the moment of its discovery (or invention), that we are unable to observe this kind of relationships, since it appeared without any relation to a visual medium. Although the discovery of stereoscopy by Charles Wheatstone was not coincident with the invention of photography (nor did it involve photography at its inception), the latter visual medium was almost immediately applied as the main support for its presentation and 13 years later (1851), one of the first stereoscopic viewers using photographic image, manufactured by Louis Jules Dubosq, was presented to Queen Victoria in the Crystal Palace World Fair Exhibition in London. This early marriage of the natural spectacle of stereoscopy and the technical nature of photography introduced new ways to do and see, leading to the production of photographic images that were spectacular, both at the stereoscopic level (with the pursue of the spectacular in the themes that were chosen for the photographic capturing) and the photographic level (through the production of images that could heighten the level of fruition of the stereoscopic spectacle); images of various kinds but all of them "awe inspiring" photographic compositions as mentioned by Gurevich (2013, p. 83-84).

This seminal union between the two is probably responsible for the characterization of stereoscopic photography as an autonomous medium, and not as an applied technique. But any connection between stereoscopy and a visual medium bears the same implications that its application to photography had: the original medium is manipulated in order to increase stereoscopic effects, spectacle, and immersion. "The stereoscope is one major cultural site on which this breach between tangibility and visuality is singular evident" (Crary, 1992, p.19).

Crary (1992, p.14) makes an interesting association of the stereoscope to optical devices (which are associated with the beginnings of animation), as mechanisms of mass entertainment that derived from studies of vision and optical phenomena. As objects capable of confronting the visual experience and based on scientific studies, these optical devices address the notion of realism by promoting the illusion of the real world through theories of vision. Stereoscopy is born in a period that examines the "after the image"(afterimage) in studies of binocular vision and precedes photography itself.

Without intending to deviate from the main purpose of this article i.e. the remediation of the spectacular and its consequences in the history of visual effects, it is relevant to mention that the first optical devices used for studies of the retinal persistence phenomenon, namely the fenakitescope, are contemporary of Charles Wheatstone's work, being commonly associated with the "spectacle of animation". From the early animations of Winsor McCay to the magic tricks of George Méliès, animation has been directed towards the production of the "awe effect", with strong connections to technical experimentations as the ones that are so common in stereoscopic images.

With the advent of cinema, and the disappearance of stereoscopy from the equation of the spectacularization of the act of seeing, what remained was, on the one hand the nature of the captured images, the photographic themes in themselves, which constituted the basis for the cinema of attractions; and, on the other hand, the technique of manipulation of stereoscopic images, that could be looked upon as the birth of applied visual effects to cinematic media, namely the films of Georges Méliès, the Glass shots of Norman O. Dawn, or the double exposures of Edwin S. Porter.

Stereoscopic photography was one of the first mass produced and consumed forms of visual spectacle and, as such, is at the origin of the current notion of spectacle as applied to most visual media, specifically all media which involve a considerable degree of immersion, such as film, animation and video games. It is not by mere accident that all can qualify as cinematic media. According to Gurevich (2013, p.84), "while they [stereocards] were not moving images, they can be thought of as proto-cinematic special effects".

What is a fact is that stereo photography, mostly driven by its commercial success, introduced new techniques of image manipulation that sought to increase its spectacular nature (hold-to-light and *tissue* stereocards), promoting the creation of fantastic environments (*Diableries*), visual modifications in the images (e.g. the appearance of colors), and the recreation of the image ambience (nocturnal illusion).

Almost all of these techniques can be found in older optical machines (such as the alethoscope, or its successor, the megaethoscope), but the adaptation to the photographic image – as a territory for spectacle – found its greater evolution and reinvention here. This adaptation is not a mere detail: the need to think of reality as raw material that can be captured by the camera, in a way that allows its later manipulation to produce a specific effect, inaugurates the technique of visual effects as they are currently understood and applied in movies or animation. Stereo photography from the 19th century is, however, practically absent from the main bibliography of the history of visual effects.

It seems that this remediation of the spectacular blotted out its parents. However, even as a chronological observation, there are obvious links between the *Diableries* (created in Paris, in 1860, whose production lasted until 1900), the cinema of Georges Méliès (whose career began in 1896 with *Un Petit Diable*) and the techniques he used.

The digital archive in 19th century stereo photography

Concerns about the photographic archive, and its digital presentation, are a field of research in itself. The materiality of photographs, the access to information contained in this materiality, and the relationship that the photography object establishes with its viewer, has proven to be crucial for studies in the field of Visual Anthropology. What is defined as a cultural biography of the photographs gains importance and becomes essential for understanding the meaning of a photographic image as socio-cultural object (Edwards, 2005, p.10).

Although the visual content of a photographic image appears to be its most pressing manifestation, access to the information contained in the material object clarifies – confirms or denies – its visual content, creating a social and cultural context for the image. This materiality

of the image elucidates about its life at the time it was created, establishing a connection with the ways in which it was seen by its contemporaries, and by doing so, helping us to understand their purpose.

It is not uncommon that the digital photographic archives fail to provide access to all this information and, even when they do, we can argue that the direct access to the material object is an experience of another degree, which can lead to different and more profound ideas. These issues, crucial for Visual Anthropology, are also prevalent in Media Archaeology.

Some of the key issues for a researcher in a field that fits into the word Archaeology (albeit in a broader sense) are the following: the visual access to different processes of photographic print (albumin, platinum, bromide, etc.); the visual apparatus that forms the presentation of a photographic image (daguerreotype cases, *cartes de visite*, postcards, etc.); the information contained in texts and the manner in which these texts fit into the photographic object; the selection (reframing) and cataloging (color markings that establish hierarchies) information left by authors. All of these issues arise in the case of stereoscopy and are further enhanced by the nature of the access to the image: two similar but not identical images, which generate a third three dimensional image, that does not match any of the previous and has no physical appearance but is formed by a physiological process of human vision, implying a physical repository (the card or glass plate, usually showing other adornments and/or written comments) and a specific apparatus for stereo vision in all its spectacle (the Holmes, Brewster, Verascope, or other viewers).

All this seems to deny the possibility of a reliable stereo photography digital archive or, at least, of one that allows a fair experience of the original object. With the emergence of relatively cheap and easy to use 3D TVs, new possibilities for stereo photography digital archives emerge. We all know the increase in ease of access and query that digital archives offer. We can advocate that the experience is not the same, that nothing replaces direct access to the original, but still these archives remain an essential tool in certain phases of the research process.

In order to analyze these issues, we have conducted a small inquiry to students in the field of visual communication (Cinema, Photography, Animation, Visual Arts). The inquiry revealed some problems that arise in the transition from an analog existence to a digital 3D environment.

Beyond the need for access to the original card or glass plate, in order to understand its sociocultural reality (whether if it is part of a commercial collection, a deluxe edition, or commercialized by a national, regional or international company; if it is a private photo; if there are inscriptions left on the back of the card or in the middle of the glass plate, among other questions) and the importance that this access to the original negative has in order to understand the options for reframing or cataloging, it became clear in conducting this inquiry that the transition to digital 3D viewing screens affords a lesser visual experience when images are not subjected to a specific post-production for this medium.

For the survey, the selected images for screening on a 3D TV were reproduced using a Canon 5D DSLR camera¹. They were lighted evenly in front (and back when necessary²) and were later submitted to a simple post-production calibration or alignment in most cases (figures 1 and 2).

1. With a 100mm Macro lens from Canon.

2. Using three 1000 watt projectors from Kaiser equipped with light boxes and Manfrotto supporting system.



Figure 1. Reprodução de originais “Diableries” – 2015 - Rodrigo Peixoto



Figure 2. Reprodução de originais “Diableries” – 2015 - Rodrigo Peixoto

When comparing the viewing experience in the 3D TV and with the Holmes viewer using the original stereocards, it was found that the visual experience (not including the whole process of handling the card and using the Holmes viewer) was more complete and satisfying. Detail perception was greater, the disturbance due to image surface imperfections (scratches, stains) was minimal and the formation of the full three-dimensional image was pleasant and without barriers for visual appreciation, even when there were differences in brightness between the left and right image. On the 3D screen, the situation was reversed: less perceived detail (probably due to the specificity of the monitors and their image displaying resolution – 1920x1080

lines), increased interference of imperfections in the visualization of the 3D image, and greater influence of changes in brightness between left and right image³.

The need to adjust the convergence of images for the 3D screen is essential to a good quality visual experience. Frequently images that are displayed without any problem with the Holmes viewer, offer great convergence problems on screen, making it difficult to experience the 3D effect.

The areas of the images that don't overlap (thus not resulting in a 3D view) while not affecting the stereo effect with the Holmes viewer, when viewed on screen, appear as ghostly tricks at the limit of a stereo image. The conversion to digital form is not straightforward: it is not just a matter of scanning the original.

Since 2004, when stereoscopic image was reintroduced in cinema, cinematographic equipment industry has been improving the quality of 3D projection. A wide variety of papers, articles and books followed this period to help illustrate how to produce good 3D effects in film or how to use them within the narrative. Despite significant technological advances, the images captured in 3D require post-production work to ensure a particular stereoscopic effect, be it natural or exaggerated in an unnatural way.

In our analysis of the various stereo pairs of the collections researched by the SVC project, most of the photographs show no evidence of manipulation (reframing), and therefore it often occurs that visual elements are only present in one of the images, left or right. Nevertheless, what the practice of post-production and extensive bibliography tells us is that this is a thing to avoid, particularly when working on digital image (Baumgartner, 2014, p.16-17). In the next image (figures 3 and 4) we can see that the North Wing of the Crystal Palace only appears in the left image. Similarly, there is a noticeable mismatch in the height of the two lenses. The image on the right side was captured in a different angle than the image on the left side, which led to a larger area of the sidewalk being visible on the left side.

When this stereo pair is viewed in an analog display, these errors tend to be masked, given the possibility the viewer has to tune the distance between the stereocard and the viewing lenses (through manual operation), the amount of time the eyes are permitted to adapt to the images, as well as the possibility of choosing the better lighting for the images.

3. Probably due to the fact that both images share the same space of the screen and are backlit with the same intensity.



Figure 3. Artur Benarus, Crystal Palace, Arquivo Municipal de Lisboa Fotográfico, ref. AML-AMLSB-BUF-001760



Figure 4. Artur Benarus, Crystal Palace, Arquivo Municipal de Lisboa Fotográfico, ref. AML-AMLSB-BUF-001760

The individual choices that a viewer makes when observing a stereo photo in a 19th century viewer are not the same as on a 3DTV⁴. When we intend to analyze images by digital means, a set of procedures for 3D post-production are required to ensure that the picture pairs form the "3DFrame" (Baumgartner, 2014, p.17): the left and right side have to present the same elements in the displaying frame and have to be properly calibrated (alignment, color, noise reduction, among other aspects). In figure 3, we can verify the selected work in post-production so that the stereoscopic effect can be properly viewed on a 3DTV area.

In addition to this image post-production, required for digital projection of stereoscopic pairs of this period, the brightness and visible degradation in the photographs require proper care. To better exemplify this, we relate the post-production work done in one stereo pair (Municipal Archive of Lisbon – Ref PT-A MLSB-BUF-000035). In figures 5 and 6, we can see multiple circular markings that indicate the presence of noise in the original image, which are naturally captured in the scanning process. When viewing the images through a digital system, the noise becomes overly present, coaxing the viewers' attention by displaying three-dimensional patches

4. The adjustment of parallax is usually a complicated process. In the tested monitors (LG and Samsung), one has to access various configuration menus that make this task very unfriendly.

that sparkle over the image. The proper procedure for correcting the error involves manipulation of photographic digital file to eliminate noise through processes of reconstruction (cloning).

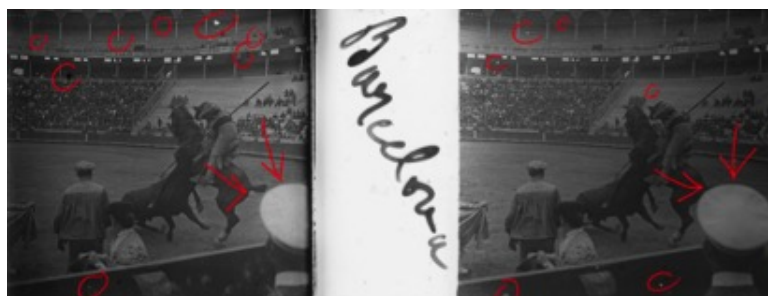


Figure 5. Artur Benarus, Barcelona, Arquivo Municipal de Lisboa
Fotográfico, ref. AML-AMLSB-BUF-000035



Figure 6. Artur Benarus, Barcelona, Arquivo Municipal de Lisboa
Fotográfico, ref. AML-AMLSB-BUF-000035 (detalhe)

In this image an odd error occurs, one that requires significant handling and removes the authenticity of the digital stereo reproduction – the difference in brightness values from the image on the left side and the one on the right side. In figure 7, we can observe the disparity of the hat's tonal value (indicated with arrows in the figure), which promotes inappropriate variation in brightness between two images when projected digitally. Even after leveling the tone of the hat, a problem remained: the three-dimensional image effect is not easily achieved due to the presence of such a large hat in the image. In order to obtain a natural viewing experience, it is important that the emphasis is given to the center of convergence (zero parallax) and that the 3D effect be naturally created from this point. When overlapping the two images, we realized that the bull and the horse would be the center of convergence. However, the strong visual spot

created by the brightness, sharpness and size of the hat distract the viewer. Therefore, we chose to slightly blur the foreground of this figure and darken the hat.

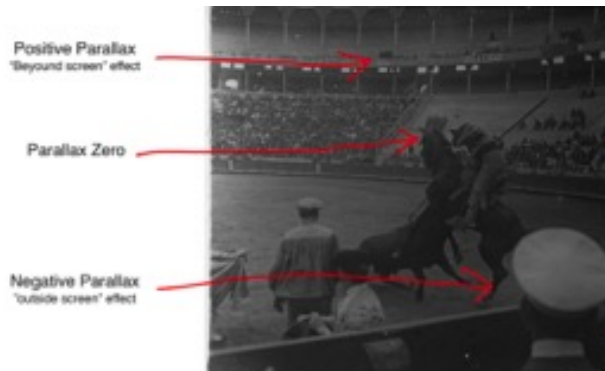


Figure 7. Artur Benarus, Barcelona, Arquivo Municipal de Lisboa Fotográfico, ref. AML-AMLSB-BUF-000035 (detalhe)

Throughout this process, it has become apparent that difficulty in digital reproduction of stereoscopic images on glass support (verascope) derived from the fact that, often when viewing the scanned image file, it became extremely difficult to establish if the glasses were scanned in the correct position without inverting the left and right side. We found several references in 19th century publications that describe in detail the process of reproduction, with mentions to this problem (AA.VV, 1900, p.100): images inverted in scanning cause the background objects to be displayed in the foreground and vice versa. In these cases, we reversed both sides with mirror effects (scale x equals -1), so that the relief effect could be reproduced correctly.

Conclusions

We have found strong relationships in the production of performance effects (awe effect) that can be established between cinema, animation and stereoscopic, in both film and photographic media supports.

The common technical and cultural background that originated a cinema of attractions and visual effects in moving images are already present in stereoscopic photography.

We have also found that the scanning and post-production of stereoscopic cards and glasses realized for the SVC project required the manipulation of the original images in order to reproduce, as closely as possible, the relief effect that is experienced when viewing the original. In order to obtain a digital stereoscopy archive of 19th century originals, this digital manipulation has to be accomplished. However, one should also have visual access the original images.

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