Visualisation for Digital Multi-Shot Photography

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Visualisation is a key element of imagemaking in photography, filmmaking and visual effects. This paper combines Ansel Adams’ process of visualisation with the notion of visualisation used in filmmaking and visual effects to introduce a visualisation process that allows for the capture of the decisive moment in digital multi-shot photography whilst maximising flexibility during postproduction.

1. INTRODUCTION

This paper explores the process of visualisation for contemporary multi-shot photography techniques such as high dynamic range photography, gigapixel photography and focus stacking, as applied in the author’s landscape photography practice. It combines Ansel Adam’s concept of visualisation with the visualisation process used in film and visual effects to achieve the final image look.

2. VISUALISATION AS SEEING IN THE IMAGE IN THE MIND’S EYE

“I am convinced that the best photographers of all aesthetic persuasions “see” their final photograph in some way before it is completed, whether by conscious visualization or through some comparable intuitive experience.” – Ansel Adams (Adams & Baker 1981, p.1)

Renowned landscape photographer, Ansel Adams advocated the use of visualisation to help aid in the making of photographs. Ansel Adams’ visualisation process involved seeing the final printed image in the mind’s eye before actually taking the photograph (Adams 1980, p.1). Once a clear mental picture, or direction for the image look, was established, necessary technical steps could be undertaken to reach that predetermined goal during the photography, film development and printing processes. Understanding and skilful practical application of photographic tools and processes, or craft competency, performs two functions in Adams’ visualisation process. Firstly, the knowledge and understanding of how the camera tools and subsequent photographic processes affect the look of the final image enables the photographer to have a better idea of the visual possibilities when conceiving the image in their mind’s eye. Secondly, having mastery over the photographic tools and processes enables the photographer to exercise control over the execution and development of the final image to match the result more closely to the visualised mental image.

In practice, there are three main issues with Adams’ visualisation process. First, the photographer to be able to see the final image in the mind’s eye, which an inexperienced photographer may struggle to do. Second, Adams’ visualisation approach requires the photographer to have an advanced level of craft competency to make an informed judgement about what looks can be achieved using the photographic tools and processes in order to be able to previsualise and see the result in the mind’s eye. Not knowing how each tool, technique or process would impact the look of the image becomes a limitation to visualising and crafting the look of the image. Third, there is no flexibility in Adams’ approach to accommodate multiple different image alternatives that the photographer might see in their mind’s eye. This issue comes from the medium of film photography itself where the negative could generally only be exposed and developed once, and, required careful control and craft competency in order to achieve the desired result.
acknowledges this limitation and suggests choosing the look that is closest to the photographer’s subjective artistic intent (Adams 1981, p.1). The possibility of experimentation with different image looks came during the printing process where Adams encouraged exercising “creative variation and subject control” (Adams 1981, p.2).

3. VISUALISATION AS THE QUEST FOR THE IMAGE LOOK

Film and visual effects employ a different visualisation process. The film director may not have a definite preconceived look for the final image and deciding on a particular look may involve a trial and error process. Even if the film director has a certain vision for the film look, that vision still needs to be communicated to the many different artists working on the film in order to create a cohesive look. A number of different visualisation tools and techniques such as mood boards, storyboards, animatics, concept art, previsualization and postvisualization may be employed to arrive at the final image look or shot design. These tools help in communicating the visual look and style of the images as well as facilitating in creative decision-making (Framestore 2019). Katz (1991, p.4) describes this form of visualisation as “the search for a goal rather than attainment of one”. The emphasis in this visualisation process is on transferring concepts and ideas into a visual form rather than seeing the image in the mind’s eye. This visualisation process combines making and doing with reflection and imagination. It is through the engagement with the medium that the process of visualisation is achieved, and, the look of the image materialises. The process of making unlocks the imagination as the raw material begins to take form and creative opportunities begin to reveal themselves (Katz 1991, p.5).

With digital video largely replacing film, both the visual data being recorded in the form of digital video, and the scene survey data, in the form of lidar or photogrammetry scans is digital. Lidar scanning and photogrammetry is used in visual effects to recreate real world sets and locations within the computer graphics (CG) software (Edwards 2019). High dynamic range light references photographed on location are used to recreate real world scene lighting inside the CG software to seamlessly light the 3D models being composited onto the live action backplates (Seymour 2011). The visual effects workflow thus relies on capturing as much scene data as the film budget allows in order to maximise control and flexibility for the look later down the production pipeline whilst also accommodating any changes that may not have been envisaged prior to filming. It is imperative, therefore, to ensure that there are no gaps in the acquired data.

4. VISUALISATION FOR DIGITAL MULTI-SHOT PHOTOGRAPHY

The visualisation process for digital multi-shot photography presented in this paper combines Adams’ approach with that used in film and visual effects. The main aim behind this approach is not to finalise the look of the final image from the outset but to enable the photographer to experiment and test different looks after photography has taken place by capturing as much data as possible. During the act of photographing, the look of the image may be under pressure to capture the decisive moment in the scene and may be overwhelmed by the numerous choices that have to be made in terms of the focal length, composition, exposure value, frame cropping etc. Delaying some of these decisions for later can not only reduce the pressure during photography but also allow for a more reflective process later down the production pipeline. It is important to ensure that the vision or data for creating any preconceived look is not lost in the quest for maximising flexibility for postproduction.

Digital data is fluid and easy mould in real time (Ritchin 2009, p.18). Ritchin (2010) argues that digital photography should be understood in its own right as a different medium from its analogue counterpart and as such, the visualisation process presented in this paper considers the digital photography capture process as data acquisition required to create the visual image. The digital equivalent of the film negative is the camera RAW file. Contemporary image editing software allow non-destructive image editing of the camera RAW files providing unprecedented flexibility for trial and error without restricting the photographer to a particular look. Photographers can apply different software presets or experiment with different image parameters without overwriting the pixel values contained in the original camera RAW file. Different virtual copies of the same camera RAW file can be generated to conduct a side-by-side comparison for particular image looks.

The visualisation process starts with identifying and prioritising the key elements in the scene that moved the photographer to take the picture. The look for the final image may or may not have been conceived at this stage, although in most instances, it is a case of having a rough idea for the look of the final image that is refined, tested and finalised during postproduction. Key moving elements within the scene are photographed first at the base exposure followed by the other exposure brackets,
panorama tiles and focus stacks in that order (Zia 2018). This process ensures that the main substance of the image is captured first with further flexibility for postproduction added later.

5. MULTI-SHOT PHOTOGRAPHY AND THE DISSECTION OF TIME

“The photograph cuts across time and discloses a cross-section of the event or events which were developing at that instant.” (Berger 2013, p.90)

A photograph arrests the event unfolding in front of the camera over the course of the photographic exposure. Contemporary digital multi-shot photography techniques and technology make use of multiple photographic exposures shot as a sequence over a certain period of time. These techniques allow photographers to capture more image detail than is possible to record in a single exposure by combining the different photographic exposures together as a single image. They also allow greater flexibility for image manipulation and image adjustment during image blending and postproduction. In the case of high dynamic range photography, the exposure duration is varied with each individual exposure capturing a certain slice of the scene luminance values. These exposures are subsequently combined to generate a high dynamic range file that contains more tonal values that can be captured in a single camera RAW exposure. The high dynamic range files can be tonemapped to fit the range of values available in the lower dynamic range print, or, on screen. Digital panoramas and gigapixel photographs are created by photographing and digitally stitching different frames, or, tiles, of the scene together in order to create an image that has greater resolution and field of view than is possible in a single photograph using the same lens. Focus stacking allows blending of variable focus distance photographs of the scene to be combined as a single image that has extensive depth of field.

The nature of the sequential capture of exposures for multi-shot photography methods, however, creates issues with moving elements in the scene. Scene elements that move over the course of the image sequence do not register in the same position, or, state across the exposure sequence, resulting in ghosting artefacts. Whilst some of these ghosting artefacts can be corrected in software, minimising these issues during photography can help reduce both time and effort later down the production pipeline. It is important, therefore, to carefully consider the number of exposures in the image sequences as well as the overlap between exposures (Zia 2018). The higher the number of exposures, the more fragmented the captured time range becomes. A higher number of exposures may provide greater latitude and/or flexibility during blending and postproduction but also requires greater effort and scrutiny when combining the exposures together. If the overlap between exposures is higher than necessary, it will increase the chances of ghosting. If the overlap between the exposures is less than what is required, it will create gaps in the resulting image output that may defeat the purpose of the multi-shot photography. Other variables such as camera buffer size and write speed of the memory card also need to be factored when considering the number of exposures for a multi-shot photography sequence as the camera can start to lag during the sequence capture resulting in an increase in the total photography time.

6. MULTI-SHOT PHOTOGRAPHY AND DISSECTION OF SCENE MOTION

It is important to consider and prioritise the motion in the scene so that the critical motion, i.e. the motion that can make or break the final image composition is not missed during, or between, exposures. It is also important to consider where the joins between the exposures should be and the relative camera distance at these points. For example, fast moving foliage in the foreground is very likely to create more ghosting issues. It is important, therefore, to consider both the relative distance of the moving scene elements from the camera in terms of parallax, and, the kind of motion that is generated. Motion within the landscape can be categorised as ambient, cyclical, or, one off. Ambient motion can be thought of as the ripples in a pond, or, leaves moving in a light breeze. Generally, this motion is localised to particular regions within the scene and the scene element is in constant flux. Cyclical motion can be thought of as waves breaking on the shore, or, gusts of wind blowing the tree leaves. This motion repeats itself in short cycles. One off motion is a singular event during a photoshoot such as sunrise or a sunset. This motion is unlikely to be repeated over the course of the photoshoot. By categorising and prioritising the motion of the scene element into these groupings, the photographer can start to take better control over the timing of the exposures to align them better with the motion in the scene and be able to capture the scene motion in the state desired by the photographer.

7. EXAMPLES

7.1 Gillett Road at Sunset

Figures 1-3 show three different variations for the look of an image created over the course of approximately five years. Figure 1 shows the first iteration at a time when lens specific colour...
aberration control was not available in the image editing software tools used. Figure 2 shows the second version of the image that was generated to create a more naturalistic look whilst reducing chromatic aberrations. Figure 3 is the latest iteration of the image produced that accentuates local contrast in the image to create more drama but keeps the saturation comparatively low. The key advantage of the visualisation approach was that the author has been able to revise and evolve the image look as his craft competency and understanding increased along with the improvement in software tools allowing for better control over tonemapping and lens artefacts such as colour aberrations.

Figure 1: First iteration of "Gillett Road at Sunset" by Rehan Zia.

Figure 2: Second iteration of "Gillett Road at Sunset" by Rehan Zia.

Figure 3: Third iteration of "Gillett Road at Sunset" by Rehan Zia.

7.2 Masjid Wazir Khan

"Masjid Wazir Khan" (Figure 7) is a tonemapped high dynamic range panoramic image consisting of a total of 27 exposures (3 exposure brackets and 9 tiles). The exposure brackets (Figures 4-7) were taken two stops apart in order to reduce tonal overlap between the brackets whilst maximising the overall tonal range captured. The panorama tiles were also taken with 25-30% overlap in order to reduce ghosting.

Figure 4: Underexposed bracket for highlight details in the sky.
Figure 5: Base exposure for midtone details primarily the courtyard and the building exteriors.

Figure 6: Overexposed bracket for shadow details within the archways.

Figure 7: “Masjid Wazir Khan” by Rehan Zia.
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7.3 Flowers by the Sea

“Flowers by the Sea” (Figure 8) is a focus stacked and tonemapped image consisting of a total of ten photographs; five exposure brackets at two different focus distances for the foreground flowers and the sea respectively. The aim was to be able to freeze the motion of the water – that could only be done using a fast exposure time – whilst having sufficient depth of field to render all the scene elements in sharp focus. Visualising the scene as two motion volumes – one for the foreground with the plants in localised ambient motion, and the over for the background with the sea in a one-off motion – allowed for the creation of the final image that has sufficient depth of field and freezes the decisive moment of the water as it laps over the rock without any discernible motion blur.

Figure 8: “Flowers by the Sea” by Rehan Zia.

The main issue with this image is the region where the foreground motion of the plants, and, the motion of the water in the background, overlap (see Figure 9). This is due to the moving elements across the two motion volumes not aligning properly over time. Regions such as these where there is an overlap between two motion regions should be identified and considered carefully at the time of photography as they can be particularly problematic to blend together and may require manual selection and cloning.

8. CONCLUSION

Multi-shot photography techniques allow photographers to delay committing to the look of the final image at the photography stage. In order to maximise the flexibility during postproduction without compromising the capture of the decisive moment, it is important to consider and analyse the motion in the scene. The visualisation process discussed in this paper can help photographers understand different types of motion in the landscape and break them down into different groups to enable better visualisation for multi-shot photography.

Figure 9: Magnified view of “Flowers by the Sea” by Rehan Zia demonstrating the ghosting issues where motion volumes overlap.

9. REFERENCES