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Andrew Davidhazy
Rochester Institute of Technology

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Recommended Citation
Davidhazy, Andrew. "Special Effects Photography." The Focal Encyclopedia, 3rd Edition, edited by Leslie Stroebel and Richard Zakia, Focal Press, 1993, pp. 389-395.

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Special Effects Photography

Andrew Davidhazy
Rochester Institute of Technology
School of Photographic Arts and Sciences
Imaging and Photographic Technology Department
Lomb Memorial Drive, Rochester NY, 14623

(this material was prepared for the Focal Encyclopedia of Photography)

This term includes a whole host of techniques that photographers use to create images that may or may not resemble reality but which usually have some unreal or questionable quality about them. Usually the purpose behind using special effects is to raise the impact or level of interest of an image or to produce images that only exist due to the use of such effects.

Special effects depend on the basic belief that photographs don't lie. They exploit this premise by presenting to the observer images that are seemingly impossible to achieve in reality or which enhance certain features of a subject beyond that achievable by normal photographic methods. In addition, special effects often enhance or modify reality for some ulterior purpose such as to enhance aesthetic merit, to convey information in a more effective manner than would be possible with a standard photograph, or to confuse or deceive the viewer into a false interpretation of reality.

Special effects and Trick Photography are sometimes considered synonymous but the word trick suggests that the photographs are intended to entertain viewers rather than serve more serious artistic and professional purposes.

A precise definition of what comes under the heading of special effects is difficult to give because some manifestation of a special effect can be found in most photographs. Although one can safely assume that "special effects" are not involved when the resulting photograph closely resembles the scene being photographed, when it is as accurate a record of the original scene as a two dimensional representation of a three dimensional scene allows, if it is an instantaneous and sharp record, if it was not manipulated after the image was recorded, and if it appears to be natural and unmanipulated, even in this case certain special effects could have been used by the photographer to achieve this look of naturalness and spontaneity. Also, a special effect that is used so frequently that it becomes commonplace tends to no longer be considered a special effect.

The advent of electronic image storage, manipulation and output has had a significant impact on the degree of sophistication and scope of special effects. Not only has this technology allowed for improved quality in creating traditional effects but it has made possible the creation of images that were totally impossible in the past. In spite of this, however, because computer generated special effects require expensive computer equipment and computer skills, their use by photographers is limited. Only special effects produced by standard methods by still photographers will be considered here.

Special effects can be classified according to a variety of criteria. Some occur prior to the making of the photograph. Others are used during photography and yet a third class of special effect is that which is accomplished by modifying the original image after the initial photograph is recorded. They could also be classified based on the procedures used or the technology involved. The techniques can be optical, chemical, physical, photographic, electronic, or combinations of these methods. In fact, there are so many techniques that could be called "special" that it becomes impossible to attempt to list, classify, and discuss all of them. Instead, under generalized headings below are listed and described some of the more popular current techniques that are connected with this subject heading.

TEMPORAL EFFECTS

Based on the widely held conception that photographs are instantaneous records of a scene photographers exploit this by purposely exposing a scene piecemeal onto a piece of photosensitive material. These sequentially-made images are then viewed by an audience instantaneously. Because of this discrepancy between the production step and the perceptual experience the audience tends to be amazed and/or confused when viewing the final product. Several techniques exploit this concept.

Matte boxes in photography-
These are devices that exploit the possibilities of making a negative by exposing its various parts at different times and under different conditions. At the photography stage, photographers use a matte-box in front of the camera lens.

The idea is that if a dark, featureless obstruction is placed in front of a camera, the film will receive no exposure where this obstruction is located. If without moving the film another exposure is then made of a similar obstruction but one such that it is the exact opposite of the first one in terms of areas that it covers, then the second exposure will seamlessly blend into the areas that were unexposed by the first exposure. These obstructions are called masks. One mask is called a positive mask, the other a negative mask. The simplest example of how one might use such a set of masks is the making of a photograph where one individual appears in two or more locations in the same scene.

Problems that photographers need to consider include the fact that there must be no movement across the delimiting boundaries of the "masks", the camera must remain locked in position and the film must remain stationary between the two exposures. Self cocking shutters are preferred although many current cameras are fitted with means to recock the shutter while introducing no film motion into the system.

The matte box also allows photographers to combine two or more scenes together on one piece of film by using two masks that are complements of each other placed sequentially in front of the camera. The outline of the mask edge sometimes becomes visible when this process is practiced but when used successfully this is made to actually contribute to the final product's visual appeal.

Matte-boxes in printing-
Matte boxes can also be used at the enlarging stage. Procedures for sequential multiple printing onto a sensitized material have been described in the literature. The process has been highly perfected by Jerry Uelsmann in producing surrealistic photographic images. The typical example of a simple application of this technique is that of adding, at the printing stage, clouds to a barren sky in an otherwise appealing photograph. The print is made by making a positive and a complementary negative opaque mask and printing the separated negatives onto the same piece of printing paper in succession taking care to carefully blend the two images together at the line joining the two masks. Some skilled photographers have combined portions from at least five separate negatives.

Focal plane shutter distortion-
The sequential assembly of images either at the taking or printing stages is also somewhat related to the sequential exposure process by which focal plane shutters expose a scene. Historically one of the most significant "special effect" photographs ever made is the one by Henri Lartigue showing a passing race car leaning one way and spectators in the background leaning another, the combination giving a very convincing impression of speed.

This effect, produced by a combination of relatively slow moving focal plane shutter and panning the camera to keep up with the moving vehicle (but not quite fast enough) is one that is normally not seen in everyday use of modern cameras also equipped with focal plane shutters. The reason for this is that in these cameras the shutter slit moves much faster than in the older models. Note that exposure time is not a factor in producing the effect, just shutter slit velocity.

Slit-scan cameras-
One can take advantage of the focal plane shutter distortion effect by purposely slowing a focal plane shutter down so that the slit at the film plane moves at the same order of magnitude, or slower, than the images one wishes to secure. Under these conditions the effect is known as "slit-scan" photography. In effect, any camera that makes an exposure by scanning a stationary scene can be classified as a slit-scan camera.

Several schemes have been developed for this. One is to devise a means for slowly releasing or winding the shutter of cameras equipped with large focal plane shutters, such as the Speed Graphic or the Graflex or to build an oversized matte-box on the front of which one installs a mechanism for slowly moving an open slit in front of the camera lens while the camera shutter is left locked in the open position. With either system it is fairly difficult to predict what the final photograph will look like because one usually loses the ability to view through the lens once the shutter is open.

To deal with this problem one may use some kind of a movable guiding finder that has been coupled to the location of the moving slit. It is also possible to use a camera that is equipped with a pellicle mirror based viewing system located behind the camera lens.

Early examples of the application of this technique were photographs made by Robert Doisneau of couples dancing and appearing to be intertwined about each other.

Scanning wide angle cameras-
Scanning wide angle cameras are a special manifestation of scanning focal plane shutters combined with a lens rotating about its rear nodal point to provide photographs with angles of view encompassing typically slightly more than 120 degrees, more than double the angle of view of a conventional camera and lens. Typical among such cameras are the rotating lens wide angle cameras such as the Widelux and the early Kodak Panorams.

Distortion normally not seen in cameras equipped with standard focal plane shutters becomes a matter of concern with these scanning wide angle type cameras because they turn the scanning lens over a relatively significant period of time. This introduces the possibility that a subject may move during the scanning action of the camera, or the camera itself may be significantly changed in position, leading to an alteration of the expected shape of a subject.

Several photographers have modified these cameras by slowing down the scanning action in order to produce highly unusual visual effects. John Zimmermann used such a modified camera to portray basketball, baseball and tennis players in amusing and unusual contortions.

Strip Cameras: linear, panoramic and peripheral-
Although not very popular except in specialized applications and in wide angle photography, strip photography and strip cameras can be considered part of the arsenal of special effect devices available to the photographer.

Strip cameras are basically classified as linear or photofinish, panoramic, and peripheral designs. These cameras are essentially derivatives of focal plane shutters in that images are exposed sequentially. In strip cameras, however, the moving focal plane shutter is replaced with a stationary slit of (sometimes) variable width past which the film is moved at a fixed or variable velocity. When an image of a subject moves past the slit at a velocity that matches that of the film a sharp record of the subject is impressed onto the film because relative to each other the film and the moving image are stationary.

Mismatch between the image velocity and film velocity will cause records of subjects to appear compressed if the film is traveling slower than the image or elongated and stretched out if the film is traveling past the slit more quickly than the image.

Probably the most widespread application of strip cameras is in the photography of the order of arrival at the finish line of participants in a racing event. Unusual distortions of arms, legs and torsos are typically inevitable because the film can only match one image velocity while the subjects are moving at a great number of velocities simultaneously. Two photographers who have explored the application of photofinish-type cameras for effective sports photography are George Silk and Neil Leifer, both associated with Time/Life.

Operating principles associated with strip camera technology are also the basis for the Cirkut panoramic camera design as well as that of the various modern versions of these cameras that were introduced on a rather large scale commercial basis by the Eastman Kodak Company in the early 1900's.

Panoramic strip cameras rotate about a point roughly under the lens' rear nodal point as they scan the surrounding scene. They must remain level otherwise the horizon line appears to curve sinusoidally. These cameras can easily cover a horizontal angle of view of up to 360 degrees. They reproduce still subjects quite well but moving subjects are distorted in shape.

Opposed to panoramic cameras, peripheral cameras consist of the same basic camera design but they hold the camera stationary while rotating the subject in front of the camera. The slit of the camera is aimed at the center of rotation of the subject. When the subject has made one 360 degree turn, the moving film, made to move at the approximate velocity of the moving image of the subject, will have accumulated information about the whole surface, or periphery, of the subject.

A cylindrical subject can be reproduced without distortion but a subject containing 3 dimensional surface features that do not fit within a cylindrical shape will unavoidably be distorted. Features that are farther from the axis of rotation than those for which the camera is adjusted will appear compressed and those that are closer to the center of rotation, and thus have a lower linear velocity, will appear expanded or stretched out.

A special version of the standard strip camera is one in which the film is made to move in circular, rather than linear, motion behind the slit to compensate for variations in image velocity along the slit of the camera. This design can produce a peripheral image that correctly reproduces the surface features of a conical subject or a panoramic record that is a conical projection of the scene which surrounded the camera during photography. In this latter case the panoramic camera is tilted while rotating about a vertical axis.

OPTICAL EFFECTS

The use of various optical accessory devices allows the making of multiple images by the use of mirrors or prismatic filters typically placed in front of the camera lens. Other optical and photographic techniques also allow for the combination of foreground and background subject matter.

Mirrors and Kaleidoscopes-
An widely practiced special effect is the use of mirrors for various creative purposes. A mirror can be introduced in a scene to portray one or more additional views of a subject. The use of flexible mirrors or mirrorized plastic or mylar sheets to distort the shape of subjects is a common use of mirrors in carnivals but they have also been used extensively by photographers to create unusual interpretations of their subjects.

The use of plane mirrors as special effect tools is probably best exemplified by their use in kaleidoscopes. In this case the camera photographs the multiple images of a subject as reflected in the kaleidoscope.

Kaleidoscopes and mirrors can be used in various locations in an optical system or during the making of a photograph. Usually they are used in front of a camera lens but they can also be used within an enlarger located between the film and the enlarging lens. It is also possible to use them on a copy stand or duplicating device and placed either between the lens and the subject or between the lens and the film. An SLR camera with built-in meter is a must for these applications.

Another possibility is to use a horizontal mirror in front of camera lens covering lower part of a scene to obtain a lake or mirage-type reflection.

Partially reflecting mirrors can be used to produce ghost-like images by the simultaneous exposure of a subject located in front of the camera with another subject located off-axis whose image is reflected into the camera lens by way of a semi-transparent mirror. Typically the scheme works best if the off-axis subject is placed against a black background so that unwanted detail surrounding the "apparition" is not visible in the scene.

Front Projection-
There are several techniques used to combine a foreground subject located in a studio setting with a background photographed on- location. The simpler approaches rely on the oblique projection of a transparency from the front onto an opaque screen placed behind the subject. Alternatively the image is projected from the rear onto a translucent screen. Foreground and background are balanced in lighting and photographed simultaneously. A more sophisticated technique commonly used in advertising, commercial and portrait photography to place inanimate, but also animated subjects, in a particular background is front projection. The technique depends on the use of a large and highly directional retroreflective projection screen. A semisilvered mirror permits the projection of the desired background onto the screen along the optical axis of the camera. The image on the screen appears extremely bright because of the highly reflective quality of the screen material.

The subject is placed in front of the screen and illuminated with tungsten or electronic flash in such a manner as to be consistent in direction, quality and quantity with the illumination present in the background scene. Typically the light falling on the subject is directed away from the surface of the screen although some spill is allowed. Although the projected image of the background falls on the subject as well as the screen, it does not show up on the subject because the directionality and reflectivity of the screen is many times greater than that of the subject. The final effect is that the subject appears placed in front of the background projected on the screen.

In Camera-Masking-
This special effect is also commonly used for commercial and advertising photography

when inanimate subjects need to be included in a scene available only as a large format transparency. While front projection could be used, in-camera masking is a less expensive alternative in many instances.

The technique consists of a sequential exposure process. The camera is usually equipped with some means to place a transparency of the desired locale in contact, or almost so, with the film on which the record will be made. This limits the technique to use with large format view cameras. The subject is placed against a black background and lit so that no light falls on the background and so that it is consistent with the lighting of the background scene. During this exposure the areas where the background will later appear have therefore not been exposed. After this first exposure, the background is changed to white and the film, with the background scene now placed in contact with the camera film is exposed again. Since the subject now appears in silhouette, black against a white background, during this second exposure only those parts of the contacted image will print onto the film through which light from the white background passes. Upon development the subject will appear "imprinted" onto the selected background.

Care must be taken to ensure that the film and subject remain absolutely stationary during the process and that light does not spill on the background during the subject exposure or on the subject during the background exposure.

Front projectiuon and in-camera masking have largely replaced the pasteup method of combining images from two or more photographs.

Zooming while shooting or during copying-
Although blur created by the use of a long exposure time when photographing a moving subject is typically avoided, it is in some cases a very effective special effect in itself. However, there is one special effect base on blur that photographers often do exploit for its creative potential. This effect is that of zooming or intentionally altering the focal length of a lens while the exposure is being made. Some modern cameras have incorporated this effect in a selection of options controlled by the camera itself. After the photographer preselects the zooming range and direction the camera automatically zooms the lens during the time that the shutter is open.

APPLICATION OF SPECIALIZED EMULSIONS SOURCES OF RADIATION

Unusual renditions of otherwise dull or mundane subjects is sometimes possible through the use of emulsions not intended for standard photography or by photographing using radiation other than light to illuminate the scene.

Ultraviolet Fluorescence photography-
The use of Ultraviolet radiation for special purpose photography is mostly restricted to fluorescence effects where a subject naturally fluoresces or is painted or coated with a fluorescing material, illuminated with a long wave UV source and the glowing, fluorescent colors are then photographed, typically against a dark, nonfluorescing background, using color film. In this nonscientific application, usually no great care is

taken to exclude UV from the final record but it is nevertheless useful to point out that to obtain photographs uncontaminated by blue, a "barrier" or UV absorbing filter should be placed over the camera lens. Light sources used for this type of photography vary widely but electronic flashes filtered with a filter such as the Wratten 18A are typically good sources of UV. Modern flash units often have an incorporated UV absorbing filter and may not be as efficient as other (typically older), uncoated, tubes in terms of usefulness as sources of ultraviolet energy.

Infrared Photography-
The use of emulsions sensitive to Infrared wavelengths can be used to advantage for special effects purposes to emphasize certain aspects of subjects such as their Infrared reflectivity. Infrared sensitive emulsions are used in the field of special effects because of the sometimes unusual tonal reproduction of subjects as opposed to their appearance in normal black-and-white and color photographs. Since IR is not a visible part of the electromagnetic spectrum it cannot be spoken of as yet another "color", but it is true that the near IR wavelengths to which emulsions can be sensitized will often result in startling tonal reproduction of familiar subjects. The reason is simply that a subject's reflectivity of IR wavelengths does not necessarily equal the subject's reflectivity of visible light wavelengths.

Infrared tends to produce images of human skin that are very light in tone and also that have a slight "aura" or glow to them. The light tone is attributed to the high IR reflectance of human skin while the perceived "glow" is due to a combination halation and overexposure of the skin surface.

Although only available on a limited basis, there is a "false color", infrared sensitized reversal color emulsion, that is used for aerial photography and remote sensing applications. This film is sometimes used as a special effect film applied to more normal subjects in order to impart an unusual color reproduction to an otherwise normal subject. In this emulsion one of the layers is sensitive to infrared, while the other two are green and red sensitive respectively. The film typically should be used with a blue-absorbing filter because all three layers are also blue sensitive.

TONE MODIFICATION EFFECTS

There are a number of special effects that fall in the category of unconventional tone reproduction, some of which involve after treatment of conventional photogrpahic images.

Bas relief-
This is a technique whereby a positive image is made of the original negative by contact printing. The negative and positive are then superimposed. The sandwiched pair is then set slightly out of register and printed. The exact pictorial effect varies depending on the density of the positive record and the density to which the larger areas of the image are printed. Usually, the broader areas appear devoid of large density variations but they retain their identity. The edges of these areas, because they gain or lose relative density as

a result of the superimposition process, impart a "shadowing" effect in the direction that the two records were displaced. While this is the most common way to do bas-relief, variations have been produced where the two records are of slightly different sizes giving yet another variation on the same general theme.

Line derivation-
This is a technique closely allied to isodensity and it is also created by the combination of a high contrast negative with a high contrast positive which are superimposed so that no light is able to pass through the combination. In this case, however, the two superimposed records are then slightly separated. The combination may be placed on a turntable and while a light is shining from the side, the sandwich is turned in such a manner that light is able to pass past the edges of the combined pair and expose the film or paper underneath. This results in a line pattern defining the edge or join line between the positive and negative records. Fine detail tends to be lost however.

Solarization-
Considered synonimous with the Sabbatier effect. In the strictest sense solarization is an exposure effect associated with gross overexposure that causes image reversal. This effect would primarily apparent in the highlights of the subject appearing in negative form on a black and white print, such as the image of the sun being reproduced black rather than white.

Sabattier effect-
The Sabattier effect is an effect that is a result of further overall exposure or fogging of the film or paper, beyond the exposure due to the first or image forming exposure. The Sabbatier effect is induced by exposing the sensitized material to light after the development step has progressed beyond the initial stages. The effect is that there appears to be a reversed or negative image in combination with the normal, positive, image that would be formed during the normal printing process.

Posterization-
This is a special effect that is the result of the sequential printing of a number of high contrast copies of an original but where each copy is of different overall density. These copies are typically printed in registration and the final density of the reproduction at any given area on the print is a result of the contributions of the partial exposure that resulted from exposure to each of the several partial "masks" that were created from the original. Posterization as well as many other special effects processes can be done in B&W as well as color. In B&W the subject tones are broken down into a series of stepped densities while when this process is carried out in color, original subject tones can be made to achieve almost any desired color.

Isodensity-
Although a rather seldom seen special effect, this method relies on counteracting negative and positive emulsions coated on a single support. A film of this type is manufactured by AGFA. The effect is that areas of the subject that produce more or less exposure at the emulsion than a critical level (adjustable by the choice of overall exposure) are

reproduced as dense areas. The critical exposure level is reproduced as clear film base. The clear lines that result are then interpreted as lines of equal photographic effect or isodensity.

A similar effect can be achieved by high contrast positive and negative images keyed about a particular density of an original. Combining these will reveal a low density region that follows areas of the originals that had the same density.

The process is basically a variation of the bas-relief and the line derivation techique described above. The only difference between the processes is that in this technique the high contrast negative and positive are created simultaneously and are in perfect registration.

LIGHTING EFFECTS

The creative use of filters and lighting devices introduces yet another special effect area for the creative photographer. Electronic flashes have been a long standing tool in the special effects arsenal used by photographers not only to create frozen images of fast moving events but also to convey the opposite, an idea of the sense of the motion of the subject. Their application for this purpose is described under the heading of stroboscopy.

Color balancing-
A not too obvious special effect involves balancing light sources of different color characteristics included in the same scene so that they will appear to be matched in color quality to the film.

One of the most common applications of this process involves the balancing of fluorescent illumination in a scene with daylight type illumination provided by an electronic flash. The flash is covered by a greenish filter to convert its color quality to that of the fluorescent tubes and then a magenta or reddish filter is placed over the camera lens to simultaneously bring both of them back to daylight quality to match the film with which the photograph is made. The filter on the flash and the filter on the camera need to be complementary in color and strength to each other.

If fluorescent tubes need to be included in an indoor scene that also includes daylight another technique that can be used is that of split exposure if the subject is a static one. The photograph of the outdoor portions of the scene is first made while all fluorescent lights are turned off. The camera is held immobile until nighttime when the next exposure is made by only fluorescent or by a combination of fluorescent modified flash and color correcting filter placed on the camera lens.

Multi-color exposure-
Interesting effects can be produced by using filters of complementary color to dramatically alter the color of a background while keeping the color balance of a foreground subject quite normal if the subject can be lit by one light source while the background is lit by a second source. For example, placing a color filter on a flash that

illuminates the subject that is complementary in color to the one placed over the camera lens and which will be used to tint the background a particular color will counteract the effect of the filter tinting the background resulting in basically neutral rendition of the flash illuminated subject.

Normally one would not intentionally introduce unnatural color casts in a photograph. On the other hand the use of filtered light sources illuminating the subject from different locations is another area of creative application of lighting as a special effects tool.

Tailflash photography-
Typically the "X" synchronization system built into most cameras and shutters causes electronic flashes to be triggered immediately upon a given shutter achieving maximum opening. The pictorial effect of this convention is that when combining existing illumination with electronic flash illumination while photographic a moving subject this results in the subject appearing to be moving backwards. This is because the "blur" exposure due to existing illumination happens after the electronic flash produces its action stopping flash exposure and thus the blur is impressed on the film after the sharp record.

To place the flash exposure at the end of the tungsten exposure some modern cameras have a provision built in that allows the photographer to chose between triggering the flash at the beginning or at the end of an exposure. With 35mm cameras this is often referred to as second curtain synchronization. In cameras or shutters that do not have this provision built in, accessory devices are available to provide a similar function. Since diaphragm shutters do not have curtains, the process of setting off an electronic flash at the end of an exposure may better be defined as trailing flash synchronization or simply tailflash synchronization.

Stroboscopy-
The use of repetitive flashes to generate images that convey a sense of motion of the subject is achieved in several ways. The most common technique places a subject against a very dark, nonreflecting background while it is illuminated by the flashing stroboscope. As the subject begins to perform the desired motion the shutter is opened. At the completion of the motion the shutter is closed. During the interval that the shutter was opened several images of the subject are recorded. Their number is a function of the frequency of the flash and the exposure time. Areas of the subject that move to new positions on the film are easily seen in their respective locations. Those parts of the subject that remain relatively stationary suffer from overexposure and generally blend into a detailless mass. Generally this means that a particular action can only be followed over a very limited time period because of multiple exposures on the film tending to mask previously recorded images.

Although the above effect is possibly desirable, photographers overcome the limitation imposed by subjects performing an action in a stationary location, by either introducing artificial translational movement in the subject or the camera, by panning the camera or introducing motion in the film stock. This latter movement is generally accomplished by

rewinding the film into its supply cassette after preparing the camera by first advancing the film into the camera's take-up chamber without exposing it. The shutter of the camera is held open while the film is rewound. With each flash of the stroboscope not only is the subject in a slightly different position but the image is recorded slightly off to one side of the one recorded with the previous flash. This technique allows the recording of a subject over an extended period of time.

See also: Electronic still photography, motion picture, video.

Addendum:

In a manner of speaking focal plane shutters are sequential exposure devices since the film is uncovered and covered in a sequential manner by the roller blind or curtains racing from one side of the aperture gate to the other. The exposure time is simple the time that elapses from the uncovering of a point on the film to the covering of the same point by the trailing curtain. The effect of the moving curtain's edge on the final appearance of the record is a function of the rate of movement of the image with respect to the rate of motion of the curtain edge during the interval that the curtain travels over the image of the subject. If the image is stationary with respect to the film then it does not matter that a focal plane shutter was used top make the exposure. If the image moves, however, then distortion will become apparent. This distortion can be called a special effect and it can be best exploited by slowing down the FP shutter mechanism or attaching an auxiliary FP shutter to a standard camera.