Glossary for Video & Perceptual Quality of Stereoscopic Video

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Glossary

Aberration – An imperfect image formed by an optical system.

Absolute Category Rating (ACR) – A rating scale for subjective testing in which test sequences are presented one at a time. The rating scale is categorical in that is uses terms “Bad”, “Poor”, “Fair”, “Good”, and “Excellent” for rating overall quality. The categories are associated with numeric scores such as 1 through 5; 1 through 9; and 0 through 10. (see ITU-T Rec. P.910).

Accommodation – The physiological process that alters the shape of the lens of the eye and thereby the optical power of the eye so as to form a clear image of an object at both near and far distances.

Accommodation-Convergence Reflex – The physiological link that causes the eyes to change focus as they change convergence

Accommodation-Convergence Rivalry – A discrepancy between accommodation and convergence depth cues in which one of the depth cue impacts perception to a greater extent than the other.

ACR – see Absolute Category Rating.

Aerial Perspective – see Atmospheric Perspective.

Aliasing – A representation artifact caused by undersampling. Spatial aliasing can appear as Moire’ pattern, for example, because the image resolution is insufficient to represent high spatial frequencies that exist in the underlying data.

Amblyopia – The loss of one eye's ability to see details. Also called “lazy eye”, it is the most common cause of vision problems in children. The preferred eye has normal vision, but because the brain ignores the other eye, a person's vision ability, including binocular depth perception, does not develop normally. Strabismus is the most common cause of amblyopia, and there is often a family history of this condition.

Apparent Depth – The distance of an object image from the viewer. The apparent depth is a function of the viewer’s distance from the display.

Artifact (Artefact) – A visual or perceptual defect introduced during capture, post-processing, compression, transmission, rendering, or display.

Aspect Distortion – An image that has a different aspect ratio than the original content as a result of resizing the horizontal or vertical components unequally.

Asymmetric Coding – A method of compression in which either the left- or right-eye image has a lower resolution or is compressed to a greater degree than the other eye.

Asthenopia – Eye strain (“weak eyes”) that may lead to fatigue, pain in or around the eyes, blurred vision, headache and occasional double vision.

Atmospheric Perspective – A depth cue in which distant objects progressively lose contrast and saturation with distance, typically as a result of atmospheric light scatter.

Barrel Distortion – An optical aberration caused by decreased magnification at increasing distance from the optical axis. Also known as a Fisheye Effect.

Binocular Aliasing – see Depth Aliasing.

Binocular Artifact – A visible defect that is perceptible when using both eyes but imperceptible when using a single eye.

Binocular Depth Cue – A depth cue that involves both eyes. Binocular parallax and convergence are binocular depth cues.

Binocular Parallax – The phenomenon in which the position of an object appears to change when viewed by the left eye alone and then the right eye alone, or vice versa, when the head is stationary.

Blockiness – Regularly spaced vertical and horizontal visual discontinuities, typically observed in content that was highly compressed using block DCT-based codecs such as MPEG2 and MPEG4/AVC.

Blur – Loss of visual detail and sharpness of edges, typically the result of optical blur, reduced resolution, noise filtering, or deblocking filters used in MPEG4/AVC.

Brain Shear – As defined by James Cameron: "The brain's inability to reconcile the images received by the left and right eyes into a coherent stereo image, which causes it to send corrective messages to the eye muscles, which try to compensate but can't fix the problems baked into the image on the screen, creating an uncomfortable feedback loop and physical fatigue of eye muscles, which causes the eye muscles to scream at the brain, at which point the brain decides to fuse the image the hard way, internally, which may take several seconds or not be possible at all –- all of which leads to headache and sometimes nausea."

Breaking the Frame – see Edge Violation.

Burn-In – Appearance of after images sometimes seen in plasma display tubes. An after image can contribute to depth cue conflicts.

Capture Artifact – Any artifact that can be attributed to image formation.

Cardboard Effect – The condition in which objects appear as if cut out of cardboard and lack individual solidity. Usually the result of inadequate depth resolution arising from, for example, a mismatch between the focal length of the taking lens, the stereo base and/or the focal length of the viewing system.

Chroma Mismatch – A situation in which the chromatic composition of an object(s) in the left-eye image is not the same as that of the right-eye image. See also Color Mismatch.

Chromatic Flicker – The regular or irregular temporal variation in color, hue, or saturation of objects or scenes.

Chrominance Mismatch – A situation in which the color, hue, or saturation of an object or scenes in the left-eye view is different than in the right-eye view.

Chrominance Ringing – A compression artifact in which the borders and edges of distinct color regions becomes less distinct or fuzzy, typically with having color oscillations.

Coding Artifact – Any artifact that can be attributed to video or image compression and decompression.

Cognitive Dissonance – An uncomfortable mental state brought on by contradictory perceptions or ideas. According to the theory of cognitive dissonance, people will be motivated to act in a way that reduces or eliminates the sources of contradictory perceptions.

Color Aliasing – A situation in which false color appears in bands or gradients. Typically the result of undersampling (see Aliasing) in the image formation, compression, or display stages.

Color Bleeding – A visual phenomenon in which an objects color extends beyond the objects boundaries, as defined by luminance. Color bleeding may result from aggressive compression of chroma or from chroma subsampling.

Color Flicker – see Chromatic Flicker.

Color Mismatch – A situation in which the color of an object(s) in the left-eye image is not the same as that of the right-eye image. See also Chroma Mismatch.

Compressed Depth Artifact – Any visible artifact that results from the digital compression of a depth map.

Cone of 3D – The physical space extending from the viewer to the display screen in which the stereoscopic illusion can be created.

Contouring – The appearance of discrete luminance or chrominance steps on what should be a smooth gradient. Usually the result of insufficient dynamic range. See posterization.

Convergence – The ability of both eyes to turn inwards together. This enables both eyes to be looking at the exact same point in space. This skill is essential to being able to pay adequate attention at near to be able to read. Not only is convergence essential to maintaining attention and single vision, it is vital to be able to maintain convergence comfortably for long periods of time. For good binocular skills it is also to be able to look further away. This is called divergence. Sustained ability to make rapid convergence and divergence movements are vital skills for learning. The term has also been used, confusingly, to describe the movement of left and right image fields or the rotation (toe-in) of camera heads.

Cross Distortion – Visual distortions that are caused by Asymmetric Coding.

Crosstalk – Incomplete isolation of the left and right image channels so that one leaks (leakage) or bleeds into the other. Looks like a double exposure. Crosstalk is a physical entity and can be objectively measured, whereas ghosting is a subjective term. See ghosting.

DCR – acronym for Degradation Category Rating.

Decoding Artifact – Visible defects, distortions, and errors that are attributable to the decoding processes. Such errors might be the result of non-compliant streams or buffer management issues.

Degradation Category Rating (DCR) – A five-level rating scale for subjective testing in which test sequences are presented in pairs. The rating scale is categorical in that it uses terms “Very Annoying”, “Annoying”, “Slightly Annoying”, “Perceptible”, and “Imperceptible” for rating the impairment of a degraded stimulus relative to a reference stimulus. (See ITU-T Rec. P.910).

Depth Aliasing – A phenomenon in which periodic detail in the left- and right-eye view results in ambiguous disparity resulting in the possibility of shifting and false depth perception.

Depth Bleeding – A distortion of depth cues in which the depth of an object influences objects and textures surrounding it, typically as the result of compression artifacts in a depth map, disparity map, difference signal, or left- and right-eye images.

Depth Budget – The maximum amount of depth consistent with comfortable stereoscopic fusion. The depth budget depends on the size of the display and location of the viewer.

Depth Change Stress – A physiological and perceptual condition that results from frequent, abrupt, or extreme depth cue changes such as might occur at scene changes or ad insertion points.

Depth Conflict – A visual artifact in which depth cues are incongruent, which can give rise to the percept that an object resides both in front of and behind another object simultaneously. This artifact may be seen more frequently in poorly coded graphic overlays.

Depth Contouring – see Cardboard Effect.

Depth Cue – Any of a number of visual characteristics that create a sense of depth in natural environments and in stereoscopic representations. Depth cues can be monocular, such as occlusion, or binocular, such as convergence. Depth cues include: occlusion, motion parallax, binocular parallax, linear perspective, atmospheric perspective, relative size, shadowing, accommodation, and binocular disparity.

Depth Cue Rivalry – A situation in which two or more depth cues are in conflict by suggesting different apparent depths for the same object or region of an image. Depth cue rivalry may sometimes be observed in connection with graphic overlays.

Depth Discontinuity – An abrupt and crisply delineated change in apparent depth that creates a sense of distinct objects.

Depth Distortion – Any artifact that creates a sense of false depth.

Depth Map – A set of values that provide data related to the depth of each pixel or region in a stereoscopic image. Depth Map is often confused with Disparity Map or Difference Map, both of which provide other kinds of data.

Depth Quantization Noise – A depth distortion that results from coarse quantization during compression of a depth map.

Depth Ringing – A condition in which edges or borders of object have ambiguous apparent depth, or in which the apparent depth in the region around an edge or border appears to oscillate spatially.

Depth Script – A scene-by-scene stereographic plan used in the creation of content.

Depth Shimmer – A regular or irregular fluctuation in the apparent depth of an object, edge, region, or scene, typically as a result of digital compression.

Difference Map – A set of values that provide data on the pixel-by-pixel difference between a left-eye image and a right-eye image. Difference Map is often confused with Disparity Map or Depth Map, both of which provide other kinds of data.

Diopter – Unit of measurement of the optical power of a lens or curved mirror. Equal to the reciprocal of the focal length.

Diorama Effect – see cardboard effect.

Diplopia – 'Double vision'. In stereo viewing, a condition where the left and right homologues in a stereogram remain separate instead of being fused into a single image.

Dirty Window Artifact – A motion compression artifact in which regions of an image remain relatively stationary and do not move smoothly and naturally with other parts of the image. Particularly noticeable during camera pans.

Discrepancy – A noticeable mismatch between the left- and right-eye images.

Disparity Map – A set of values that provide data related to the pixel-by-pixel disparity between homologous features in a left-eye and right-eye image. Disparity Map is often confused with Depth Map or Difference Map, both of which provide other kinds of data.

Disocclusion – The process of revealing previously hidden areas.

Disparate Images – A pair of images that fail as a stereogram (e.g., due to distortion, poor trimming, masking, mismatched camera lenses or the like).

Disparity – The distance between conjugate points on overlaid retinas, sometimes called retinal disparity. The corresponding term for the display screen is parallax.

Display Artifact – A visible defect that results from the physics or signal processing of the display apparatus.

Distortion – In general usage, any change in the shape of an image that causes it to differ in appearance from the ideal or perfect form. In stereo, usually applied to an exaggeration or reduction of the front-to-back dimension.

Divergence – The converse of convergence. The situation in which the optical axis of the left and right eyes move outward away from parallel. Divergence is most likely to be associated with objects placed at extreme distance in the Z axis.

Double Stimulus Continuous Quality Scale (DSCQS) – A subjective testing method to measure the quality of a system relative to a reference. (See ITU-R BT.500-12).

Double Stimulus Impairment Scale (DSIS) – A subjective testing method to measure the robustness and failure characteristics of a system. (See ITU-R BT.500-12).

DSCQS – acronym for Double Stimulus Continuous Quality Scale.

DSIS – acronym for Double Stimulus Impairment Scale.

Duration of Comfort – The amount of time that a viewer is free of discomfort.

Dwarfism – See Lilliputism.

Edge Distortion – Any visible artifact that creates an unnatural appearing edge or boundary typically caused by optical mismatch or compression artifacts.

Edge Violation – A visual artifact that can arise when part of an object near the edge of the display is represented in the left-eye image but is not represented in the right-eye image or vice versa.

Extrastereoscopic Cues – Those depth cues that are appreciated by a person using only one eye, also called Monocular Cues. They include occlusion, interposition, geometric perspective, motion parallax, aerial perspective, relative size, shading, and textural gradient.

Eye Poke – An object that appears to move rapidly towards the viewer and designed to evoke a reaction from the viewer. See also Flinch Factor.

False Contouring – see Contouring.

False Depth – A visual artifact in which an object or part of an object appears to be at a depth that is in unnatural given the context of the scene. This artifact may be more common in 2D-to-3D conversions.

False Edges – see Contouring.

Field Inversion – A situation in which the top and bottom fields of interlaced content are reversed.

Field Replication – A situation in which either the top or bottom field of interlaced content are repeated, sometime as a result of low quality upsampling.

Fisheye Effect – see Barrel Distortion.

Fixation Point Conflict – A situation in which a scene or image has numerous objects, graphics, and focal points that cause a viewers gaze to flit and wander excessively.

Flicker – Any regular or irregular temporal variation in luminance of an object or scene.

Flinch Factor – The extent to which an object within a scene is likely to elicit a physical reaction from a viewer. See also Eye Poke.

Floating Window – A set of cropping masks applied asymmetrically to the left- and right-eye images to avoid window violations and give the appearance of a virtual window at a depth other than the screen depth.

Focal-Length Mismatch – characterized by a radial interference pattern when L-R images are viewed overlaid. This can be a vexing source of brain shear.

Focus-Fixation Mismatch – A situation in which a viewer's visual attention is drawn to an object or feature that is out of focus, typically as the result of the use of a narrow depth of field in a stereoscopic image.

Focus Mismatch – An optical or signal processing artifact in which the focus of the left- and right-eye images are not the same.

Frustum Effect – Front-to-back keystone distortion in the space-image so that a cube parallel to the lens-base is portrayed as the frustum of a regular four-sided truncated pyramid with the smaller face towards the observer. In reverse frustum distortion, the larger face is forward.

Fusion – The merging (by the action of the brain) of the two separate views of a stereo pair into a single three-dimensional (or Cyclopean) image.

Fusion, Irregular – Fusion of points that are not homologous, as with accidental and false stereo effects and multiple diplopia.

Geometric Distortion – Any visible artifact in which apparent magnification varies spatially within an image. Common geometric distortions include barrel and pincushion distortion.

Ghosting – A condition of incomplete stereoscopic fusion that results in the perception of a double image. See also Crosstalk, which is an objective physical phenomenon as opposed to ghosting which is a subjective phenomenon.

Giantism – Jargon term for the impression of enlarged size of objects in a stereo image due to the use of a stereo base separation less than normal for the focal length of the taking lens(es). See also hypostereo.

Gibb's Phenomenon – An oscillatory overshoot near sharp edges and boundaries that results from a loss of high spatial frequency component as is common in digital compression. Gibb's phenomenon is a mathematical explanation of ringing artifacts.

Graininess – A visible artifact in which a most or all of an image contains numerous small variations in luminance or chrominance.

Height Error – Vertical error. A fault present in a stereogram when the two film chips or prints are not aligned vertically in mounting, so that homologous points are at different heights.

Horizontal Image Translation – The horizontal shifting of the two image fields to change the value of the parallax of corresponding points. The term convergence has been confusingly used to denote this concept.

Horopter – The surface in space that contains all points whose images stimulate corresponding retinal points; i.e., that all have zero disparity. (Lambooij, et al., 2009).

HVS – acronym for Human Visual System.

Hyperstereoscopic – Use of a longer than normal stereo base in order to achieve the effect of enhanced stereo depth and reduced scale of a scene; it produces an effect known as Lilliputism because of the miniaturization of the subject matter which appears as a result. Often used in order to reveal depth discrimination in architectural and geological features. The converse of hypostereo.

Hypostereoscopic – Using a baseline that is less than the distance between the left and right eyes when taking the pictures. This exaggerates the size of the objects, making them look larger than life. It produces an effect known as Giantism. The converse of hyperstereo. A good use for this would be 3D photographs of small objects; one could make a train set look life size.

IDR Pulse – A visible periodic temporal discontinuity that is most noticeable in slow moving images or regions. IDR stands for Instantaneous Decoder Refresh, and an IDR frame is a special kind of I-frame in that serves as a complete restart in H.264/MPEG4/AVC compression. IDR pulses are similar to I-frame Breathing but typically occur less frequently and are sometime more noticeable.

I-Frame Breathing – A visible periodic temporal discontinuity that is most noticeable in slow moving images or regions. A result of the different compression coding methods used for I-frames compared to P- and B- pictures.

Image Flipping – The sharp transition of image appearance caused when a viewer moves through the visibility zones of some kinds of autostereoscopic displays.

Interlace Distortion – Appearance of jagged edges in progressive images and displays. Caused by low quality de-interlacing during format conversion or display.

Inversion – The visual effect achieved when the planes of depth in a stereograph are seen in reverse order; e.g., when the left-hand image is seen by the right eye, and vice-versa. Often referred to as pseudostereo.

JND – acronym for Just Noticeable Difference.

Just Noticeable Difference – The smallest difference between any two stimuli, such as reference and test stimuli that can be detected.

Keystone Distortion – Term used to describe the result arising when the film plane in a camera or projector is not parallel to the view or screen. The perspective distortion that follows from this produces an outline of, or border to, the picture which is trapezoidal in shape, resembling the keystone of a masonry arch. In stereo, the term is applied to the taking or projecting of two images where the cameras or projectors are ‘toed-in’ so that the principal objects coincide when viewed. The proportions of the scene will then have slight differences that produce some mismatching of the outlines or borders of the two images. Gross departures from orthostereoscopic practice (e.g., if using telephoto lenses) can produce keystoning in depth; more properly called a frustum effect.

Lattice Artifact – The appearance of a floating grid in some kinds of autosterescopic displays having non-orthogonal pixel grids that result in false disparity with respect to the left and right eyes of a viewer.

Lilliputism – Jargon term for the miniature model appearance resulting from using a wider-than-normal stereo base in hyperstereography.

Linear Perspective – An image formation phenomenon and perceptual depth cue in which, for example, lines that are parallel in 3-dimensional physical space appear to converge.

Loss of Detail – Absence or significant reduction in fine visual textures, typically as a result of compression or noise filtering.

Luminance Flicker – Regular or irregular fluctuations in brightness.

Luma Mismatch – A situation in which the luma of an object(s) in the left-eye image is not the same as that of the right-eye image.

Mean Opinion Score – The average of scores from participants in a subjective test.

Mean Square Error (MSE) – The average value of the square of the pixel-by-pixel difference between an reference image and a another image. Typically only luma values (or equivalent grayscale values) are used to calculate the mean squared error.

Metamer – Stimuli that are perceptually identical in color even though they have different spectral composition.

Misalignment – In stereo usage, a condition where one homologue or view is higher or lower than the other. Where the misalignment is rotational in both views, there is tilt; in one view only, twist. Viewing a misaligned stereogram can result in diplopia or produce eyestrain.

Mixed Resolution Coding – A method of compression in which either the left- or right-eye image has a lower resolution than the image for the other eye.

Moiré Effect – low frequency interference patterns that result from the overlap of periodic grating, grids, or annuli. The pixel grid of a display may form interfering periodic structures. A form of aliasing.

Monocular Artifact - A visible defect that can be detected solely using either the left or right eye.

Monocular Blur – Image softness or lack or resolution that is limited to either the left- or right-eye view such as may occur as the result of asymmetric or multi-resolution coding.

Monocular Depth Cue – See Extrastereoscopic Cues.

MOS – acronym for Mean Opinion Score.

Mosaic Artifact – A compression artifact in which adjacent blocks in an image have mismatching color, brightness, or texture.

Mosquito Noise – Visual business or ringing near sharp edges or borders, typically a result of the compression processes.

Motion Artifact – A visible defect invoked by motion. Blur, smearing, streaking, stutter, and object jumping are examples.

Motion Blur – loss of sharpness of moving details as a result of camera exposure or noise filtering during post-processing or compression. May also be caused by slow display response dynamics.

Motion Parallax – The visual phenomenon and perceptual depth cue in which the relative position of foreground and background objects change as a function of distance from the viewer when the viewer's head moves.

Motoroic Fusion – The neuromuscular process of vergence movements by which the optical axis of left and right eye are dynamically aligned to bring corresponding retinal images into the zone of clear single binocular vision.

Moustache Distortion – optical aberration caused by a combination of barrel and pincushion distortion.

MSE – acronym for Mean Squared Error.

Multiple Points of Reference – see Fixation Point Conflict.

Near Point Stress – The closest distance from the eyes that reading material can be read. This distance varies with age. It is often measured in each eye separately and both eyes together. The results are compared to one and other.

Negative Parallax – A situation in which a feature in the left-eye image is to the right of the corresponding feature in the right-eye image, which causes the eyes to converge to a point in front of the display, which causes the feature to appear to be in theater space.

Network Error – Visible artifact that can be attributed to an error or errors in the transmission processes, such as delayed or dropped packets.

Noise – visible defects.

Object Edge Plane Distortion – A visual artifact in which the edge of an object appears to be at a different depth than the rest of the object. This artifact may be found more frequently in 2D-to-3D conversions.

Objective Test – A method of evaluating video or perceptual quality using a mathematical method or model or algorithm such as those found in test and measurement equipment. Objective test are typically intended to predict the results of subjective tests that employ human observers.

Occlusion – The image formation phenomenon and depth cue in which nearer objects block all or part of more distant objects.

Ocular Near Triad – Accommodation, Convergence, and Pupillary Dynamics.

Optical Aberration – Any distortion resulting from imperfect image formation by a lens system.

Optical Distortion – Any geometric distortion resulting from image formation by a lens system.

Orthostereoscopic – An image capture system that mimics the binocular geometry of human vision, including interocular distance.

Panum's Fusional Area – The small area around the horopter where sensoric fusion takes place. (Lambooij, et al., 2009).

Parallax – The change in the apparent location of an object or features as viewing position changes. See also Binocular Parallax and Motion Parallax.

Perceptually Lossless – Any compression process that results in an image or video that is not discernibly different to a viewer from the corresponding uncompressed image or video.

Percival's Zone of Comfort – An optometric rule of thumb for the viewing of stereo stimuli; it is the approximate range of vergence and accommodation responses for which the viewer can fuse images without discomfort. (Banks, et al., 2008).

Persistence – The time required for a display pixel to turn off. Long persistence can lead to crosstalk.

Perspective – see Linear Perspective or Atmospheric Perspective

Perspective-Stereopsis Rivalry – Any inconsistency between binocular depth cues and perspective that can lead to ambiguous interpretation of depth.

Picket Fence Effect – Vertical banding of alternative bright and dark bands caused by head position relative to some kinds of autostereoscopic displays.

Pictorial Cues – Monocular depth cues such as relative size, linear perspective, and aerial perspective that are used to denote depth in non-stereoscopic images.

Pillow Effect – see pincushion effect.

Pincushion Distortion – optical aberration caused by increasing magnification at increasing distance from the optical axis. Also known as a pillow effect.

Pixelation – A visible artifact in which individual pixels or blocks of pixels are evident, typically as the result of upsampling or compression.

pMOS – acronym for Predicted Mean Opinion Score.

Positive Parallax – A situation in which a feature in the left-eye image is to the left of the corresponding feature in the right-eye image, which causes the eyes to converge to a point behind the display, which causes the feature to appear to be in screen space.

Posterization – The appearance of discrete luminance or chrominance steps on what should be a smooth gradient. Usually the result of insufficient dynamic range. See contouring.

Predicted Mean Opinion Score (pMOS) – An objective score generated by a computer algorithm to predict the true Mean Opinion Score (MOS) that would be obtained by subjective testing.

Production Artifact – A visible defect introduced in the capture or post-production process.

Pseudoscopic – The presentation of three-dimensional images in inverse order, so that the farthest object is seen as closest and vice-versa: more correctly referred to as inversion. Achieved (either accidentally or deliberately, for effect) when the left and right images are transposed for viewing.

Pseudostereo – The effect produced when the left view image and the right view image are reversed. This condition causes a conflict between depth and perspective image.

PSNR – acronym for Peak Signal to Noise Ratio.

Psychophysics – The scientific discipline that investigates and measures the relationship between physical stimuli and perception or sensation.

Pupillary Dynamics – The neuromuscular process by which the pupils tend to constrict for when viewing near objects and to dilate when viewing distant objects as a means of controlling depth of field and aberrations.

Puppet Theater Effect – A phenomenon in which objects appear smaller than their familiar size, caused by conflict between the binocular cues, perspective cues, and prior knowledge of the sizes of familiar objects.

Quantization Artifact – A visible artifact in which natural texture, gradient smoothness, or edge smoothness is lost, typically as a result of compression.

Quantization Noise – Distortions introduced as a consequence of compression. The difference between a source image and its compressed image.

Rainbow Artifact – The apparent separation of neutral colors into discernable red, green, and blue components, an anomaly that may be seen with some DLP display systems particularly for objects in motion. The artifact is associated with DLP systems that use that use a color wheel and single-chip.

Reduced Spatial Resolution – A condition in which original content is downsampled or resized, which results in a loss of higher spatial frequency information.

Reference Point Conflict – see Fixation Point Conflict

Rendering Artifact – Any artifact which results from the process of preparing data for display. Some examples include deinterlacing, color conversion, and aspect ratio conversion.

Retinal Rivalry – The simultaneous transmission of incompatible images to each eye.

Reverse 3D – see Pseudostereo.

Ringing – Visible regular or irregular oscillations of luminance or chrominance near edges and borders, typically a result of compression or over-enhancement, such as in telecine or in image processing within a digital camera.

RMSE – acronym for Root Mean Squared Error.

Root Mean Squared Error – A common measure of image fidelity. The square root of the average value of the square of the pixel-by-pixel difference between source and processed images.

Rotation – Tilting of the images through not holding the camera horizontally, causing one lens to be higher than the other at the picture-taking stage. If the tilting is not too severe, it may be possible to straighten both images when mounting but there will be a height error, however small, in part of the image. A difference in the alignment of the two images in a stereogram caused by faulty mounting.

Screen Door Artifact – A grid of fixed pattern noise resulting from the space between pixels.

Screen Space – The area that appears to lie behind the plane of the display screen. See also Theater Space.

SDSCE – acronym for Simultaneous Double Stimulus Continuous.

Sensoric Fusion – The neural process of merging two retinal images into a single stereoscopic image. Sensoric fusion is limited to a retinal disparity of 0.1° at the fovea, 0.33° at an eccentricity of 6°, and 0.66° at an eccentricity of 12°. (Lambooij, et al., 2009).

Shear Distortion – The phenomenon by which the relative positions of objects in a stereoscopic image appear to change with the change in the viewer's position.

Simulator Sickness – A feeling of unease caused by a conflict between the visual perception system and the vestibular system that confuses a viewer's perception of motion.

Simultaneous Double Stimulus Continuous Evaluation (SDSCE) – A subjective method for measuring the fidelity between two impaired video sequences. (See ITU-R BT.500-12).

Single Stimulus Continuous Quality Evaluation (SSCQE) – A subjective method for measuring video quality without respect to a reference and in a manner intended to be close to home viewing conditions. (See ITU-R BT.500-12).

Size Distortion – see puppet theater effect, gigantism, and lilliputism.

Smearing – A visible artifact in which objects or textures become elongated and lose detail along the direction of motion, typically a result of compression, filtering, or slow display response dynamics.

SNR – acronym for Signal-to-Noise Ratio.

Squeeze – Diminution of depth in a stereogram in relation to the other two dimensions, usually resulting from a viewing distance closer than the optimum (especially in projection). The opposite effect to stretch.

SSCQE – acronym for Single Stimulus Continuous Quality Evaluation.

Staircase Artifact – A visible distortion in which edges, lines, and borders that would be expected to vary smoothly appear to be instead composed of short connecting horizontal and vertical segments.

Stereo Acute – The ability to perceive stereoscopic depth cues. Inability to perceive stereoscopic depth cues is known as Stereoblindness.

Stereoblindness – The inability to perceive stereoscopic depth cues. Common causes of stereoblindness include strabismus and amblyopia. Normal stereoscopic vision is also known as Stereo Acute.

Stereoscopic Latency – The amount of time between the presentation of a stereoscopic stimulus and the perception of depth by a typical viewer.

Sticky Motion – see Dirty Window Artifact.

Strabismus – A disorder in which the eyes do not line up in the same direction when focusing. As a result, the two eyes fail to focus on the same image thereby compromising or completely eliminating binocular depth perception. Strabismus is a leading cause of amblyopia, also known as “lazy eye,” which is the loss on one eye’s ability to see detail.

Stutter – Irregular pauses or repeated pictures that result in non-smooth motion.

Subjective Test – A method of evaluating video or perceptual quality under controlled conditions with human viewers.

Suprathreshold Distortion – Any artifact that is visible beyond the Just Noticeable Difference (JND) level.

Sweet Spot – The viewing distance and position that produces the optimal stereoscopic experience free from excessive convergence, cross talk, ghosting, psuedostereo, or other artifacts.

Synchronization Error – A situation in which the left- and right-eye images or frames are not presented simultaneously.

Tautomorphic Image – A stereoscopic image which presents the original scene to the viewer exactly as it would have been perceived in life; i.e., with the same apparent scale, positions of scenic elements, and a stereo magnification of x1 for all subject matter in the view.

Temporal Mismatch – see Synchronization Error.

Theater Space – The area that appears to lie in front of the plane of the display screen. See also Screen Space.

Transcoding – The process of converting one 3D video format into another. Example field sequential 3D video into column interleaved image data.

Transmission Artifact – Any artifact that can be attributed to an error or errors in the transmission processes, such as delayed or dropped packets.

Twist – Rotational displacement of one view in a stereo pair in relation to the other.

Unfusable Images – Any image pair or object within an image pair in which the disparity exceeds a viewer's convergence abilities.

Vergence-Accommodation Conflict – see Accommodation-Convergence Rivalry.

Vergence-Accommodation Linkage – see Accommodation-Convergence Reflex.

Vertical Disparity – The situation is which the corresponding points the left- and right-eye images are not coincident along the vertical dimension.

Vertigo – The condition in which a viewer perceives self motion while actually physically stationary.

View Discrepancy –The situation in which the left-eye image contains visible details or features that are not present in the right-eye image, or vice versa. Reflections are a common source of View Discrepancy.

View Interspersing – see Ghosting.

Viewer Discomfort – A feeling of unease or fatigue that can sometime result during stereoscopic viewing. Several causes of viewer discomfort have been proposed, including: rapid changes in accommodation and convergence; depth cue conflicts; and unnatural blur. (See Banks, et al., 2008 and Lambooij, et al., 2008).

Viewer Fatigue – A condition of eye strain and/or reduced ability to achieve binocular fusion that can sometimes result during stereoscopic viewing. Several causes of viewer fatigue have been proposed, including: rapid changes in accommodation and convergence; depth cue conflicts; and unnatural blur. (See Banks, et al., 2008 and Lambooij, et al., 2008).

Vignetting – An optical aberration in which intensity decreases with increasing distance from the optical axis.

Window Violation – A depth cue conflict that can arise when part of an object is cut off by the edge of the display. In the case in which the object has a disparity that would make it appear to be in theater space, the part of the object that is cut off by the edge of the display may also be interpreted as occlusion by the viewer: i.e., the disparity and occlusion depth cues would be in conflict. Window violations can be addressed by use of Floating Windows.

Zero Parallax – A situation in which a feature in the left-eye image is in the same place as the corresponding feature in the right-eye image, which causes the eyes to converge to a point on the display, which causes the feature to appear to be at the same depth as the display.

Zone of Clear Single Binocular Vision – The set of vergence and focal distances for which a typical viewer can see a sharply focused image; i.e., it is the set of those distances for which vergence and accommodation can be adjusted sufficiently well. (Banks, et al., 2008).

Zone of Comfortable Viewing – see Percival's Zone of Comfort.

Zoom Mismatch – see Focal-Length Mismatch.

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