Illusion night
August 27th, Aberdeen Art Gallery

1. BinoculART: Surface Stereo

Nick Wade

University of Dundee (UK)

Random-dot stereograms carry disparities concealed from each eye and revealed by binocular observation. Alternatives to random dots as carrier patterns will be displayed as anaglyphs requiring red/cyan viewers (which will be provided). The carrier patterns are not only more complex than random dots but they can also have an appeal independently of the depth they contain. The starting points for the illustrations are either graphic designs or natural textures. They were scanned or photographed and digitally modified to produce the carrier patterns which could be paired and combined to make the anaglyphs. Random-dot stereograms typically conceal a region (like a square) in depth relative to an apparently flat surrounding surface. It is less common to modulate the apparent depth within the carrier pattern itself so that the whole surface no longer appears flat. A series of stereograms is presented in which the surfaces are in differential depth and some contain depth inclusions, too.

2. Illusory depth reversals in Patrick Hughes' trunks, tables and chairs

Patrick Hughes[1] and Brian Rogers[2]

1. Reverspective Ltd. London (UK)

2. University of Oxford (UK)

Patrick Hughes is best known for his Reverspective artworks in which the perspective images on the protruding pyramids and wedges are seen to recede into the distance, unless the observer is close to the artwork. More recently, Patrick has created Hollow Dice which appear as convex despite their concave physical 3-D shape. The Hollow Dice were displayed during Illusion Night at the 2022 ECVP meeting in Nijmegen. For the 2024 ECVP meeting, Patrick will be showing some of his latest artworks including hollow trunks, tables and chairs. The perceptual

significance of his artwork lies in the conflicts they create between the different sources of 3-D information: binocular disparity, perspective, occlusion, motion parallax and shading.

3. *Virtual* Reverspectives, Hollow Dice and other 3-D structures

Brian Rogers[1] and Patrick Hughes[2]

[1] University of Oxford, UK

[2] Reverspective Ltd. London

Patrick Hughes Reverspectives, Hollow Dice and other 3-D structures have provided us with a valuable tool for investigating the relative contributions of binocular disparities, perspective and motion parallax to 3-D vision. From a distance, observers are typically fooled into seeing these different 3-D structures according to the information specified by perspective, occlusion and shading rather than by the binocular disparities that specify their "*real*" 3-D shape. Previous experiments by Thomas Papathomas and ourselves have used the technique of asking observers to approach one of Patrick Hughes' artworks until their percept switches ("flips" - Richard Gregory) from the "*illusory*" to the "*real*" shape. However, this technique does not allow us to determine whether it is (i) the distance, (ii) the angular size, (iii) the magnitude of the disparities, (iv) the perspective information, or (v) the motion parallax that determines the "*flippin*" distance. Moreover, there is no good reason to regard the depth created by the binocular disparities as the "*real*" depth and the depth specified by the other sources of information as "*illusory*". To address these issues, we have created *virtual* Reverspectives, *virtual* Hollow Dice and *virtual* versions of Patrick Hughes' other artworks on a 3-D TV monitor. This technique allows us to vary the size, the distance, the magnitude of the binocular disparities and the other variables *independently*. The *virtual* versions of his artworks will be demonstrated in our Illusion Night presentation.

4. Visual World Manipulation

Samuel Johnson and Felicia Ileladewa

University of Aberdeen (UK)

Our brains cleverly process information to understand the visual world around us, such as using the difference between how an object appears in each of our eyes to judge its distance, or accounting for the fact that the lenses in our eyes flip the world so it is presented to our retinas

upside-down. But what if these cues go wrong? Explore how important these cues are for correctly perceiving the visual world by trying simple tasks like writing and tying knots while viewing the world through special glasses that extend or flip the perspectives of each eye, mimic being drunk, or flip the whole world upside-down!

5. When the Sky Turns Pink

Yesesvi Somayaji Konakanchi, Lemona Xinxuan Zhang, Shoaib Nabil, Anna Franklin, Jenny Bosten, John Maule
University of Sussex (UK)

An experience of twisted colour realities. As we go about our daily lives, we see an enormous array of colours in our interactions with the world around us. Over time, the colours we associate with objects become cemented in our experience and in our memories. These associations stay more or less consistent throughout our lives. What if we could see the colours of the world differently? The altered reality setup used in our research not only allows us to understand how humans perceive colour, but also provides a novel, rich visual experience of a colour world that would not normally be possible. In the sensory experience, all the colours are switched in specific ways, altering the way we see the normal world (see pictures before for example). Participants in our demo will be able to view their environment through a virtual reality head set which transforms the colours of the live camera feed in real time. Our transformation rotates the colour space, so that for example, the grass becomes pink, and the sky becomes green when viewed through the head set. Participants will be encouraged to interact with the world around them whilst in the head set and to reflect on questions such as: Does a blue banana taste the same? Do we prefer art in its natural colours? How quickly can we learn to adjust to a new coloured reality?

6. Ames' Glass

Maarten Wijntjes
Delft University of Technology (NL)

Among the various Pictorial Space Crafts (optical viewing aids altering pictorial perception), the Ames' Glass is rarely studied or reported. This could be due to a 'mistake' in the optical description of the glass by Adelbert Ames, who proposed a positive cylindrical curvature

whereas we found a negative curvature works better. This probably sounds rather abstract but you first have to see it before you will understand it.

7. Perception of Smooth and Gradual Expansion of Stereoscopic Spatiality Recorded by Two Drones

Martin Dokoupil, Ladislav Sutnar
University of West Bohemia, Pilsen (CZ)

The author's contribution is part of his art-based research, in which he investigates the adaptability of human perception to extended spatiality in correlation with the perception of time. This slowly emerging effect, the gradual illusion of deeper space, is an absolutely breathtaking experience, but there is an important influence of extremely different individual sensitivities to spatial perception. Following virtual simulations of retinal disparity changes using motion and parallax variables in 3D software, hyper-stereo situations were captured in the real world using two identical drones. This provided an opportunity to play with the limits of human perception, to explore the possible crossing of these boundaries by learning to perceive new sensations. As part of the Illusion Night Contributions, it will be possible to experience this special sensation, the perception of the birth of spatiality, using a VR headset. The altered binocular perception of perceived space is not only a very powerful experience for the audience, but can also be an opportunity to peer into the universe of multidimensional perception and the mysteries of time perception.

8. What Do You See?

Daisy Faruque
Royal College of Art (UK)

Set of three optical illusions: (1) Rubin's Vase Illusion, (2) Hermann Grid Illusion, (3) Scintillating Grid Illusion

Why people should see it? These are examples of old favourites which are magical and entertaining. As these are paintings, the work encompasses the space between and overlapping science and art. They demonstrate the scientific complexities of the human brain and visual perception.

9. Face Booth - Card-Sorting Task

Barbora Illithova, Leoni Masroujah, Fiammetta Marini, Mairi Irvine, Clare Sutherland
University of Aberdeen (UK)

Photographs are not always reliable indicators of a person's facial appearance because the same individual can look quite different in various images. While we excel at recognizing familiar faces despite their variability, this skill doesn't extend to unfamiliar faces. In this demonstration, inspired by Jenkins, White, Van Montfort, and Burton (2011), participants will be given a deck of cards with multiple photos of unfamiliar faces with high variability. For example, photos might show the same person from different points of view, or in different life periods. The task is to group the photographs by identity, matching different photos of the same person. Attendees will discover that this task is quite challenging: our face recognition abilities are limited for unfamiliar faces.

10/26. Beuchet Chair and Bike

Martin Giesel, Zhong Jian Chee, Oliver Hamlet, Andy Norqvist
University of Aberdeen (UK)

Step into the world of visual size illusions with the Beuchet Chair and Bike exhibits! Experience firsthand how perspective can deceive our size perception as you interact with these intriguing objects which use differently sized elements placed at different distances to create the illusion of people appearing tiny.

11. Peep into a robot's eyes

Joel Currie
University of Aberdeen (UK)

You may have heard the phrase 'the eyes are the window to the soul', but what about for a mechanical entity without a soul? Emerging research shows that endowing robots with humanlike eyes can help ease communication in human-robot teams. Come meet 'Peep' our early robot-eyes prototype. Utilising real-time computer vision, Peep will try to identify interaction features, such as your head orientation, the relative position of your pupils and when you blink. You will be able to interact with our robot prototype, by either remotely puppeteer puppeteering it when the robot is in 'teleoperation' mode, or have a staring competition when it is in 'autonomous' mode.

12. The ideomotor effect – how do the psychic pendulum and Ouija board work?

Patric Bach, Igne Jasukaityte
University of Aberdeen (UK)

Would you like to play with a "psychic" pendulum or the Ouija Board? While these devices are often associated with magical or occult practices, they rely on the well-known psychological "ideomotor" effect, which creates the impression that the devices are being moved by outside forces – while in reality they only capture participants' own imaginations and unconscious behaviours. In hands-on guided demonstrations, you will be able to try out the psychic pendulum and Ouija board, learn about the psychological mechanisms underpinning them, and experience first-hand that these devices indeed seem to move by their own accord, but that these movements always reflect your own thoughts and imaginations.

13. Aberdeen Psychology Participant Panel information stand

If you are local to Aberdeen, this is a chance to learn about the Participant Panel and sign up to be contacted about future studies and ways to contribute to our research.

14. Starry Lisa, Mona Night

Rob van Lier[1], Vebjorn Ekroll[2]
1. Radboud University, Netherlands
2. University of Bergen, Norway

We will present a demonstration in which two paintings can be seen at once in a mixed display, or in which just one of two paintings is visually present, based on specific occlusions made in a superimposed layer. Remarkably, when displaying just one of the two paintings by (occluding 50% of the mixed image), the displayed painting appears to be visible almost in full, despite the fact that only approximately 50% can be seen. In our demo, rapid occlusions and disocclusions, with different degrees of (dis)occlusion provide various unexpected and amusing effects.

15. Richard Gregory Illusions

Priscilla Heard[1], Ken Nakayama[2], and Brian Rogers[3]

1. University of the West of England, UK
2. Harvard University, USA
3. University of Oxford, UK

Here we showcase some of the many innovative contributions of Professor Richard Gregory. Besides stunning perceptual demonstrations that still have relevance to visual perception and cognition, his influence has been far broader, including emerging technologies that were to predict modern developments. This included advanced hearing aids as well as better astronomical imaging to counteract atmospheric distortions. Besides this, he started an interactive science museum. We will show historic devices as well as hands on perceptual demonstrations and experimental apparatus.

16. Keeping it Light(ness) with stimupy

Joris Vincent, Lynn Schmittwilken
Technische Universität Berlin (DE)

Visual illusions are not only fun, but also teach us important things about how our visual system is encoding visual information. In our demo, we explore the realm of lightness illusions. These illusions show convincingly that the perceived lightness of a surface is not just determined by its physical properties (luminance), but varies dramatically depending on its local and global context. In fact, there are countless surround configurations that can produce lightness illusions – some known, and probably many more yet to be discovered. As the basis for our demo, we use stimupy - a toolbox that we recently developed to generate 2D visual stimuli. Stimupy makes it delightfully easy to create different lightness displays and play around with their specific properties. During illusion night, we show a variety of lightness illusions including the classics, some new variations, and some intriguing in-between "transition" stimuli. Moreover, attendees of our Sunday tutorial will have the opportunity to create and display their very own lightness displays, after just a bit of exposure to the toolbox. So, come join us and (con)figure out lightness with stimupy!

17. Perceived Stereo Depth reflects Retinal Disparities, not 3D Geometry

Paul Linton & Nikolaus Kriegeskorte
Columbia University (US)

We present a new illusion that challenges our traditional understanding of stereo vision. Traditional 'Triangulation' accounts of stereo vision back-project from points on the retina to points in the world. This requires that stereo vision incorporates how binocular disparities fall off with the viewing distance squared. By contrast, Linton 2023 Phil Trans R Soc B 378: 20210455 proposes a 'Minimal Model' of stereo vision where perceived stereo depth is simply a function (most likely a linear function) of the amount of disparity on the retina. We present a new illusion (the 'Linton Stereo Illusion') to adjudicate between these two approaches. The illusion consists of a smaller circle (at 40cm) in front of a larger circle (at 50cm), with constant angular sizes throughout. We move the larger circle forward by 10cm (to 40cm) and then back again (to 50cm). The question is, what distance should we move the smaller circle forward and back to maintain a constant perceived separation between the circles? Constant physical distance (10cm) ('Triangulation') or constant disparity (6.7cm) ('Minimal Model')? Observers choose constant disparity. This leads us to four conclusions: First, perceived stereo depth appears to be best captured by the 'Minimal Model'. Second, doubling disparity appears to double perceived depth, suggesting that perceived stereo depth is proportional to disparity. Third, changes in vergence appear to have no effect on perceived depth. Fourth, stereo 'depth constancy' appears to be a cognitive (not perceptual) phenomenon, reflecting our experience of a world distorted in perceived stereo depth.

18. Sunset Shadows Do Not Show Size Constancy

Stuart Anstis[1] and Brian Rogers[2]

1. University of California, San Diego (US)

2. University of Oxford (UK)

The setting sun can cast a long shadow of a person who is standing on a flat horizontal surface. Optically, the shadow is stretched-out on the surface (perhaps tenfold) compared with the shadow's width but the proportions of the stretched out body parts are perfectly preserved. This is what would be seen by a bird or drone flying overhead. However, this is not what the observer sees: instead, the shadows of observer's legs look greatly enlarged while the shadow of the observer's head looks tiny. On the other hand, if a second observer stands just beyond the shadow and looks back towards to first observer, s/he will report that shadow of the head appears to be stretched-out and the legs in the shadow appear to be shortened. If size constancy were perfect, the shadow should appear to be thin and elongated but perfectly proportioned: i.e. the smaller angular size of the more distant head ought to be "scaled-up" by its increased

distance. Instead, the perceived smaller size of the head in the shadow seems to be more a consequence of its smaller angular size.

19. Two Eyes, Two Images: Exploring Binocular Vision

Sanni Ahonen
University of Aberdeen (UK)

Why can't pirates see Magic Eye pictures? Do we really see the same thing through both eyes? This interactive demonstration of binocular vision provides insight into how our eyes work together (and separately!) and how some of the principles behind 3D vision are used in entertainment and vision research.

20. Serial Effects in Vision: The Past Influences What We Currently See

Fiammetta Marini
University of Aberdeen, UK

Illusion of Visual Stability

Our visual environment is continuously changing, and the image projected onto our retina is constantly affected by external and internal noise, such as eye movements and lighting changes. How does our brain create such illusory stability? Serial dependence has been proposed to be a mechanism that stabilizes vision over time by continuously biasing what we are seeing in the present toward the recent past, creating an illusion of stability. In this demonstration, observers will be presented with a movie of a face that gradually ages from young to old. Due to serial dependence, the changing face will be misperceived as ageing less than what it is, or not to age at all.

The Motion Aftereffect: The Waterfall Illusion and the Northern Lights Illusion

Do you know that Scotland inspired Robert Addams, a lecturer in chemistry and natural philosophy, to discover a significant visual illusion, back in 1834? While visiting the Falls of Foyers in Loch Ness, Addams noted something curious: after staring at the falling water for a few seconds, he looked at the nearby rocks and saw them seemingly drift upwards. This phenomenon, known as the motion aftereffect, occurs because the neurons in our visual system that detect downward motion become less sensitive after prolonged exposure to the falling water. As a result, stationary objects viewed afterward appear to move in the opposite direction.

Try the Waterfall Illusion yourself and see what happens to the Aberdeen Northern Lights under the influence of the motion aftereffect!

The Colour Aftereffect: The Craigievar Castle Illusion
In this demonstration observers will stare for 40 seconds at the inverted-colour photograph of Craigievar Castle, an iconic pink castle situated in Aberdeenshire. Immediately after, observers will view the same photograph of the castle in black and white, but they will perceive it in its true pinkish colours. This illusion is a due to colour aftereffect. This phenomenon occurs because the neurons in our visual system that detect colour become less sensitive after extended exposure to certain colours, resulting in an afterimage in the complementary colours.

21. Size-Weight Illusion

Daniela Ruseva
University of Aberdeen (UK)

The size-weight illusion is a phenomenon where people perceive smaller objects to be heavier than larger objects of the same actual weight. When holding two objects of equal weight but different sizes, individuals consistently report that the smaller one feels heavier. This illusion highlights that our brain combines sensory information from holding the object with expectations about the weights of objects based on our experiences.

22. Contour Erasure and Filling-in

Yih-Shiuan Lin[1] , Stuart Anstis[2], Chien-Chung Chen[3], Mark W. Greenlee[1]
1. University of Regensburg (DE)
2. University of California, San Diego (US)
3. National Taiwan University (TW)

Contour erasure, first discovered by Stuart Anstis, is a captivating phenomenon where objects completely disappear into the background after brief adaptation to flickering contour outlines. This effect dramatically accelerates the perceptual filling-in process, leading to an instantaneous merging of the object with its background. Contour erasure underscores the crucial role of edge information in object and surface perception, offering valuable insights into the mechanisms underlying perceptual filling-in.

In our demos, we showcase several fascinating examples of contour erasure: objects of various shapes and sizes vanishing or merging together after only brief adaptation. These demonstrations illustrate how easily our eyes can be tricked with a simple setup. Previously presented at VSS and ECVP, these demos received enthusiastic feedback from attendees, and we aim to amaze and engage the audience once again at this year's ECVP. By presenting contour erasure, we highlight both its visual intrigue and its importance in understanding visual perception, offering an engaging and educational experience for all attendees.

23. Induced Movement in a Tessellation

David Phillips

The movie is a variant on induced movement illusions that were first reported in antiquity. For example, Ptolemy of Alexandria noted that a stationary boat, tethered in a swiftly flowing stream, can appear to be moving, whilst the water appears still. The unusual feature of this tessellation variant is that the viewer selects the direction of induced movement by making a figure/ground choice.

In the movie, a tessellating pattern of interlocking left and right-facing heads is stationary, but textures within the heads move. The textures are identical in every head, except that they are rotated 180o in one set of heads.

Most viewers see a vivid illusion of movement: the heads facing one way are selected as 'figure' and appear to move collectively, whilst the other heads form a stationary background. Which heads are selected as 'figure' is arbitrary, but the selection, and with it the direction of apparent movement, can 'flip'. The effect is striking. It can happen by choice, (though it can be hard to achieve without practice), or it may happen spontaneously.

However, some observers, at least some of the time, see the pattern veridically, with the heads stationary and the textures moving in opposed directions. Illusion Night offers a great opportunity to explore informally how different observers see the effect.

The movie includes a segment with texture masked in one set of heads, showing that the texture that dominates in driving the effect is the apparently occluded texture in the heads forming the 'ground', opposing the perceived illusory movement. The movie ends with the illusion shown as still available on surfaces rotating in 3D space.

24. Object Doubling in the Furrow Illusion Quartet (FIQ)

Ian M. Thornton, Anna Riga
University of Malta (MT)

We present a novel variant of the classic furrow illusion, incorporating aspects of displays by both Anstis (2012) and Cormack, Blake & Hiris (1992). In the furrow illusion, the perceived trajectory of a target object appears to deviate greatly from veridical when it moves within the context of static inducing lines. In common with other well-known motion illusions – such as the infinite regress (Tse & Hsieh, 2006), curveball (Shapiro, Lu, Huang, Knight, & Ennis, 2010), and double-drift illusions (Lisi & Cavanagh, 2015) – this effect is thought to arise due to faulty integration of local and global motion signals in the periphery. Here, in addition to showcasing this form of motion illusion, we present quartet displays specifically designed to amplify naturally occurring negative afterimages. In order to experience the furrow illusion, gaze must be stabilized relative to the inducing lines. Consequently, afterimages quickly form and are dynamically released as the target object moves and occludes different portions of the lines. Using composite target elements consisting of opaque rectangular apertures within which a simple shape is drawn, we will additionally introduce a new "object doubling" effect. We believe this effect – which can easily be turned on and off by simple contrast manipulations – is caused by an interaction between the physically drawn contours of the enclosed target shape and dynamically released afterimages. An online demo will be made available for attendees to also experience the illusion and manipulate aspects of the displays on their own devices.

25. What do you see when you…

Matt Johnson
University of Aberdeen (UK)

Anamorphic installations explore perspective with the aim of challenging our perception. In this anamorphic installation, a dynamic interplay of geometric shapes and colours, which when viewed from a specific angle, align to reveal an abstract design. Become an active participant in this illusion - can you find the hidden message?

27. Arts and Crafts

Antonio Font, Caitlin Tittensor, Eileen Clemens, Rosalind Hillhouse
University of Aberdeen (UK)

Discover the magic of visual perception at our Arts and Crafts Stand during Illusion Night. Engage your creativity by crafting Swivel Head Animals that come to life with a simple twist, and explore the mesmerising world of illusions through dynamic patterns in various craft projects. Experience the fascinating interplay of art and perception. Perfect for all ages!

28. Language in Colour: The Stroop Test Experience

Michail Ntikas
University of Aberdeen (UK)

Explore how language shapes perception with the Stroop Test, a psychological experiment that reveals the mind's inner workings. Test your reaction times across different languages and discover how fluency impacts your ability to navigate the colourful world of words. Can you keep up when your brain's language circuits are put to the test?

29. How Much Does Your Distance Judgment Depend on Yourself?

Zhuoen Lu
University of Aberdeen (UK)

Using Virtual Reality (VR), this program will help you explore how personal factors influence your distance judgment skills in various social scenarios. It provides insights into how self-reference and individual experiences shape our ability to gauge distances accurately in different environments.

30. School of Psychology through the time

Igne Jasukaityte
University of Aberdeen (UK)

Aberdeen was the first university in the UK to create a lectureship in Psychology, a subject that's been taught here for over a century. Learn about the School's history, its notable scientists, and the historic research equipment that played a role in its development.

31. Ambiguous objects

Kokichi Sugihara is a Japanese mathematician and artist known for his three-dimensional illusions. These objects appear to change form when viewed from different angles.

32. Vision's Chainsaw

Patrick Cavanagh[1], Stuart Anstis[2]
1. Glendon College (CA)
2. University of California, San Diego (US)

Moving frames can displace the apparent location of brief flashes presented at the moment the frame changes direction. We use this here to attempt a novel dismemberment of the human body. This is a live, so to speak, presentation and we invite observers to step up and be severed. Sorry, served.

33. Visual and non-visual illusions in magic

Vebjørn Ekroll
Department of Psychosocial Science, University of Bergen (NO)

The sense of vision is used extensively in the art of magic, but is this strong association between magic and vision fundamental or merely conventional? In this 30-minute presentation, I provide demonstrations of how the sense of vision play a pivotal role in some magic tricks, but not in others. Although the latter kind of tricks are conventionally presented using the sense of vision, they can also be presented to blindfolded participants because the main factors involved in evoking the magical experiences are illusions of spatial imagery (i. e. errors in our intuitive reasoning about how objects may or may not change their configuration in space) rather than illusions of vision. The adaptation of tricks based on illusions of spatial imagery for non-visual presentation may be useful for making the art of magic more accessible for people with blindness or visual impairments.