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Article

Re-enacting Space: Behind and in front of the Lidar Camera

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Introduction

This article investigates how scanning can be appropriated as part of practice-based research probing notions of body extension. It is a practice I developed alongside writing the artist's book '*Tupaia, Kybernetes & Lara Croft*', a monograph that could be seen as the so-called B-sides of my PhD - the book gathers ideas that did not make it into the final PhD version.

'*Tupaia, Kybernetes & Lara Croft*' juxtaposes the navigational practices of three different characters: Tupaia is an eighteenth-century Polynesian navigator who sailed across the Pacific with James Cook; Kybernetes, originally from ancient Greek literature, is presented from a Margaret Mead-inspired perspective; and the third character, Lara Croft, one of the most prominent computer game avatars, is a source of friction for feminist criticism. The ways in which the three characters understand and navigate space are incomparably different yet reveal surprising intersections: Just as avatars remain immobile in the centre of a screen while the digital world passes by, in the Polynesian worldview, the travelling boat is a fixed centre around which the islands pass like constellations of stars or schools of fish. The constructedness and fundamental importance of the perspective from which one observes is again significant in Mead's questioning attitude.

Also available as an open-access publication,[1] '*Tupaia, Kybernetes & Lara Croft*' is the result of practice-based research using performative approaches and building on spatial philosophy. Its imagery involves the re-enactment of drawings and the generation of digital body geometries that merge with their tools and surroundings. Redrawing the map that Tupaia made with Cook's crew opens up a decolonial perspective on Western geographical biases, standardised mapping practices and the status of lost ethnographic artefacts. Locating the observing researcher both within and beyond the frame of investigation helps to rethink how to employ cameras, and the development of alternative avatars allows for new modes of image-making and empowered embodiment.

Revisiting the processes involved in the making of the artist's book, in particular the use of a time-based lidar scanning technique, extended by some novel considerations, forms the basis of this article, which discusses the performative approach inherent in this practice-based research and tests a number of possible bodily engagements in relation to a (lidar) camera that exceed standardised subject-object constructs.

1 - The pdf can be read on or downloaded from my website www.eyetry.at.

A performative paradigm

The 64-page work of *Tupaia, Kybernetes & Lara Croft* was screen printed manually on both sides of a 6.7 metre long roll and then folded into a leporello in a further process so that the finished book consists of a single long piece of paper (Figure 1).

The leporello combines elements of the multi-page book and the scroll, a single piece of paper on a roll.[2] It is up to the readers to decide how to approach it: Either in a spread-out overview, with all the contents available side by side, or by turning the pages, encountering the contents one by one. The discovery of ancient leporellos in Central Asia, pre-Columbian South America and the Far East has demonstrated the literacy of these early civilisations; leporellos coexisted in different parts of the world rather than having a single origin in a single place - the leporello folding method is independent of any particular region.

In the context of art and architecture, there exist many different versions of the leporello, ranging from elevation paintings or photographs depicting a particular linear stretch of river or street[3] to installation pieces.[4] The leporello is a particular format that can also refer to practices of a revelation: In Wolfgang Amadeus Mozart's 1787 opera '*Don Giovanni*', the servant Leporello discloses the carefully recorded notes of his master Don Giovanni's many romantic relationships. In keeping with staging tradition, Leporello majestically presents the catalogue on stage, unfolding the pages of an accordion-pleated document one by one, revealing a tale of sexually motivated conquests and obsessions. The role of Leporello is inextricably linked to the accordion-folded object and serves as the namesake for the peculiar format due to the exceptional nature of this opera character's performance.

Here, I deliberately use the term "leporello" to allude to the performative dimension inherent in the accordion-folded book,[5] but in a less stage-like way. Rather than follow a notion of performance that is closely linked to the acting out of predefined roles, I prefer to adopt Judith Butler's view of the performative, which stresses the phenomenal aspects of embodiment and which is neither static, given, nor predetermined, but born of the present moment and thus capable of creating identity (Butler, 1988).[6] First used by John L. Austin in a 1955 Harvard University lecture series of lectures on the philosophy of language entitled "How to do things with words", "performative" is a neologism referring to forms of speech that are not merely descriptive but rather perform an action: the utterance "the buffet is now open" does not narrate a current situation, but brings into being a new one. Performative acts instigate change and, therefore, are constitutive of (a new) reality (Fischer-Lichte 2008,31); first detected in the use of language, performative practices can take any form - the capacity to constitute reality and to bring about change is their essential characteristic.

2 - A more in-depth version of this leporello history runs upside down at the bottom of the pages in the physically printed versions of Tupaia, Kybernetes & Lara Croft.

3 - I first encountered the idea of elevational photographs and drawings displaying a 'representational space' in the guise of a book in Mike Aling's 2017 exhibition '*Paginations*' at the Stephen Lawrence Gallery, Greenwich. See, for example, '*The Riversides of the Sumida River*' by Katsushika Hokusai, 1795; '*Ginza Kaiwai/Ginza Haccho*' by Yoshikazu Suzuki and Kimura Shohachi, 1954; Every Building on the Sunset Strip by Ed Ruscha, 1966.

4 - See, for example, '*Concetto Spaziale*' by Lucio Fontana, 1966

5 - I am aware that the term "Leporello" could imply a European origin for the format, which would be misleading. It is therefore important for me to reiterate that its origin does not refer to any particular region of the world.

6 - For analogous thoughts on the performative in relation to various projects, see Valerie Messini (Sommeregger 2022)

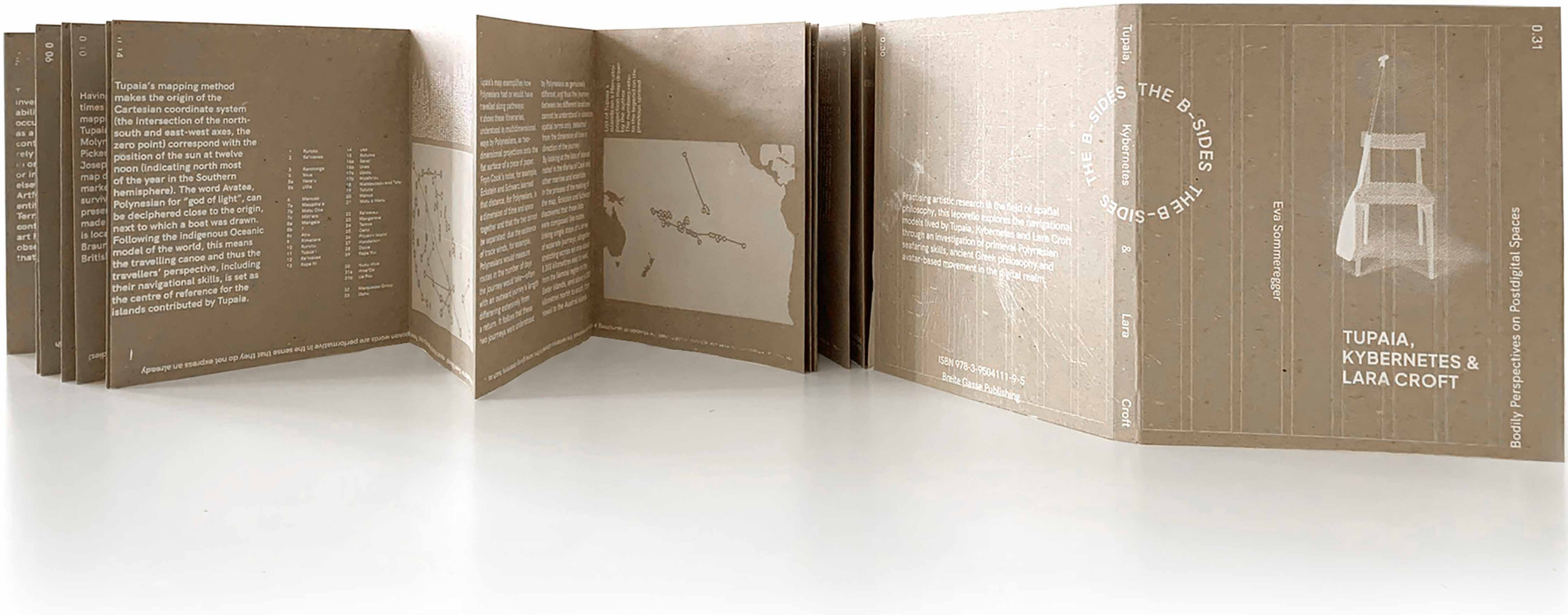

Figure 1. *The B-sides. Tupaia, Kybernetes & Lara Croft*. 64-page double-sided leporello, hand printed, limited edition of 16

Artistic re-enactments, i.e. practices of repeating historical events, constitute a particular form of the performative: They aim at an altered perception of history and at change by rewriting and reinterpreting the past (Slanar 2016). Artistic re-enactments challenge one-sided readings of historical events and celebrate the open-endedness of interpretation by fundamentally questioning what is established discourse or what is taken for granted. This open-endedness contrasts with the re-enactment practises popular among amateur historians, which follow in the footsteps of "authentic" re-enactments originally introduced as a means of gaining a better understanding of past events (Collingwood 1946). Those who engage in the repetition of an event (a battle, for instance, whose outcome remains accepted as it is) tend to recreate details as accurately as possible in order to immerse themselves in an otherwise distant past event, usually represented in images or text. However, they remain unable to institute change and are trapped in an endless cycle of repeating the way history is told rather than reinterpreting it (Lütticken 2005). Both practices of re-enactment, the artistic and the amateur historian, have in common that they use their own bodies as intermediaries to bridge the gap between themselves and the past.

While re-enactment practices are usually concerned with the realm of *history*, I find it useful to adapt re-enactment methods to specific *spaces*,[7] thus shifting the focus from historiographical issues to more pressing questions about space as such. Spatial re-enactments form the conceptual basis of the practice-based research that includes the lidar scans presented in '*Tupaia, Kybernetes & Lara Croft*', and in this paper: I have developed a research practice in which technology-enhanced bodies act as intermediaries to bridge the gap between themselves and their surroundings. In order to discuss the aspects relevant to my lidar scan setting, this article offers a tour presenting several existing (game engine) camera uses that relate digital environments to human navigation within them and analyses them in terms of the spatial aspects they perpetuate or rather subvert and alter—informed by the view gained through my spatial re-enactment practice.

Technology-enhanced bodies

'The Forest' is an orienteering computer game designed by software developer Graham Relf in 1978 for 8-bit home computers.[8] Using arrow keys to walk straight ahead, turn left, right and around, and +/- keys to look up and down, players can take a walk through an environment consisting of a coarsely textured terrain from which leafy trees stand out. This application belongs to the genre of so-called "walking simulations": Computer games in which the primary form of interaction is a digital form of walking, i.e. how the game engine's cameras interpret the view of a human being as they make their way from point A to point B.

However, the computerised version of seeing in motion does not resemble the way a human observer optically registers space with a head dynamically attached to a bipedal body, essentially shaking as they walk. Rather, computer vision resembles the way the human brain interprets walking in a chemical process, filtering out the jerky movements and producing a projection of smooth motion. Computer vision is fundamentally different from the way the human visual senses work: Human visual registration of the environment is a whole-body endeavour, not a single way of receiving optical information (Gibson 1979,205). Human vision, therefore, does not correspond to any kind of pictorial space, be it moving, static or panoramic (Gibson 1979,207).

The interpretation of human vision in a game engine is built through the architecture of the game: In the case of '*The Forest'*, walking means moving the viewport, i.e. a 'window' within the game. The movement of this game engine's camera is limited by the available arrow key commands and thus does not resemble a human gait, but rather the movement of a machine, which has its

7 - The idea of applying the notion of re-enactment to spatial aspects was introduced in a workshop at the first VASS Vienna Architecture Summer School in September 2022, co-taught by Florian Schafschetzy and myself.

8 - Relf reprogrammed the application to be accessible via web browsers, see https://www.grelf.net/terrain.html (accessed 2024-06-01)

precursors in a cinematic practice from the turn of the 19th to the 20th century: At a time when film cameras usually captured movement from a static position, the novelty of phantom rides[9] materialised the concept of moving images by setting the camera apparatus itself in motion (Hayes 2003) - by attaching the camera to a vehicle, often mounted on the front of a locomotive, for example, pointing in the direction of travel. As the framing of the motion picture did not expose any part of the locomotive, but only the environment in front of it, the term phantom ride referred to the camera movement being initiated by an as yet unseen agent. Phantom rides can also be associated with a traveller's view out of a train window; when facing forward, i.e. when the direction of movement and the camera angle are aligned, phantom rides show the view of the locomotive - literally the view of a machine.

The movable window-setting of walkthrough[10] games such as *The Forest* introduces the users and their views into the digital world and enables their navigation - the window setting is a vehicle that takes users to another place. Rather than a simulation of something else, the space of the movable viewport is a construction of an independent reality: The space of a window-vehicle transporting users elsewhere, perhaps the space of an avatar[11] that has taken on the form of a phantom. Similar to the phantom rides shot in front of the locomotive, the navigation in walkthrough games alludes to the idea of a phantom: The phantom-avatar becomes effective through the user-initiated movement of the viewport and remains invisible.

Avatars are means of transport that take viewers elsewhere, metaphors in the classic ancient Greek sense of the word (i.e. vehicles taking you to another place).[12] Signifying incarnation or descent in Sanskrit, avatars retain their divine qualities as powerful beings moving between worlds, although incarnated.[13] It is the contemporary, more widespread use of the term that describes avatars as the visual trace of technology-enhanced bodies in media space: Avatars not only transport users into the digital realm, i.e. open up another world, but also let users navigate within the digital space of a computer game, i.e. move players from A to B - similar to the inversion that takes place in a cinema, where a seated audience is moved by means of a mobile film camera (Eisenstein 1989,117). Ultimately, avatars embody the complex relationship between humans and machines: They are forms of life that transcend the limitations of the human body and incorporate technology as an integral part of their being[14] - thus challenging the traditional (humanistic) unity of a subject and exemplifying a posthuman form of embodiment (Braidotti 2015).

However, cyberspace has proved 'not to be a universally shared utopia', perpetuating existing racial and gender biases and heteronormative ideals (Russell 2020,26). The standardised appearance of avatars reinforces binary and white body standards, leaving very little

9 - I would like to thank Claudia Slanar for introducing me to the practice of Phantom Rides.

10 - I refrain from using the term "walking simulation" for the reasons given above. I also avoid the term 'exploration' because of its connotations of territorial conquest. For lack of a better term, I therefore use 'walkthrough'.

11 - Already as a student on the AVATAR (Advanced Virtual and Technological Architecture Research) Masters course at the Bartlett School of Architecture in 2006/07, I took the programme's acronym as an invitation to engage further with the notion of the avatar.

12 - I would like to thank Axel Stockburger for suggesting the connection between avatars and metaphors.

13 - This is in contrast to the Christian concept of incarnation, where God loses divinity once on earth and becomes sinful flesh.

14 - These ideas have already been raised in two lectures I collaborated on with Dietmar Köring: 'Exploring Avatars as Posthuman Entities' at the John Cabot University in Rome, May 2023, and 'Digital Posthuman Spaces: Innovation and Bias in Human-Technology Fusion' at the LMDA Riga, September 2023

room for identities that Legacy Russell calls glitched. According to Russell's 'Glitch Feminism', avatars have an enormous subversive potential: They can be understood as machinic assemblages (Russell 2020,137). Read against Butler's notion of the performative - the power to create identity out of the present moment - avatars have a spatial capacity as a redrawing ability. They can redraw, i.e. redefine themselves and redraw the nature of human-machine interaction. In this respect, avatars are predestined to perform spatial re-enactments and subvert existing norms. *'Virginia'*, a walkthrough game developed by Variable State in 2016 for Windows/ PlayStation/Xbox platforms, breaks many conventions of standardised spectatorship: Flashbacks, flash-forwards and dream sequences interrupt the linear narrative of an FBI agent involved in a conspiracy plot. As typical of walkthrough games, players navigate by moving the viewport - the phantom avatar's frame displays what lies ahead. The avatar's identity as a woman of colour is only revealed under certain circumstances, such as the act of looking in the mirror, and only then can the avatar's face be seen. In this scene, the avatar does indeed return the player's gaze.

In contrast to the phantom-framed settings discussed so far, avatars are fully visible in third-person games. Here, the game engine's camera takes on the role of an observer, orbiting around the full-body avatar geometries and following them wherever they go, keeping the avatars firmly in the centre of the frame. While constantly exposed to the viewer's gaze, third-person avatars - such as the 1990s fetish character Lara Croft - are usually shown from the side or behind and thus do not return the act of *being looked at* (Ward 2000). *Being-Looked-at-ness* is a term that can be traced back to Laura Mulvey's influential essay, originally written in 1975 (Mulvey 1999), in which she argues that standard Hollywood film narratives cause the camera to adopt a heterosexual male gaze that takes pleasure in looking while objectifying women - avatars like Croft have inherited this gaze from the action heroines of cinema. Examining remediations, i.e. the mutual influence between film and computer games, media theorist Kim Walden highlights the fact that Croft's cinematic alter ego is a cyborg, a body fused with technology (Haraway 1985). The Croft character in the film is able to perform physically impossible movements that defy normal gravity, borrowed from the computer game avatar (Walden 2004, 80).

Other films also borrow from cyborgs' upgraded bodies and avatars' ability to literally redraw space, turning the impossible into (cinematic) reality: Tom Tykwer's film, *'Run Lola Run'* from 1998, is divided into three episodes, three alternatives to a single chain of events, alluding to the replay function of a computer game. The narrative provides for female lead Lola to opt for a replay after the story has failed to bring the desired end - reminiscent of a player replaying a level after failing to complete it, as well as of the literary character Pippi Longstocking's motto 'I make the world as I like it' (Walden 2004, 86). Throughout the film, Lola is at the centre of the action: The film's narrative follows her, the framing positions her at the centre of the frame, the camera circles around her as she makes her way, running through Berlin's urban space, which is rendered as creative geography appropriate to the screenplay - creative geography is a term from the 1910s for a montage that combines different film sets through editing to create a single space that only exists in film (Kuleshov 1975). In addition, the way the camera is used prevents Lola from being merely *looked at* (Majer O'Sickey 2002, 130). Before starting to run, Lola returns the gaze: in a point-of-view shot, staring at the clock in her room, we adopt her gaze; we *look through* her. This aspect of audience identification is enhanced by the way Lola's character is constructed in the film: The inner monologue soundtrack (Siewert 2009, 236) reinforces the fact that the audience is meant to take Lola's point of view. Franka Potente is both the protagonist of the film and the singer of a song in which she expresses her desires (Potente/D. 1998):

> I wish I was a hunter in search of different food
> I wish I was the animal which fits into that mood
> I wish I was a person with unlimited breath
> I wish I was a heartbeat that never comes to rest [...]
> I wish I was a forest of trees that do not hide [...]
> I wish I was a clearing of secrets left inside

Lola, the character infused with a cyborg's unlimited capacity to run and an avatar's power to choose when a chain of events is repeated, wants to become a forest - a forest in which the trees do not hide behind each other. Approached from a visually dominant perspective, a forest is probably the most layered environment one can imagine from a single point of view, with foliage offering an overabundance of occluding and revealing surface edges. Considered in line with a recent debate in the field of philosophy of the body, a more embodied stance that complements the notion of extension with enacting, embedding and embodying (Rowlands 2015), Lola perhaps longs for an embodiment of the forest in which lies the clearing - i.e. the embedding of a void -, as well as the ability to enact and make kinship all the members of the forest, transcending individuality (Haraway 2016).

Lola relies on the use of media technologies to express her understanding of herself and the world, complexifying the inextricably intertwined relationship between humans and technology. Lola is an example of avant la lettre, alluding to the unprecedented wealth of possibilities for embodiment and enactment that contemporary digital realms offer. It is even debatable whether humans using technology as a form of extension of themselves is new - philosopher Stefan Sorgner, for example, argues that humans have always been cyborgs, identifying the use of technology as a key human characteristic (Sorgner 2022).

Lidar camera re-enactments

Departing from the mindset sketched above, the practice-based research discussed here engages with how to draw these complexified bodies that make technology part of their being. As part of *'Tupaia, Kybernetes & Lara Croft'*, I developed drawings of bodies that are not easily deciphered. With the intention of not perpetuating an objectified, misogynistic image of avatars, I used spatial re-enactments to build my own version of an avatar using a lidar scanner. Lidar, an acronym for 'laser imaging, detection, and ranging', is an imaging technology commonly used to obtain high-resolution 3D information in fields as diverse as agriculture, archaeology, automated driving, surveying, transportation, robotics, military applications, mobile applications, video games, and more. In addition, lidar scanning has a time-based option.

What I found valuable about this technology is that, at a given frame rate, it simply records the three-dimensional coordinates of points on surfaces that reflect the laser beams within a given range: Human or non-human, animate or inanimate matter merge into a single geometry when they touch. In my work, I processed only the wireframes resulting from the scans, omitting any texture information so that it becomes difficult for the viewer of the resulting drawings to distinguish between bodies, their surroundings or the tools they use. The result of a scan is a series of points in space-time, open to interpretation.

The Phantom's propelling force has returned: The off-screen locomotive power, the primary source of movement, has entered the frame. Figure 2 is an avatar, barely visible on paper due to the use of a line weight that is far too thin for the screen printing process - a phantom. The print's original digital artwork is based on a lidar scan: Figure 2 depicts three moments within the performance of a person captured by an L515 lidar camera using a custom-made script capable of registering the 3D information of multiple frames per second.[15] Figure 2 is thus a re-materialisation of a digital flow - deep waters mostly incomprehensible to humans (Köring & Sommeregger 2023).

Figure 2 is a third-person perspective shot of someone navigating, sitting, and moving a paddle - but the body does not move forward and remains in the same place as if seated in a chair. This reversal of bodily movement, remaining static while moving, is key to both cinema and computer games. From my limited Western understanding, surprising overlaps with the Polynesian practice of navigating exist: Navigators conceptualise a journey through a boat that remains fixed in the

15 - My colleague Marco Palma from TU Vienna has developed a Python script for the L515 lidar camera, capable of outputting a 30-frame sequence of obj files, which he generously allowed me to use.

Figure 2, Re-enacting.

Overlay of three frames captured by an L515 lidar camera sequence, choice of camera position / lens length for rendering in Rhino, graphical post-production in Illustrator. Screen print on recycled paper, hand-printed using vegan colour without retarding agent.

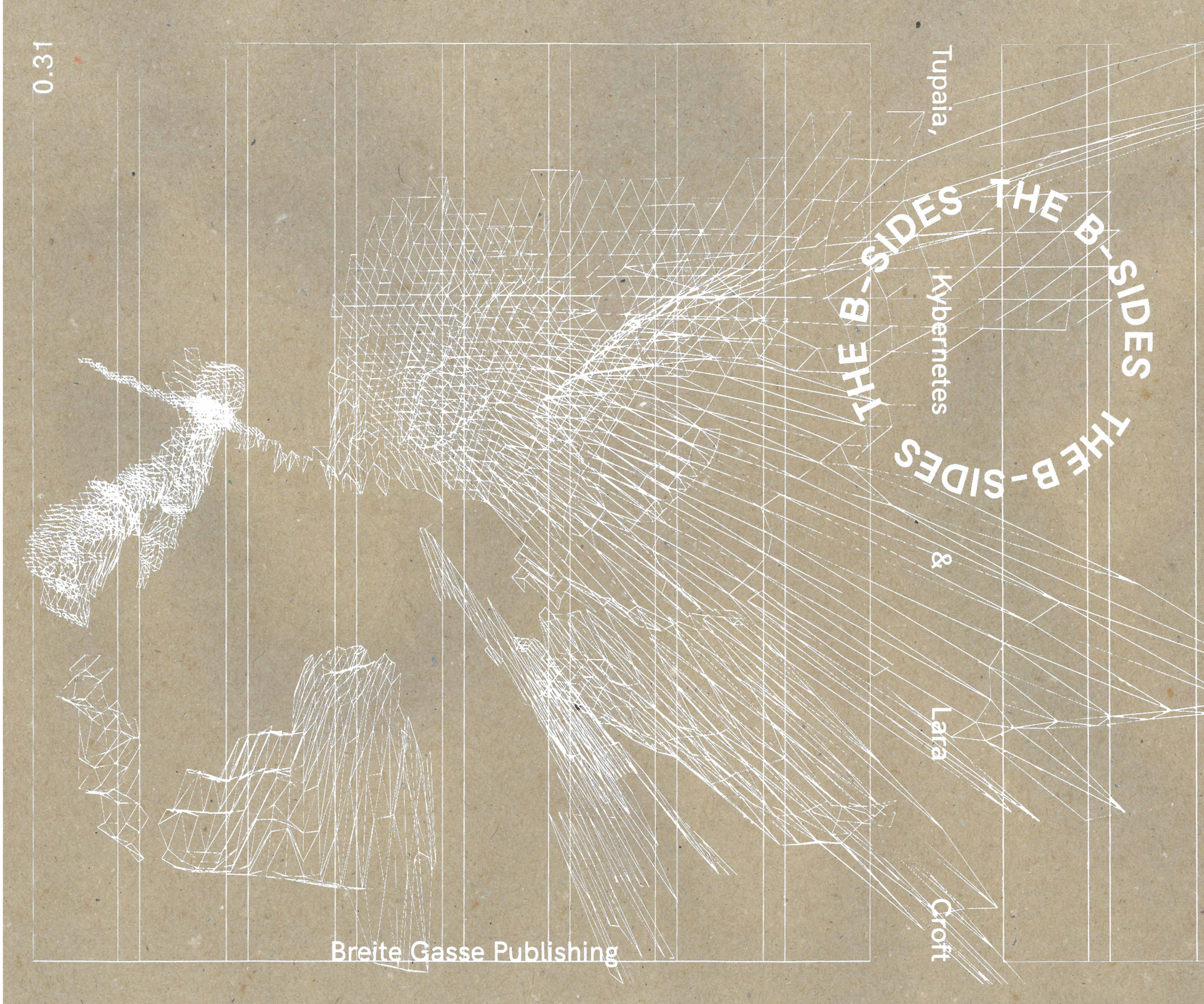

Figure 3. Over-the-shoulder shot.

Overlay of three frames captured by an L515 lidar camera sequence, choice of camera position / lens length for rendering in Rhino, graphical post-production in Illustrator. Test print of the back cover (the final version has a text caption covering most of the scan), screen print on recycled paper, hand-printed using vegan colour without retarding agent.

centre of a hemispherical world animated by events: constellations, sun, moon, winds, birds, fish, currents and islands pass to the right and left of the referenced boat (Eckstein & Schwarz 2019).

In the scan, the body and the navigational instrument become one. The body depicted is mine, and her objectification is limited because my cyborg-self also controls the camera and the post-production of how the scan becomes an image. In the setting produced by the spatial re-enactment, '*I am both in front of and behind the camera',* performing the double function of immersion and distance. I am observing the scene and performing it being observed: The bodies in front of and behind the camera merge into an unusual avatar.

By adopting the characteristics of artistic re-enactments, the performance involved in making Figure 2 marks a distance from what it refers to - I am neither a Polynesian navigator nor an avatar. Yet, the Figure 2 re-enactment builds on avatars' and Polynesian navigators' ability to realise a space with particular qualities: A fully mobile and versatile space that literally revolves around one's presence, in sync with the environment. The recently deciphered map drawn in collaboration with the Polynesian priest and navigator Tupaia at the end of the 18th century proves the existence of knowledge of how to navigate even beyond the extent of the vast Polynesian triangle (Eckstein & Schwarz 2019).

In Figure 2, the avatar's scope of influence expands beyond the frame, towards where the locomotive force is situated; the avatar thus exceeds their usual role of movement outsourcing and visual presentation/display. In addition, the avatar overcomes its status as a clearly delimited object and connects with its environment.

Figure 3 is an over-the-shoulder shot. These shots depict someone in dialogue, suggesting closeness with the interlocutor. Figure 3 again displays an unclearly delimited paddle-holding avatar whose interlocutor, in this case, is the technology itself.

Figure 3 is produced by a body enabled to enhance her existence with lidar camera technology; Margaret Mead's anthropologist method of locating the observing researcher both inside and outside the frame of investigation allowed me to rethink how cameras work and, therefore, how they can be used differently.

As in the previous figure, the lidar camera captures motion; the final image shows three successive frames taken from a particular movement - a jagged geometry with gaps between the individual shots. The superimposed frames create an image that invites a different reading. The edges of a surface, such as the foliage of a tree, usually reveal what lies behind it as soon as the viewer shifts their perspective: Edges delineate what is concealed or revealed, and they differentiate foreground, midground and background in pictorial space, or distinguish between figure and ground; Edge detection maps are fundamental to current image-generating AI, which uses them to subsequently generate depth maps and sector organisation.

However, the edges in Figure 3 are different. These lidar scan edges are not occluding edges ready to undergo the standard steps of generative image AI processing. The edges in Figure 3 are modulating edges, allowing for gaps to occur. These gaps between the edges of the 3D model do not obscure or reveal what lies behind them in 3D space; these gaps are voids in space and time in which no information is transmitted.

Finally, the drawings resulting from the lidar scans go beyond their illustrative function and are an integral part of the research: They investigate the ways in which an avatar can perform and thus redraw space - as part of their capacity to constitute reality and to bring about change; the drawings are the residue of a research process dealing with avatars and cyborgs that produces new insights through the spatial re-enactment method employed: The development of alternative avatars allows for new modes of image-making and empowered embodiment of technology-enhanced bodies who act as intermediaries to bridge the gap between themselves and their surroundings.

The pertinent question, implicit in re-enactment strategies, remains: Which standards do we perpetuate, which do we appropriate, subvert or alter?

Thanks
My thanks go to Marco Palma, who generously allowed me to use the script he programmed to generate lidar scan motion sequences, and to Dietmar Köring, my long-time collaborator and, until recently my colleague at the LMDA Research Institute for Contemporary Art, Design and Architecture at the Art Academy of Latvia in Riga, for being an exceptional research partner and for creating an atmosphere of friendship, understanding and mutual respect. Last but not least, I would like to thank Florian for always having an open ear and some late night feedback, and Lilith for being a bundle of joy and a source of inspiration.

Declaration
I hereby declare that this article is my own work. I used DeepL Translate to translate my writing from German to English, DeepL Write to optimise text, and Quill Bot Grammar Checker to proofread.

References

Braidotti, R. (2013) '*The Posthuman'*, Polity Press, Cambridge

Butler, J. (1988) 'Performative acts and gender constitution: An essay in phenomenology and feminist theory." *Theatre journal*, vol. 40.4, 519-531

Collingwood, R. G. (2005 [1946]) '*The Idea of History'*, Clarendon Press, Oxford

Dey, A. R. (2019) '*Contemporary Action Heroines: The Quest for Emancipation from The Male Gaze'*. Masters thesis, University of Huddersfield. http://eprints.hud.ac.uk/id/eprint/35034/

Eckstein, L. & Schwarz, A. (2019) 'The Making of Tupaia's Map: A Story of the Extent and Mastery of Polynesian Navigation, Competing Systems of Wayfinding on James Cook's *Endeavour*, and the Invention of an Ingenious Cartographic System', *The Journal of Pacific History*, Volume 54, pp.1-95; doi: https://doi.org/10.1080/00223344.2018.1512369

Eisenstein, S. M. (1989 [1937-40]) '*Montage and Architecture'*, *Assemblage* No. 10 (Dec., 1989), pp. 110-131;https://doi.org/10.2307/3171145

Fischer-Lichte, E. (2008) *The Transformative Power of Performance: A New Aesthetics.* Routledge, London

Gibson, J. J. (1979) *The Ecological Approach to Visual Perception*, Houghton, Mifflin and Company, Boston

Haraway, D. (1985) 'A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s', *Socialist Review* Nr 80

Haraway, D. (2016) *Staying With the Trouble. Making Kin in the Chthulucene*, Duke University Press, Durham

Hayes, C. (2003) 'Phantom Rides', *Screen online*, British Film Institute,http://www.screenonline.org.uk/film/id/1193042/ retrieved 2024-06-01

Köring, D. & Sommeregger, E. (2023) 'Vessels for New Digital Landscapes', in: Sommeregger, E., Köring, D., Jākobsone, L., Suhanova, D. & Traumane, M. (eds.) *(Building) New Perspectives through Practice-led Research in Art, Design and Architecture. Symposium Proceedings*, LMDA, Art Academy of Riga.

Kuleshov, L. (1975) 'Kuleshov' on *Film: Writings by Lev Kuleshov*, Ronald Levaco, R. (ed.) University of California Press, Los Angeles

Lütticken, S. (2005) 'An arena in which to reenact' in: Lütticken, S. (ed.) *Life, once more : forms of reenactment in contemporary art*. Witte de With, Center for Contemporary Art, Rotterdam

Mulvey, L. (1999 [1975]) 'Visual Pleasure and Narrative Cinema', in: Thornham, S. (ed.) *Feminist Film Theory: A Reader.* Edinburgh: Edinburgh University Press, pp. 58-69

O'Sickey, I. M. (2002) 'Whatever Lola Wants Lola Gets (Or does she?): Time and Desire in Tom Tykwer's *Run Lola Run*" in: *Quarterly Review of Film & Video 19*, Routledge, pp.123-131

Potente, F. & Thomas, D. (1998) '*Wish (Komm zu mir)*', song performed by Potente, F.& Thomas, D. Songwriters: Klimek, J., Heil, R., Tykwer, T., Duerr, T. & Gmbh, A. M.
Rowlands, M. (2015) '*Bringing Philosophy Back: 4e Cognition and the Argument from Phenomenology*', Routledge, Milton Park UK

Russell, L. (2020) '*Glitch Feminism: A Manifesto*', Verso Books, London, New York

Slanar, C. (2016) 'Warum Ereignisse re-inszenieren?' (Why Restaging Events?) in: Schnell, A. & Sommeregger, E., Waltraud Indrist (eds.) *entwerfen erforschen. Der performative turn im Architekturstudium*, Birkhäuser, Basel

Siewert, S. (2009). '*Entgrenzungsfilme : Jugend, Musik, Affekt, Gedächtnis : eine pragmatische Poetik zeitgenössischer europäischer Filme*', Universiteit van Amsterdam

Sommeregger, E. (2022) *Tupaia, Kybernetes & Lara Croft. Bodily Perspectives on Post-Digital Spaces.* Breite Gasse Publishing, Vienna, doi: 10.21937/9783950411195PDF

Sommeregger, E. & Messini, V. (2022) 'Posthumanist Sandbox, The Potential of Multiplayer-Environments' in: *UNITO Universities of Tomorrow: Global, Interdisciplinary, Digitised, Sustainable*. Conference proceedings, HTWG Constanz: https://nbn-resolving.org/urn:nbn:de:bsz:kon4-opus4-29970

Sorgner, S. (2022) '*We have always been Cyborgs*', Bristol University Press, Bristol

State, V. (2016) '*Virginia*', 505 Games

Tykwer, T. (dir.) (1998) '*Run, Lola, Run*', X Filme Creative Pool, Prokino Mediapart

Walden, K. (2004) 'Run, Lara, Run! The Impact of Computer Games on Cinema's Action Heroine' in Schubart, R. & Anne Gjelsvik, A. (eds.) *Femme Fatalities. Representations of Strong Women in the Media*, Nordicom, Gothenburg, pp.71-88

Ward, M. (2000) '*Being Lara Croft, or, We Are All Sci-Fi*', online article, *Popmatters.com*, retrieved 2024-06-01

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