444.2: Posthuman Performativity and Diffraction in Fashion XR

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ABSTRACT

Screen-based media, whose performativity as ability to effect material changes (Butler 1990) in its contexts of dissemination, is widely documented as carrier of ideology through examples such as cinema (Ryan and Kellner 1987) and the fashioned bodies it projects (Uhlirova 2021). While contemporary media content still often serves commercial and hegemonic interests, distributed access to emerging technologies for media production and dissemination has meant that diverse voices are empowered to tap into digitality's new convergences towards disseminating narratives for social change. Virtual reality (VR), augmented reality (AR), mixed reality (MR), collectively referred to as extended reality (XR) are some of the increasingly accessible modalities that can provide different and intensified conduits for digital storytelling.

This paper discusses the VR fashion film *444.2* as a posthumanist project which presents African cultures as cultures of technology by scripting in fashioned black bodies within the broader themes of astronomy and outer space. As a response to the call for the 'Forming Futures' theme for the 27th IFFTI conference, this paper presents my practice-based research as an instance of engagement with emerging technologies as fashion XR. By dislocating the hegemonic narrative of a singular reality, this transdisciplinary proposition becomes performative of the diversity of the Majority World. This paper discusses *444.2* in terms of the production of digital fashion bodies and world-building in VR through diffractive material-discursive thinking as 'doing' Baradian 'posthuman performativity' (Barad 2003; 2007) and 'quantum feminicity' (Colman 2023), to pluriversal (Escobar 2015) and decolonial ends.

Keywords: fashion digital media, fashion XR, posthumanism, diffraction, quantum thinking, digital storytelling

INTRODUCTION

444.2, which I directed and produced in 2022 for distribution in 2023, can be said to be the first VR fashion film of its kind. As a real time 6-DoF (degree of freedom)[1] project

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[1] A degree-of-freedom relates to the range of movement that is enabled in a virtual world experienced in a head-mounted device (HMD) or VR headset. While 3-DoF only allows head movement only, 6-

using volumetric filming, it has been showcased internationally, and notably at electronic and digital, computational arts academic conferences. A poetic introduction to *444.2* reads as:

The first star cluster mapped by the original stargazers of Southern Africa
constellates 444.2 light years away from Earth,
ancient astronomical practice superposed on the geography
and modern astrophysics
of the Southern African Large Telescope.

Immerse in the starlit & ghostly terrain of the Karoo, where volumetric fashion
performance unfolds to a cinematic Afro-diasporic score.

Costumed figurations and particle bodies morph in a triptych,
entangling African cosmology with the sublime of inner and outer space.

CONTEXTUALISATION

The research is introduced by briefly situating fashion as well as my interdisciplinary fashion and digital media creative practice in the broader context of the post-convergent digital landscape. This section discusses the project's adoption of a critical feminist posthumanist perspective, given the project's incompatibility with prevalent Western humanist ideals stemming from a dualist ontology. By reading *444.2* diffractively into the next section, with, and through quantum thinking in relation to feminist theory, the paper articulates how this output meets its objective of being underpinned by a critical approach, while taking shape as an innovative and generative encounter in VR.

Fashion media and digital post-convergence

Digital art practitioner Adam Nash (2015) argues that the convergence of media into digital media forms has been followed by the further merging of these formations into the post-convergent digital. Interdisciplinary practices such as expanded photography, digital filmmaking, game design, and fashion media - are increasingly configured into new formations as they become implicated in each other's production and dissemination through the use of shared tools and overlapping conventions. Virtual worlds, of which the metaverse, originally defined by a speculative fiction writer as a computationally generated world (*Merriam Webster*, 2024), are examples arising from the coming together of interdisciplinary practices.

DoF allows full user locomotion and very importantly, a sensation of depth within the virtual world created by the ability to move forward, backward, up and down left and right, along and between the X, Y, Z axes transversally and longitudinally, as in the actual world (Richardt et al. 2020)

Fashion as bodily and cultural practice, has a specific implication in these digital post-convergent formations. Users can be embodied as avatars in these worlds, and where other bodies are encountered across a broad spectrum of avatars ranging from digitised versions of actual persons or born-digital, 3D models as humanoid or non-humanoid avatars (Madhoo, 2024). Where metaversal contexts present the possibility for alternative ways of being, video games and interactive social XR platforms have also however become sites for the replication of existing issues as such as the objectification of other bodies in these new perfomative modes (Square, 2021), misogyny and racism (Bokinni, 2022; Channel 4, 2022) as well as other criminal forms of harassment (Gómez-Quintero et al. 2024) on these new platforms. Critical, feminist and posthumanist theories hold that these issues are ultimately created by the binary and political construction of social categories such as gender and race (Braidotti, 2013).

Ontological and epistemological locations

Western Enlightenment's Cartesian, dualist organisation of self>other and human>non-human has resulted in Eurodescended, heteronormative, able-bodied Man's exceptionalism and the weaponisation of difference to legitimise the physical and ideological oppression of his others (Braidotti, 2013; Stark, 2017). As a fashion filmmaker and a woman of Indo-African diasporic origins from the community of black, indigenous and people of colour (BIPOC), I have become acutely aware of the universality of the humanist paradigm and its incompatibility with efforts for social justice. Coming from this positionality, I therefore first adopt a post-qualitative approach (St.Pierre, 2019), which enables me to factor in my postcolonial subjectivity and embodied experience towards an account of situated knowledge production (Haraway, 1988). Post-qualitative research as driven by the critique of humanist Man's centrality (St.Pierre, 2014), aligns with a posthumanist lens on the world. Posthumanism is understood broadly as spheres of activity across the artistic, academic and sociopolitical domains and which have a specific concern for how technology extends and challenges the definition of what it is to be human (Gladden, 2016). A critical posthumanist framework is specifically concerned with gender-based and racism issues as the result of what the synopsis for Rosi Braidotti's (2021) book *Posthumanist Feminism* terms "the virulent return of patriarchal and white supremacist attitudes". My practice as concerned with the intersections of not only gender and race, but also technology, finds an adequate lens in posthumanism for examining and challenging Man's constructs of culture and progress as the drivers of an exclusionary modernity he claims as his territory.

The construction of contemporaneity as a uniquely Western phenomenon includes fashion's positioning as a specifically Western expression of modernity (Jansen and Craik, 2016) that has its foundations in the project of colonisation (Rovine, 2015). For the colonial system to work optimally, the subjugation it exercised was physical, as well as ideological (Macmillan and Bates, 2021). BIPOC bodies were not only

trafficked, but their technological and knowledge bases, arts and crafts, fashions and cultural heritage were appropriated, and assimilated into systems such as modernity that elevated Western epistemes and primitivised the same bodies and cultures that colonists benefitted from (Jackson 2012; Azoulay 2019; Rovine 2021). While Euro-descended women figured as second-class citizens in this system, "the black female body" was dehumanized, according to intersectional feminist theorist Zakiyyah Iman Jackson, through its vilification in Western scientific, medical, aesthetic and philosophical canons (Jackson, 2018, p.621), the effect of which was also felt in the original white feminist movements[2] who excluded black women from their fight for equality. As a filmmaker and BIPOC woman, I ask how fashion in its intersection with digital media, can be instrumentalised to undo the untruths this negative construction creates, and which still works at disadvantaging BIPOC women materially in a hegemonic system.

A review of literature in the context of this research reveals fashion's framing from the perspectives of posthumanism (Smelik, 2021), postcoloniality (Gaugele and Titton, 2019) and the critical appraisal of the phenomenon of digital blackface[3] (Square, 2021) as emergent discourse. The intervention that *444.2* makes is as a specific cut within an intersection of these areas, as well as a contribution of knowledge to a gap identified around critical fashion praxis in its configuration with new realities.

Using the non-narrative style of fashion film (Khan, 2012) where story is told through fashion performance, *444.2* is informed by postcolonial critique, yet seeks to function beyond it, as it strives for an innovative, productive becoming of the black feminine. As a cinematic production that enacts the material stake that BIPOC bodies have in territories they are excluded from, *444.2* brings together seemingly disparate elements such as fashion performance, astronomy and African cosmology, becoming an exercise of Baradian quantum thinking, "plugging in new concepts; attaching new points; diffracting points" (Bühlmann, Colman and van der Tuin, 2024, p.12), towards generating new, multiple Deleuzian lines of flight.

METHODOLOGY

Elizabeth St.Pierre's (2019, pp.4-5) post-qualitative inquiry was formulated in response to what she recounts as difficulties with reconciling the qualitative tradition's concern with objectivity, which she deems is a vestige of positivist, rationalist thought

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[2] In 1851, Sojourner Truth, previously a slave, asked white feminists who refused to let her speak at a conference since she was Black: "Ain't I a woman?" (hooks 2015/1981).

[3] Researcher of Afro-diasporic and black visual culture, Jonathan Square (2021), discusses examples of digital influencers such as Shudu and Lil'Miquela as BIPOC or racially ambiguous virtual characters puppeteered by non-BIPOC individuals and corporations as a neo-imperialist strategy and towards capitalist gain.

incompatible with post-structuralist thinking.[4] As practice-based research, aspects of the methods were emergent (Barrett and Bolt 2010). In order to understand what *444.2* became important to look at how I conceptualised and analysed the output. A shift was made from looking at concepting and analysing things interpretively to one looking at how the digital fashion bodies and virtual world of *444.2* were produced using the method of diffraction. This is following Bühmann, Colman and van der Tuin (2024:4), who hold that "(s)tudies of production… are pitched as offering insight in all elements driving the actual writing/composing, materialising, interpreting and further distributing of texts/recordings/visuals."

Diffraction

Drawing from the physical behaviour of light, the suggestion for the use of diffraction as a research method in lieu of reflective methods was first made by Donna Haraway, drawing from the work of Trinh Minh-ha (Schrader 2023, p.20). The potential that diffraction is a process that generates the new instead of what already is (Haraway 1999) is explored further by physicist Karen Barad's (2003; 2007) reference to diffraction in quantum systems. In the double-slit diffraction grid experiment, electrons are observed as waves producing an interference, or diffraction pattern, which is understood as mapping "where the *effects* of difference appear" (Haraway 1999, p.320). Where difference has been weaponised through Descartes' dualist ontology (Stark, 2017, p.70), diffraction troubles the traditional dualist, oppositional conceptualisation of difference (Haraway, 1999). When electrons are subjected to measurement in the double-slit diffraction grid experiment, they emerge in the particulate form, showing that matter can exist as both wave and particle (Barad 2014). This wave-particle duality nature of matter is in contradiction of classical theories of physics, which understand matter as particular and which obey Newtonian laws of physics.

Barad makes it clear that she does not intend an analogy of quantum phenomena for interpretive purposes in other systems, but rather, she considers the effect of the encounters of bodies - as matter and in quantum terms (Sellberg and Hinton 2016). Barad (2007, p.36) further argues that diffraction is not only about difference, but also about the entangled nature of matter – its ability to be both wave and particle as a result of quantum entanglement is what gives rise to materiality (Barad, 2007, p.392-393). This infers that the properties of the matter that makes up bodies are entangled and co-constituted and that the conditions for the existence of bodies is therefore predicated on the material-discursive entanglement of matter.

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[4] Although post-qualitative research is resistant to the notion of methods (St. Pierre, 2021), 'methodology' and 'method' are used for the sake of communication of how the research was designed.

Underscoring the Material-Discursive

As a point of departure for the project, instead of 3D modeling assets for the virtual world, a tacit decision was made that actual data captures would be effected from the location of the Southern African Large Telescope whose geographical location doubles up as the notion of place from which the First Peoples of the African continent and their descendents engaged in stargazing activities as proto-astronomers as early technology entangled to spiritual activities (Alcock, 2014; Holbrook, 2021). LiDAR (Light Detection and Ranging) and drone photogrammetry captures were done on site in Sutherland, South Africa by a locally-based production team. This intent for inscribing meaning from actual bodies was echoed with the volumetric filming of Jessie Oshodi as a performer of African diasporic origins, done in Melbourne, Australia.

Reading this through N. Katherine Hayles' (1999) theory of inscription and incorporation, it became possible to articulate how these methods perform the material connection with the physicality of actual bodies and place for the production of their digital twins that could then be proposed to encode the respective performativity of politicised bodies and a geopolitics of place. The posthuman theory of inscription and incorporation is a materialist theory of media, as it contests the worldviews that separate data from the media and materialities it derives from, into "bodiless information" (Hayles, 1999, p.12), which reinforces the information>matter binary (Hayles 1999, p.13). Media's materiality is also theorised by Anna Munster (2006), and Jussi Parikka (2015). Munster's (2006) text discusses technology a co-constituting bodies, while Parikka (2015) convincingly anchors media production in the geological, earth-sourced minerals that power the technology to - the politics of the bodies involved in the totality of its life cycle.

444.2's use of digital tools such as volumetric filming, and photogrammetry capture are processes that capture RGB data which are Red, Green and Blue values which make up the pixel-data in each frame is created in response to the photons of light bouncing off the surface being captured. Similarly, LiDAR scanning used primarily for geospatial mapping, captures laser readings bounced off an actual static surface to create data that is then configured into a 3D object. While photogrammetry uses the overlapping 2D points in images to calculate static 3D spatial positioning (Wilken and Thomas 2022), volumetric capture and LiDAR are technologies that sense respectively moving and static, depth and spatial data towards an accurate reconstruction of 3D models on computational platforms (Intel 2018; FARO 2024). Rather than using the term 'capture', Julien (2021), refers to Barad and Gandorfer (2021) to suggest that the apparatus is rather, an agency that enables the creation of digital artefacts and spatiality for the different organisation of matter and towards differential meaning-making.

Materially, the capture of RGB and depth data from, for instance, Oshodi's fashion

performance, consists respectively of the photons of light and infrared photons bouncing off her body and textile surface in movement to become digital data, ones and zeros inscribed as charge on the material surface of data storage devices, to then be further re-organised and transformed into a graphic reconstruction of a digital twin in the game engine Unity. By diffracting the process though theories of media materiality including Hayles' and Barad's, this paper proposes how the physical data as material processed through the apparatuses and *444.2*'s fashion XR computational and graphic workflows of are material processes that produce digital bodies that exceed mimetic re-presentation. Rather than re-presentations, digital twins can be understood to interface the actual and digital (Boddington 2024) – 'interfacing' proposes a dynamic, rather than fixed relationship. In *444.2*, digital fashion bodies reconstructed in the augmented spaces of 3D software and game engines exceed mimetic re-presentation, becoming digital embodiments in relationship with the physical subjects and objects they derive from (Madhoo, 2024), opening up virtual potentiality or Deleuzian *puissance* as the other bodies of immersants encounter these in VR. The link is material-discursive, by the means and context of its production and dissemination.
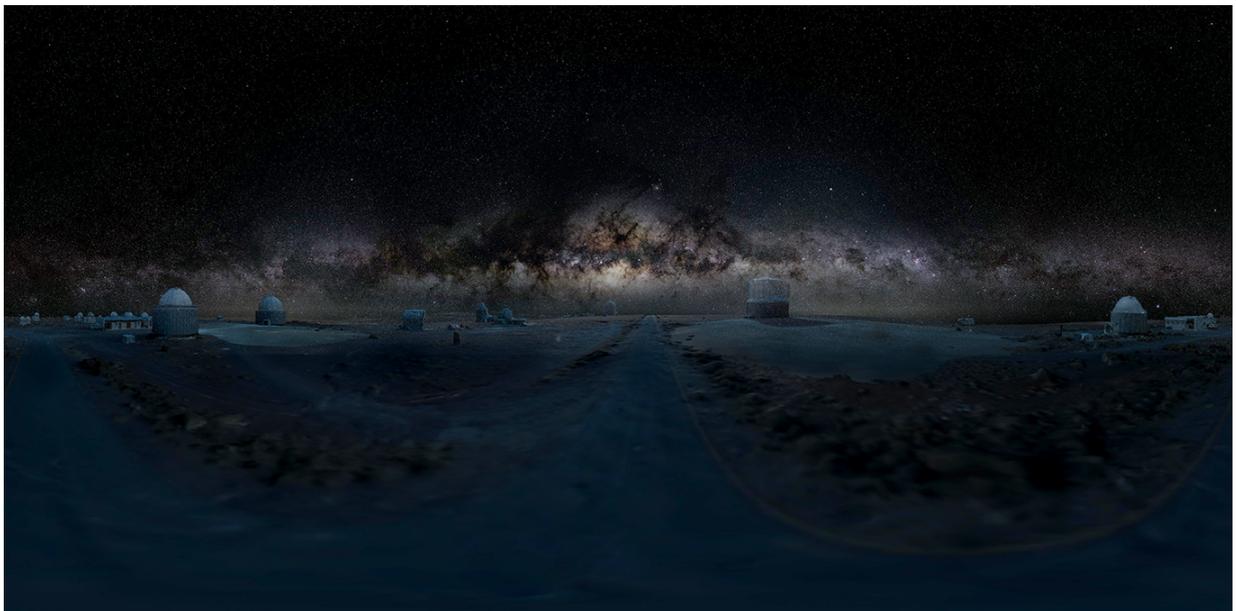
Fig. 1 360° image export from the digital twin of the Southern African Large Telescope site reconstructed from drone photogrammetry for *444.2*. In Unity, a different Milky Way skybox was used. Here the panoramic image is composited with *The Milky Way Panorama* by ESO and S. Brunier (2009) for a 2D artistic impression of the virtual world.

Where a traditional objective lens would be limited in its reading of the processes described in the previous paragraphs, a posthumanist perspective acknowledges the coming together of the different bodies, human and machinic as Deleuzian agentic assemblage. The diffraction of fashion performance through digital media and vice

versa reveals Oshodi's costumed performance as gesture encoding embodied knowledge; body and textile surfaces in movement encoding gesture, which as becoming-data, in a material entanglement with the apparatus, can be reconstructed as malleable topologies in a game engine such as Unity. The same applies for the scans of the semi-desertic terrain of the Karoo and the SALT observatory structure (see Figure 1), which are used for world-building in *444.2*. Apparatuses as agencies in *444.2* can be understood to enable the material interfacing of geopolitical place and digital worldbuilding.

The composition of all elements, including the scenography in Unity game engine, music and the treatment of digitised surfaces with visual effects, inscripts and incorporates (Hayles 1999) the materialities of the bodies and processes involved as posthuman performativity (Barad 2003). These all come together for XR storytelling, discussed in the next section.

DISCUSSION

The relationships that make up *444.2* and the bodies and other-world encountered are proposed as quantum and entangled, not from a unifying material perspective, but rather through materiality, and data as material relations, and as per Barad (2010, p. 265), "specific material relations of the ongoing differentiating of the world". This section continues in a Baradian quantum, feminist stride; and where the African cosmology and Afrofuturism in *444.2* finds further attunement with Felicity Colman's (2023) 'quantum feminicity'.

African cosmology, afrofuturism and quantum bodies

African cosmology refers to the way in which African cultures conceptualise of the universe and perceive reality in relation to their origin stories; its bodies and practices, multi-species bodies as a natureculture continuum (Haraway, 2008) linked to its starlore (Alcock, 2014; Emeagwali and Shizah, 2016). The 'stellification'of people, and events such as migrations into constellations was not only for storytelling purposes grounding the ancient cultures (such as the Khoe and San) in their broader environments, but also functioned as mnenonic systems, or memory-making for practical purposes and the mapping of time in relation to early technological activities, including navigation and agricultural planning (Holbrook, 2021).

444.2 is an exercise of Afrofuturism for the way it embeds African cultures with a concern with space and futurity (Womack, 2013) through its relationship with SALT as a signifier of modern astrophysics. This Afrofuturism is performative of Colman's (2023) quantum feminicity as the immersant is confronted with the black feminine as digital fashion body, becoming-technology in the virtual world of *444.2*. The costumed figurations morph into particle systems in the film's alternative science fiction sensibility, a feminist story of space. Data points from body and place as material-

discursive figurations are enabled spatially and graphically in the game engine (Unity in the case of *444.2*). In this volumetric scenography, the fashioned body's surface as digital body and digital textile movement instantiates particles, extending her performance to the cinematic score, (digitally) materialising an affective performance that in turn, enfolds the immersant in VR.

With reference to Barad, Colman (2023, p.10) theorises quantum feminicity as feminist theory's engagement with quantum physical concepts such as diffraction, superposition ad entanglement which are understood and experienced through political, lived feminisms, and "intergenerational, revisionist accounts of feminist praxes of events in feminism" such as "digital, post-structural, posthuman". One of the operationalities of quantum feminicity is to 'countermander time', meaning it can "rescind, reverse, undo, repeal, retract…take back…override, overturn, overrule…" (*Oxford Languages* 2024) the Western and masculinist construction of linear time (Colman, 2023).

For instance, in *444.2*, isiXhosa as the living language deriving from |Xam, the extinct language of the Khoe and San is used in a poetic narration as prelude to the film. The voice of the performer, a Xhosa woman, Nasfa Ncanywa was treated electronically to sound like different generations of women – girl, woman and *gogo* (grandmother) and written to work with music composed with African instruments, their textures and tones modulated to intensify the sonic qualities of natural-cultural African landscapes. In Act 1 a volumetric figure appears (See Figure 2); her digital surface fashioned to look and sound like ancient data. Monumental, she summons the Large Telescope observatory with gesture and to a vocal swell in the music. Through the track's tempo, the figure's movement, shaped by her sculptural costume, moves to a rhythmic cadence reminiscent of the migration of elephants, matriarchal, deliberate and leading the immersant into the virtual observatory as portal to the stars. Rather than as a linear[5] quantitative phenomenon, time from an African cosmological framework is considered as a lived experience via phenomena such as celestial motions and the menstrual cycle are considered in relationship with other phenomena such as the behaviour patterns of animals in the ecosystem (Mpofu, 2016, p.65). A relational onto-epistemology (Barad, 2007) of time which implicates the visceral body and its bodily practices, would have shaped the ways in which cultural production such as fashion and music have been imagined in these societies. The triptych of fashion performance that unfolds in *444.2* to the voices of artists from African diasporic artists can be said to carry the bodies of generations of BIPOC bodies; bodies not re-presentationally quantum, but performatively entangled and superposed quantum bodies.

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[5] Western, linear time as technology however has its roots in 'cultural technologies' with evidence of the first mathematical artifact discovered being the Lebombo bone from Southern Africa (35,000-43,000 years old), a baboon fibula marked with 29 evenly spaced notches and said to relate to the lunar calendar, speculating the very first mathematician was a black woman (Palmer, 2022, p.248).

Users who are open to being immersed and engaged in an embodied encounter with other bodies in an extended reality, experience the flow of affects generated by the artwork as intensified by the spatialised medium. In this scenario, the temporal and conceptual superpositions in the immersive film create a different sense of time felt in relationship to the music and fashioned gesture and movement through the world.

Fig. 2 Image composite of the virtual interior of the SALT Observatory reconstructed from LiDAR data for the promotion of *444.2*. Jessie Oshodi as the costumed figure wears garments from RMIT alumna Michelle Li's fashion collection and is composited with an image of *The Milky Way Panorama* by ESO and S. Brunier (2009).

The effect of differences in terms of temporality and in terms of the conceptual superposition of seemingly disparate ideas in *444.2* is that these generate new diffractions and open the space for new ideas and frameworks (Colman, 2023, p.3). Arturo Escobar (2015) looks at design in particular as a form of materiality that that shapes bodies and spaces. I extend this idea to propose the different digital materialities we encounter through post-convergent media can do the same. As exemplified by *444.2*, fashion XR as digital storytelling can therefore also be used to both enact and instill particular ideas and politics into bodies and spaces.

444.2 takes the shape of a pluriverse (Escobar 2015), an other world which accommodates many other worlds, something that coloniality and the singularity of its ontology cannot conceive of. It is by this means that *444.2* emerges as 'doing' decoloniality, even so if perhaps differentially engendered from my situatedness of my subjective approach.

CONCLUSION

444.2 presents an affective journey through an XR world; a pluriverse, which through Afrofuturism, complicates binary worldviews such as nature-culture, body-technology, ancient-modern. VR as digital storytelling offers an embodied experience.

It is therefore difficult to understand exactly what it does, unless it is experienced. By using diffraction as a method to analyse the project, the paper has however attempted to communicate how an XR world can become, through the agential assemblage of fashion performance, music, digital worldbuilding, while implicating the very material and discursive processes of their production to critical ends.

The discussion of *444.2* through quantum thinking and quantum feminicity has seen this fashion XR, critical posthumanist project become less about fashion itself, but rather about the relationship between many material-discursive elements (of which fashion is one of the actants) that co-constitute this type of world-building. It indicates that my practice is shifting towards a more transdisciplinary modality, which is a direction that I intend on pursuing further for future projects.

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