_DIGITAL DECAy

glitch architecture

by. BLAIRE HASLOP

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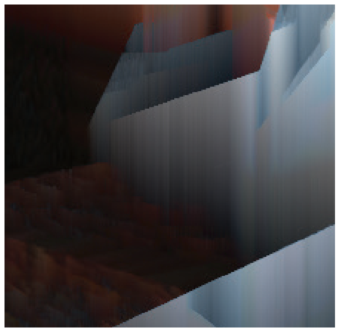

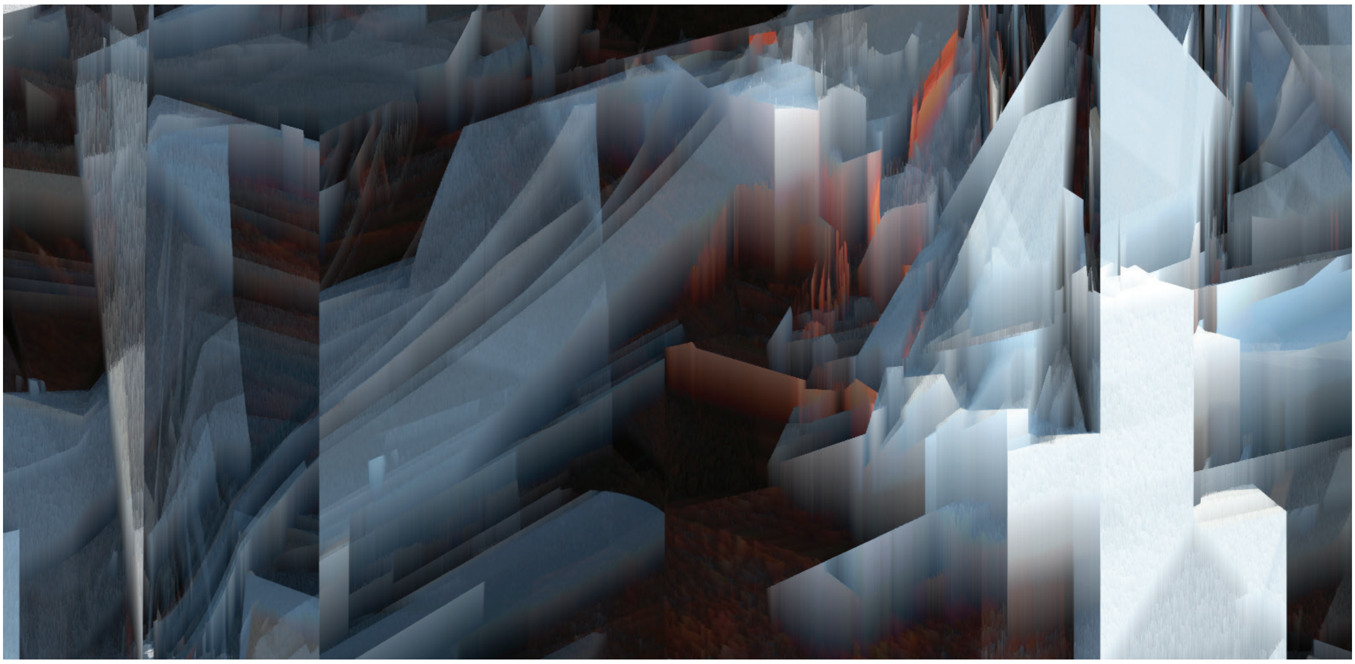

Figure 1.1 Pixel sorting (Kortbeek, 2013)

This is not just a book-mark, these are your anaglyph glasses which you will need to view stereoscopic animations and stills. They can be employed as a bookmark also.

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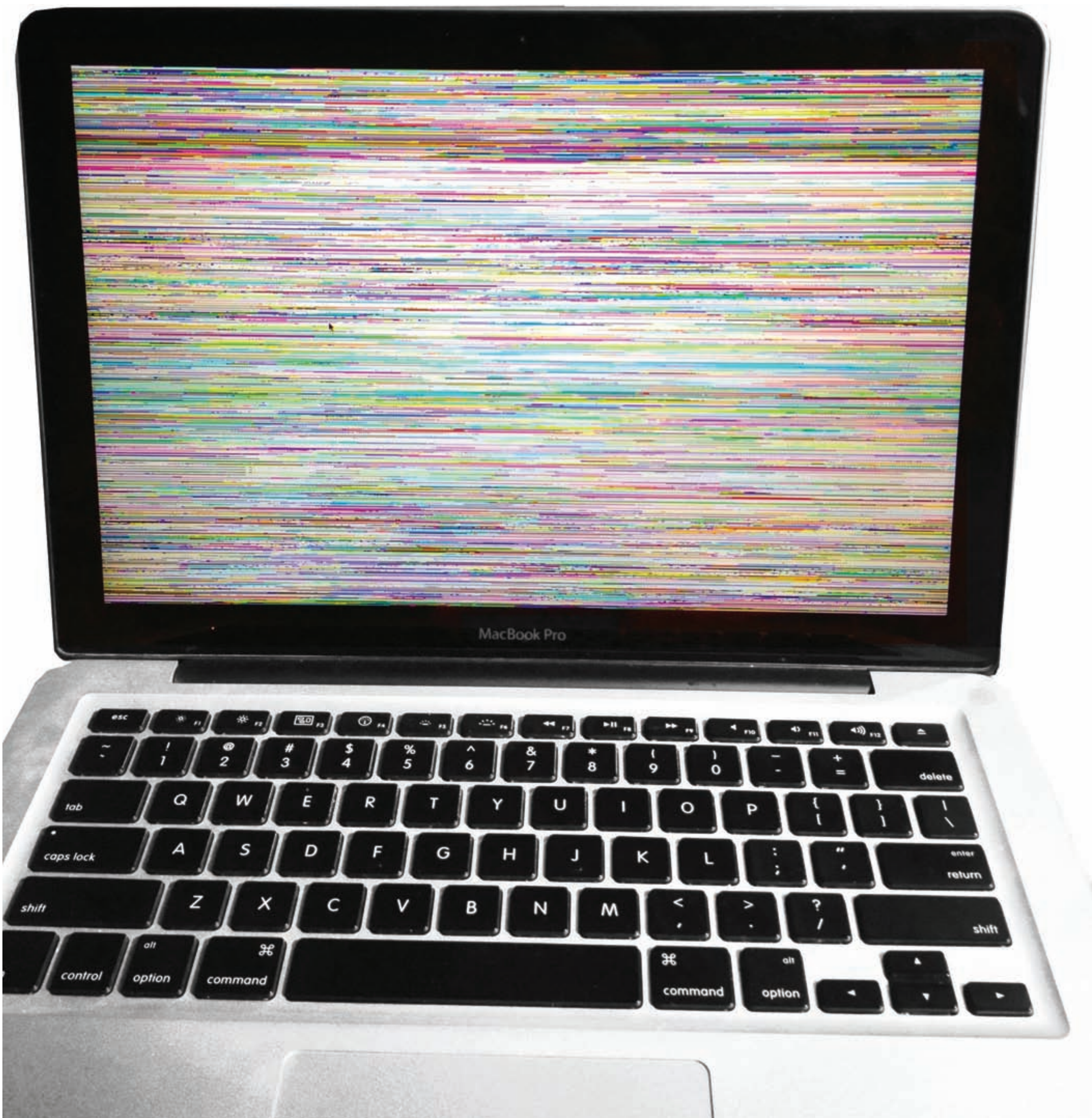

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First and foremost, I must acknowledge my supervisor Marc Aurel Schnabel for your continuous support throughout this year, for extending my horizons and encouraging me to take this research internationally. You make everything look easy and with your guidance I feel I have achieved something fantastic here.

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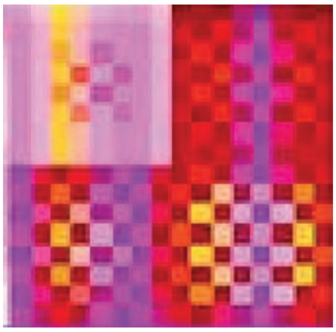
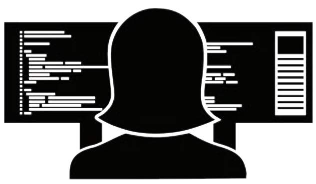
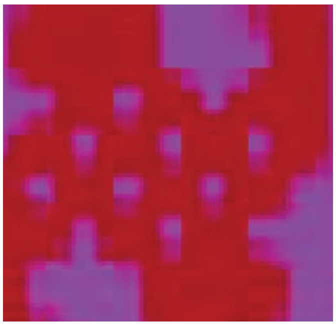
To the Glitch Artist Community for accepting me into your society and providing unique feedback throughout this year, I feel very much a member and will always be a glitcher now.

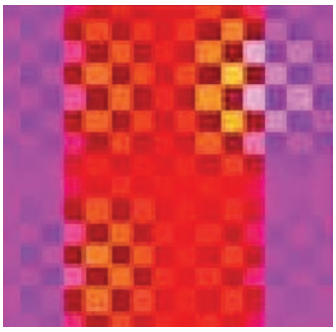

Postgraduate Teaching Award







How can glitch as a result of digital decay be interpreted in three dimensional form?



ABSTRACT

We now live in a world where architecture is produced through arrays of pixels and this remains as the representation rather than the reality of buildings inevitably ageing their physical forms. So if architecture is kept in this digitally frozen state, then how does architectural form age over time? It glitches. A glitch is defined as a sudden malfunction or fault caused by the harsh reality of digital decay. Currently glitches as a result of digital decay are solely explored as forms of 2d art therefore this thesis looks to reconnect the underlying data to its digital architectural spatial form and interpret digital decay in 3d. Our methodology follows a systematic iterative process of transformational change to explore design emergence on the base of computational glitches. A numerical data driven process is explored using decayed files which are turned into 3d formal expressions. In this context, stereoscopic techniques are experimented, helping understand further how glitch can be performed within a 3d virtual environment. Ultimately we explore digital architectural form existing solely in the digital realm that confidently expresses glitch in both its design process and aesthetic outcome. This thesis does not aim to answer the research question through a resolved building, we instead define architecture as three dimensional digital form and space. This thesis uses glitch as a methodology to design three dimensional spaces within the digital realm. The architecture exists in the digital therefore the spatial perception of architecture created through this research is in the eye of the beholder and their previous spatial experiences. Employing a methodology of transformational change to explore design emergence on the base of glitches or decayed files, the aim is to generate a contemporary architectural interpretation of decayed data. (Haslop et al., 2016)

THERE'S NOTHING HERE.

WHATEVER YOU WERE LOOKING FOR DOESN'T CURRENTLY EXIST AT THIS ADDRESS.
UNLESS YOU WERE LOOKING FOR THIS ERROR PAGE.
IN WHICH CASE, CONGRATS! YOU TOTALLY FOUND IT.

Figure 1.2 Error Message (Tumblr, 2016)

FF D8 FF E1 06 EA 45 78 69 66 00 00 4D 4D 00 2A 00 00 00 08 00 05 01 1A 00 05 00 00 00 01
00 00 00 4A 01 1B 00 05 00 00 00 01 00 00 00 52 01 28 00 03 00 00 00 01 00 02 FF FF 02 13 00
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00 04 11 05 12 21 31 41 06 13 51 61 07 22 71 14 32 81 91 A1 08 23 42 B1 C1 15 52 D1 F0 24 33
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8A 92 93 94 95 96 97 98 99 9A A2 A3 A4 A5 A6 A7 A8 A9 AA B2 B3 B4 B5 B6 B7 B8 B9 BA C2 C3
C4 C5 C6 C7 C8 C9 CA D2 D3 D4 D5 D6 D7 D8 D9 DA E1 E2 E3 E4 E5 E6 E7 E8 E9 EA F1 F2
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87 88 89 8A 92 93 94 95 96 97 98 99 9A A2 A3 A4 A5 A6 A7 A8 A9 AA B2 B3 B4 B5 B6 B7 B8 B9
BA C2 C3 C4 C5 C6 C7 C8 C9 CA D2 D3 D4 D5 D6 D7 D8 D9 DA E1 E2 E3 E4 E5 E6 E7 E8 E9
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4C E1 50 EF C4 50 C9 21 C6 5B FD 8A A1 E2 3D 62 E2 F6 E1 EC D0 91 6C 8D B0 04 63 B6 4C
63 25 B9 C3 7C C0 E3 DA BB AB 3B 47 B9 82 E4 46 C5 E5 92 DA E2 38 F2 DC 6F 78 D9 00 AE
7E 3F 0E 0B 3B 6B A9 B5 35 5F 3F 7B 79 63 70 20 46 17 24 FF 00 3F CA 9C B1 9C 55 4D C0 D7
9F 79 52 FF 00 CF 43 F9 9A 3C A9 7F E7 A3 7E 66 B4 7E 41 C2 A1 C0 E9 F4 A4 C8 FF 00 9E 67
F2 A2 9D 5D 8D A6 B3 1C 6F 27 DA 64 DD E5 26 78 85 30 FB C1 C8 C3 CA 70 42 F4 C6 EF 9B
D2 B5 D6 4B 3B 98 ED 9A D9 9A 4D D1 43 3D CC 86 55 55 8D F6 60 46 83 82 77 4B 24 79 1F
31 52 BD 6B 29 FC 3F 69 0B 6D 90 CF 2B 63 39 8A DD 40 FC CE 7F 9D 48 BA 5D B2 21 9B 37
A9 E4 7E F0 24 9E 5F F0 7C DF C3 9F F1 A5 51 CD 3E DF 99 56 B9 AB D9 16 79 2E BC C6 0D
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AB 40 78 8A FA 0C 4D 68 6D AD 77 CB BB 65 B8 91 F6 B0 E3 9F 3D A5 EA 31 FC 47 B5 6C FF
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A5 4E 3E 5C 56 3D B6 8F 77 7B F3 CE 45 9C 6E 7E 55 D8 C4 F5 FE E1 3B 80 FF 00 78 E6 BB
9F 0E 78 56 04 B5 D5 26 BB 68 6E 24 2F 71 65 1E C7 94 79 7F 67 95 E3 97 76 36 FF 00 AC 2A
AC BF EC E2 9D 59 01 80 39 AF 31 0C 98 1C F6 A5 DF 1F F7 AB 4E 5B 04 49 64 5C 7D D7 61
F9 1A 8F EC 49 E9 4B B0 D3 72 2B BC 96 E2 F3 38 89 E3 D9 8F E2 DC 4F E8 45 55 99 2E 5A
CE E0 9D 81 48 D8 EE 91 9D A3 CD F9 06 7F 78 3E BD 7A 03 56 6A DC 84 FF 00 62 6A 23 27
0B 2D B9 1E C4 EE 07 1F 5A 13 AD 5B B2 FF 00 8F 94 FA 8A F2 8B E8 A3 8B 64 69 92 C0 BE
E2 46 37 73 8D C3 D8 E2 B4 A1 D4 61 8E 38 84 70 22 C8 B6 F8 69 86 EF 37 74 70 63 AA F3 B5
8A E3 AE 07 5A A5 A9 00 26 5C 0C 7E EF FA 9A A9 17 FE C8 FF 00 FA 01 A4 AB 7A A9 DD 21
AE 9E C2 49 B5 27 58 E1 66 DE CA C5 A1 69 5D 87 CA 47 39 94 E3 BF AD 5D 17 3A 9E 99 E7

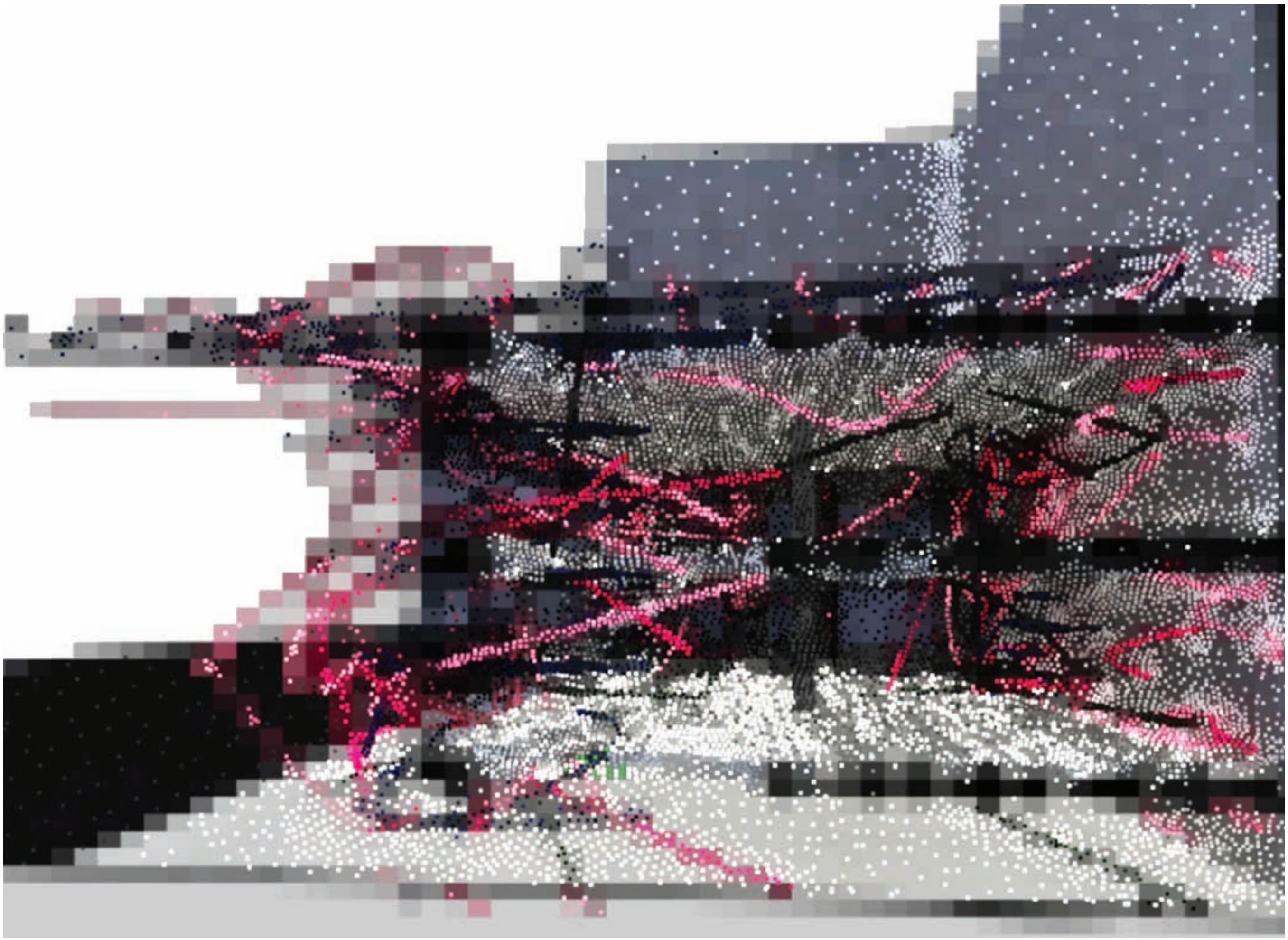
CHAPTER ONE

INTRODUCTION

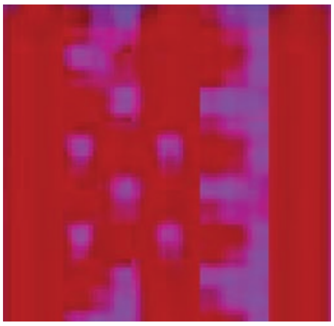
In this digital age the architectural output is now both the physical building existing within the built environment and the digital model remaining within the digital realm. Both physical and digital forms are subject to constraints and natural forces that impede architectural production and maintenance, decay being one. We understand the slow weathering decay of the physical world but struggle to comprehend glitch as a result of decay within the digital realm. Digital decay is not the wear of a tangible material but the decomposition of binary codes perception, creating new interpretations as perception is shifted. Architecture and digital media researcher Almond writes, “we are all aware of the decay that exists in our physical world, we are exposed to degradation, death and destruction frequently. We still struggle however with the concept of decay in the digital sense. We forget what we have been taught, but we do not expect our computer to forget what we have used it to create.” (Almond, 2009) We are constantly updating our digital systems with little understanding of the effects this has on the information’s continued legibility. Files are not resilient to our constant digital updates. We can look to digital forensics and digital cultural preservation or we can embrace glitches as the opportunity for appreciating digital aesthetics. We find beauty in age within the physical world, we view derelict ruins as poetic and nostalgic, contrastingly our reactions to digital decay are that of temporal anxiety. Shipwright writes for Uncube magazine, “glitch surely warrants attention within the field of architecture precisely because it is in this realm that aesthetics and technology are so inextricably woven together.” (Shipwright, 2015) This computer aided architectural design research works with generative algorithmic and evolutionary data driven experimental design methods to interpret and understand digital decay through architectural form. We are advancing glitch as digital decay from its non-graphical and 2D image representations into meaningful 3D architectural interpretations. Glitch brings us to question how we can use digital decay as a means of designing digital 3d architecture and how architectural form and space can help us to understand and appreciate digital decay in the form of glitch.

The thesis research discusses these questions in the context of architectural design. With regards to digital decay, a glitch is defined here less as transient and temporary than as a sudden perpetual error caused by the unexpected decomposition of digital information that this thesis embraces as the innocence of digitally 'aged' aesthetics. Glitch is regarded as a stimulus to questioning the limits we can reach in digital modelling and the predictability of digital files (Almond, 2009; Temkin, 2014). Glitch deepens the appreciation of human agency and creativity within the digital realm of architectural design in the way glitch humanizes the computer. A glitch acts deep within our technology and comes about seemingly unexpectedly (Shipwright, 2015). We can look to digital forensics, file restoration and cultural preservation (Webb and Brown, 2016; ibid., 2011; Brown and Webb, 2010; Kvan, 2016), or we can embrace glitches as a new opportunity for a digital antique (Schnabel et al., 2016; Aydin et al., 2016).

Figure 2.3 Capture of render process for pilot study



The unique contribution of this research is that it treats glitch in two forms; first as ‘the given’ and second as ‘the in-formed’. In contrast precedent works tend to observe the relation between these two forms in an ‘immediacy’. Two glitches are always seen on the same horizon, producing no triumphant hierarchy between each other, which is bounded to a phenomenological deadlock, whereas its subjective capture finds room to grow into static protocols. There- fore, glitch works tend to create monolithic outcome. However, the glitch itself seeks a vertical dimension and an excessive remainder between glitch as ‘the given’ and glitch as ‘the in-formed’. The present work identifies this unknown and unexplored part in which its sporadic nature is questioned.



DIGITALLY DECAYED FILES

We are constantly updating our technology striving for the next best but we understand little around how the legibility of these files can be managed or sustained in innovative and emergent forms. Sarah Kessler writes, “the problem with digital… is that it requires active upkeep. Most computers don’t have the floppy disk drives that were standard 15 years ago. Nor do they run the same operating systems or software used to create documents saved to floppies — even if the data is recovered, it may look more today like a garbled mix of symbols than your first novel written in WordPerfect.” (De Groote, 2013) This rearrangement and reinterpretation of code due to computer systems being updated is not our usual definition of old, however it is the inevitable antique of our digital world. Digital decay really is a natural and happening occurrence. Member of the IEEE Transactions on Software Engineering Computer Society Stephen Eick writes, “we have observed a nearly unanimous feeling among developers of the software that code degrades through time, and maintenance becomes increasingly difficult and expensive.” (Eick, 2001) With an entire generations history stored in these binary bits, ‘bit rot’ (Coupland, 2017) is more threatening that the average layman can comprehend. Ohlmann writes, “most of our digital media is dying faster than we can preserve it. CD’s become unusable over time, storage formats become obsolete and discarded, leaving people with no way to save their information. Tapes die, hard disks crash, sometimes a power surge happens and bits simply get shifted.” (Ohlmann, 2007) There are copious amounts of research at relevant online discussion forums debating digital cultural preservation and file transfer updates, (Webb and Brown, 2016; ibid., 2011; Brown and Webb, 2010; Kvan, 2016) however little on embracing digital glitches as an aesthetic of the aged that has its own value and heritage. Eick writes, “because the digital bits that define it are immutable, software does not age or wear out in the conventional sense. In the absence of change to its environment, software can function essentially forever as it was originally designer. However, change is not absent but ubiquitous.” (Eick, 2001) ‘Bit rot’ implies that 1’s and 0’s of binary code rot (Pritchard, 2016), however it is the computers perception and reinterpretation of the code due to system updates that corrodes. Furthermore, it is beneficial to consider that ‘corrossion’ of digital data is simply a point of view, a human percpetion that can likewise be shifted to find beauty and delight in digital decay in the form of glitch, in which this thesis encourages.

DIGITALLY DECAYED SAMPLE

Figure 2.4 Laura Beverly took footage while on film sets that she later stored on a hardrive. When the hardrive storage device was accidentally dropped all the footage was naturally data-moshed. (Beverly, 2016)

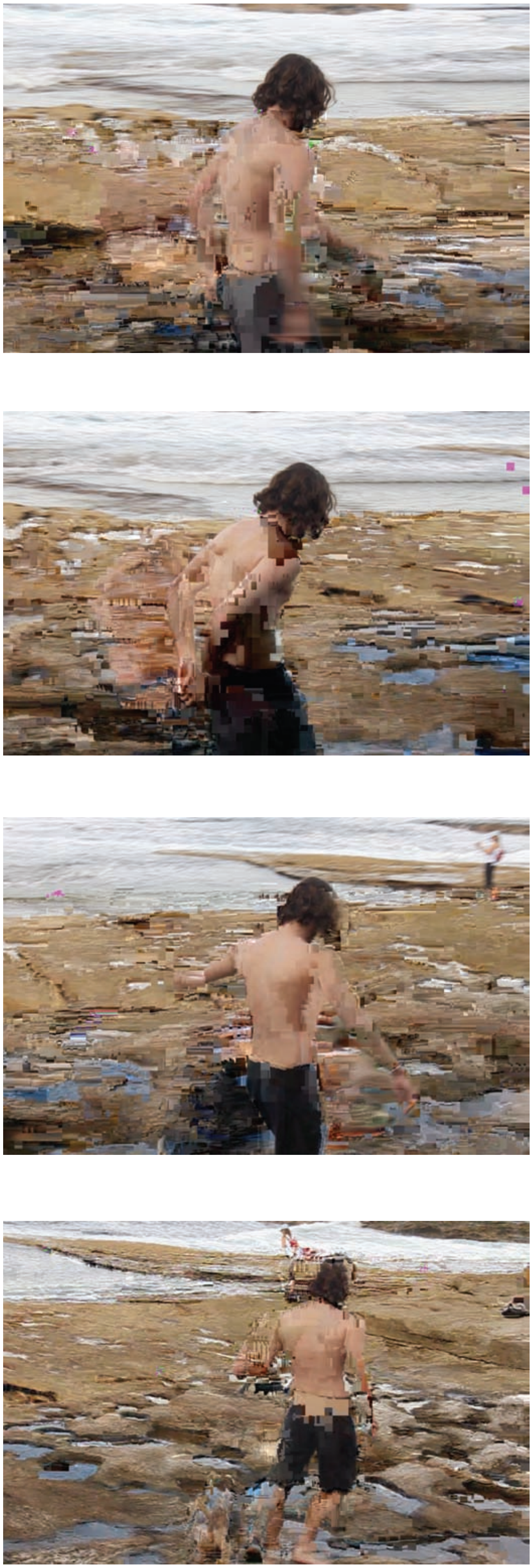


Figure 2.5 Naturally data-moshed video footage from dropped hard-drive storage device. (Beverly, 2016)

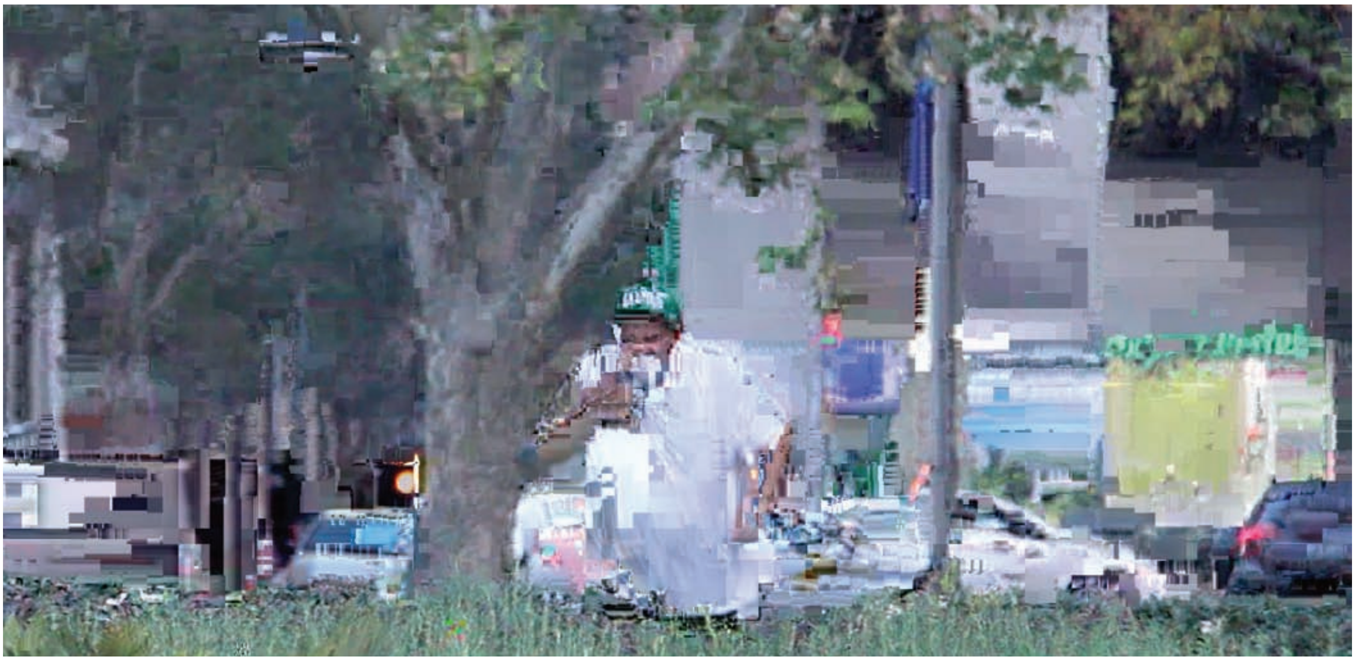


Figure 2.6 Naturally data-moshed video footage from dropped hard-drive storage device. (Beverly, 2016)

BEAUTY IN PHYSICAL DECAY

There is a wealth of knowledge discussing the way in which humans find beauty in decay dating back centuries, therefore this notion will only be briefly reviewed through a contemporary installation precedent. British Artist Alex Hartley recently created an architectural intervention called 'A Gentle Collapsing II' which sits amongst the waterside gardens of the Victoria Mira Gallery in London. (Mira, 2016) The piece speaks about modernist legacy and the romantic notion of decay. The clean lines and crisp white walls of our well known modernist architecture is seemingly left open to the elements with an accelerated process of ageing. (Mira, 2016) The press release suggest that "the work offers poignant reflection on themes of entropy and decay… Running contrary to such thoughts, however, is the undeniable aesthetic pleasure we find in ruins – their compelling, transportative quality." (Mira, 2016) This is a nobel precedent demonstrating the beauty of decay not only in the natural ruins but also in the conscious premeditated decay. The artists use of modern architecture provokes the audience to concurrently reflect on decays alignment with time with a consideration for the future. The gallery writes, "for Hartley, this is a surprisingly fertile territory, one that allows the imagination to roam freely, to envision what might have been and what might be to come." (Mira, 2016) Hartley is picking up on the romantic notion of decaying ruins and provoking the viewer to question how our modern architecture decays. These ideas are parallel to glitch in the way we are picking up on a natural decay within the digital and questioning modern technology through architectural re-interpretation.

Figure 2.7 'A Gentle Collapsing II' (Miro, 2016)

Figure 2.8 'A Gentle Col-
lapsing II' (Miro, 2016)

Imagine if throughout the decaying process of a physical building we knew where to restore each piece of nearby stone and rubble so that we could put back the original architecture piece by piece, would we always want to? We expect to be able to put digital code back together, but should we?

(Hass, pers. Comm. 2016)

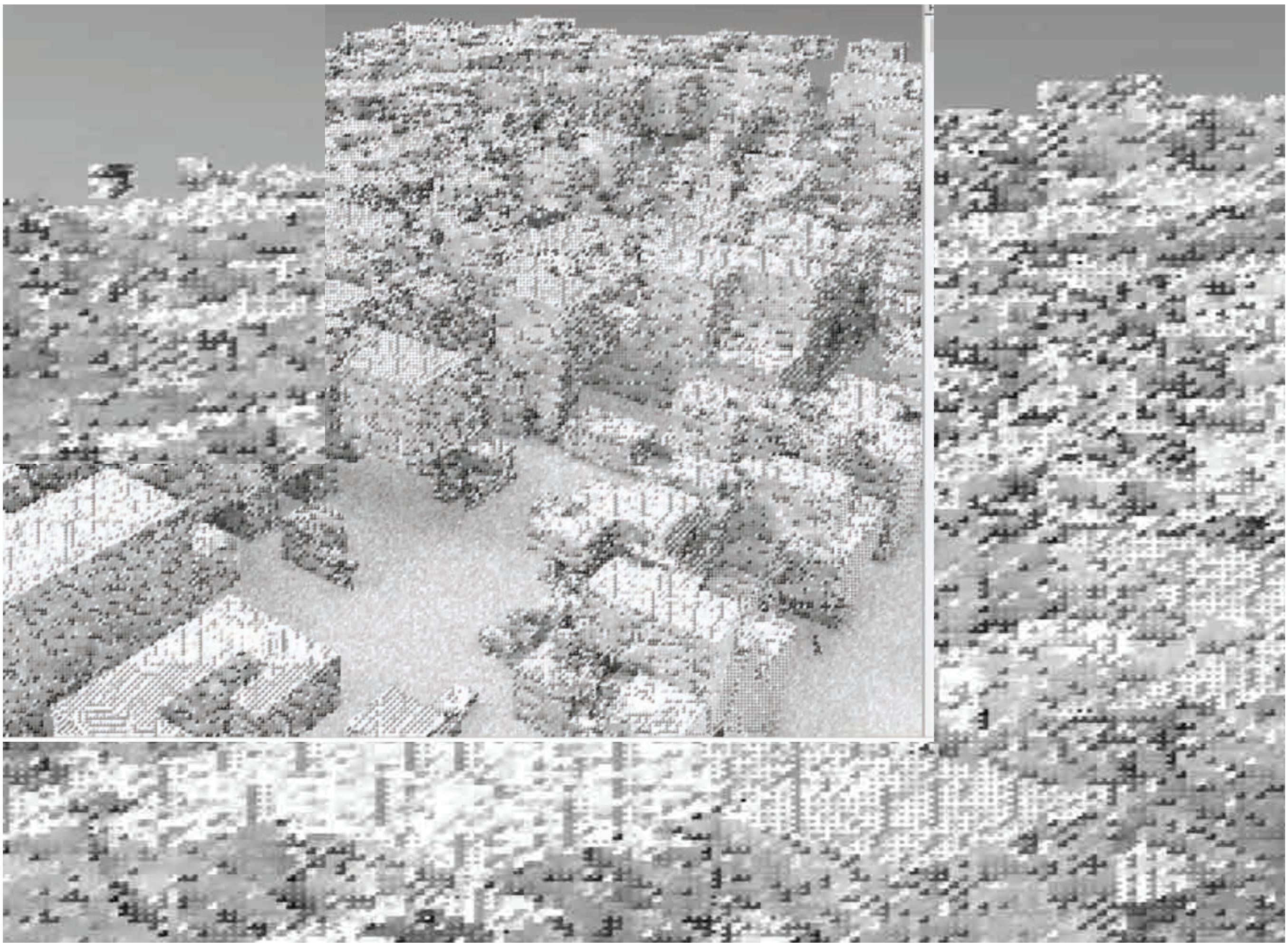
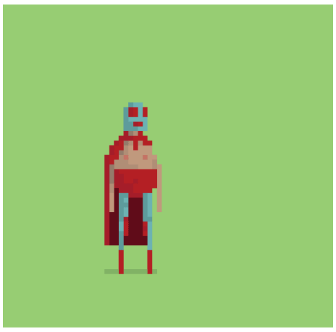


Figure 2.9 Screenshot of Vray render in mid progress

BEAUTY IN DIGITAL DECAY

New media artist Lauritzsen discusses how we have become slaves to perfectionism writing, “we worship the smooth and the cold. Why is that? If one compares digital media to analogue media, it makes little sense.” (Lauritzsen, 2015, p.9) Artist and designers have embraced imperfection for centuries, from Pollock’s chaotic splashing of paint, Lyonel Feininger exposing the same frame twice on his camera, Tejo Remy chairs that differentiate in every individual production. This experimentation with the Lo-fi, the handmade aesthetic makes the analogue realm arguably more honest that the digital. (Lauritzsen, 2015, p.9) For years’ digital designers have strived to get as close to reality as possible for example, ‘The Third & The Seventh’ (Roman, 2009) short film produced by Alex Roman, some of the most astonishing computer generated realism to date and a must see film for all budding architecture students. However, this endeavor for digital realism is becoming monotonous and slowly through subtle pseudo analogue filters an injustice to the digital media has arrived. (Lauritzsen, 2015, p.9)

Figure 2.10 8-bit GIF style images are circulating popular social media platforms such as Facebook and making subtle appearances in digital art and design. (Cezek, 2014)



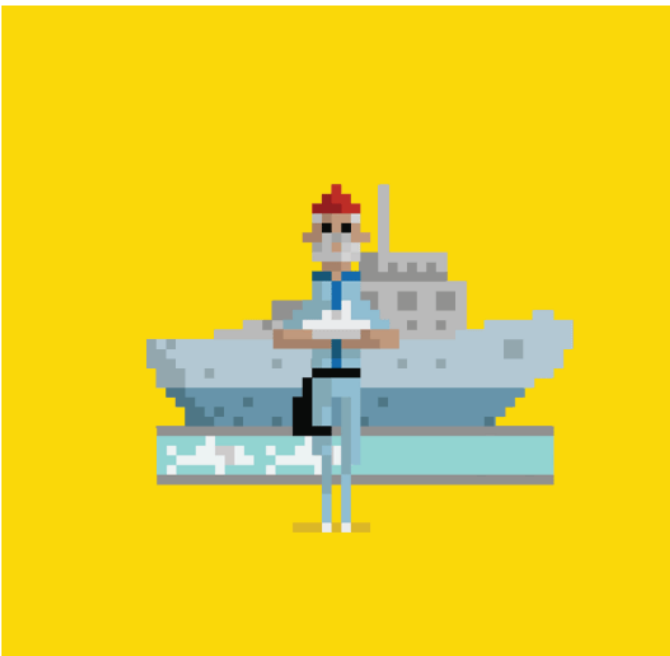


Figure 2.11 Digital aesthetics are even being employed by high Fashion Houses such as Gucci's Fall 2016 ad campaign images which are supplemented by descriptive digital subtitles as if they were screenshots from a foreign film. (Gucci, 2016)

Figure 2.12 Musicians and DJ's are using digital aesthetics in their music videos and song titles. 'My Way' music video by Calvin Harris consciously augmenting digital glitch effects that appear as if YouTube is crippling your Wi-Fi connection. (Harris, 2016)

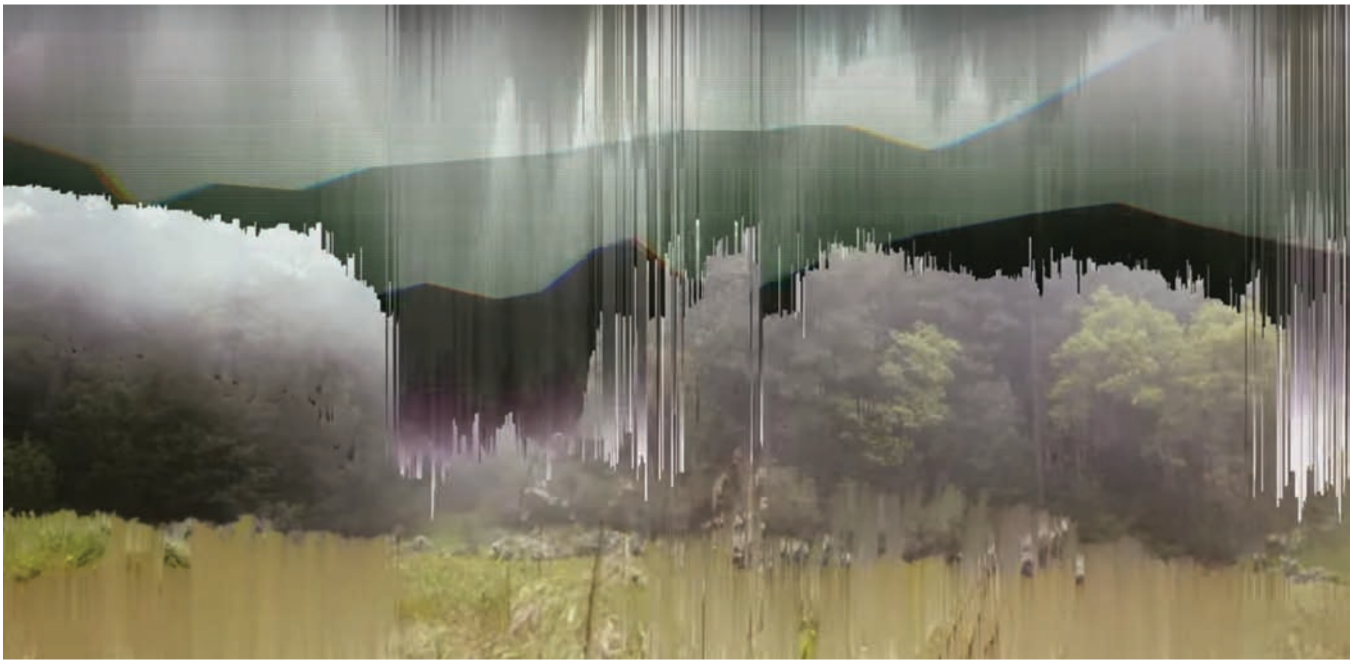


Figure 2.13 Bon Iver's album '22 A Million' song titles possess a digital aesthetic resembling buggy websites that often place ',Äô' where an apostrophe should be. (Anonymous938743, 2010) Vernon's song titles include symbols, numerals and shifts in letter case looking much alike a keyboard dysfunction. (Iver, 2016)

1	22 (OVER S∞∞N)
2	10 d E A T h b R E a s T ⚄ ⚄
3	715 - CR∑∑KS
4	33 "GOD"
5	29 #Strafford APTS
6	666 ʇ
7	21 M◊◊N WATER
8	8 (circle)
9	____45_____
10	00000 Million

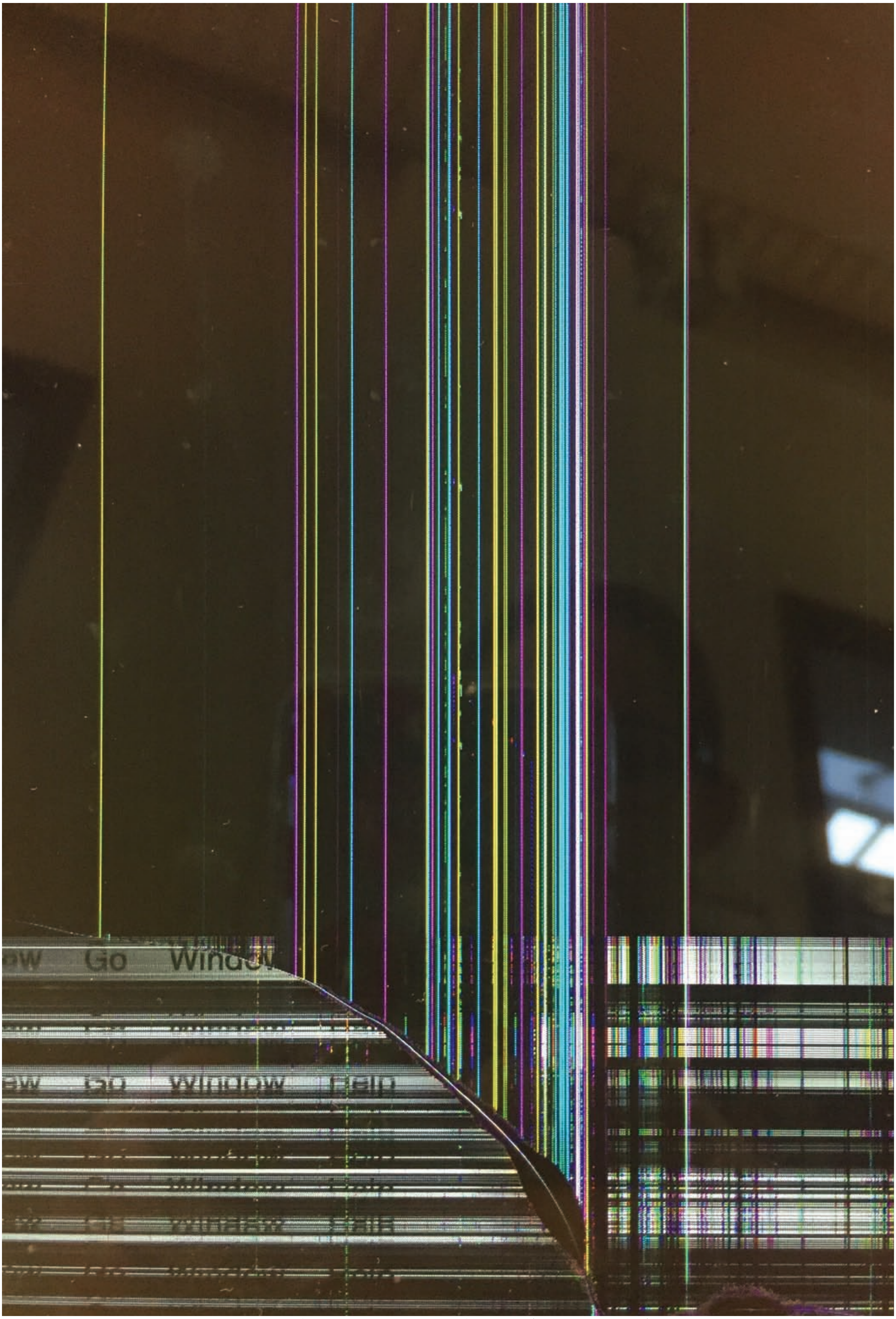


Figure 2.14 MacbookPro natural glitch from physical crack of screen (Jackson, 2016)

Digital decay is not unnatural, as new media artist Curt Cloning writes, "it is just that we humans are still acclaiming ourselves to it."

(Cloning, 2010)

C5 F6 89 60 CC B2 BB 27 9E C5 0F 99 F7 B2 8B 26 C3 9F 52 B5 9F E1 74 59 75 28 C4 8A B2 00
AC C3 78 DD F3 2F 43 CF 71 57 B5 E5 5F B4 4F F2 8F CA 8A C8 AD C4 7D 3A 44 49 25 50 D2
3A 86 72 B0 2E D2 C4 65 B1 F3 74 CD 3F FE 25 5F DC 3F F7 E1 3F F8 BA C5 B7 FF 00 8F 78
3F EB 8C 7F FA 08 A9 AB 56 AB EE AF FF D9 FF DB 00 43 00 08 08 08 08 08 08 08 08 08 08
08 08 08 08 09 09 09 09 09 09 0A 0A 0A 0B 0A 0A 0A 0C 0B 0B 0C 0C 0B 0B 0C 0D 0C 0E 0F 0E
0C 0D 0E 0F 12 12 0F 0E 12 15 17 15 12 19 1C 1C 19 24 24 24 33 33 3F FF DB 00 43 01 07 07
07 0A 08 0A 13 0A 0A 13 2A 1C 17 1C 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A
2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A
2A 2A FF C0 00 11 08 00 F0 01 40 03 00 22 00 01 11 01 02 11 01 FF C4 00 1F 00 00 01 05 01 01
01 01 01 01 00 00 00 00 00 00 00 00 01 02 03 04 05 06 07 08 09 0A 0B FF C4 00 B5 10 00 02 01
03 03 02 04 03 05 05 04 04 00 00 01 7D 01 02 03 00 04 11 05 12 21 31 41 06 13 51 61 07 22 71
14 32 81 91 A1 08 23 42 B1 C1 15 52 D1 F0 24 33 62 72 82 09 0A 16 17 18 19 1A 25 26 27 28 29
2A 34 35 36 37 38 39 3A 43 44 45 46 47 48 49 4A 53 54 55 56 57 58 59 5A 63 64 65 66 67 68 69
6A 73 74 75 76 77 78 79 7A 83 84 85 86 87 88 89 8A 92 93 94 95 96 97 98 99 9A A2 A3 A4 A5 A6
A7 A8 A9 AA B2 B3 B4 B5 B6 B7 B8 B9 BA C2 C3 C4 C5 C6 C7 C8 C9 CA D2 D3 D4 D5 D6 D7
D8 D9 DA E1 E2 E3 E4 E5 E6 E7 E8 E9 EA F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FF C4 00 1F 01 00
01 05 01 01 01 01 01 01 00 00 00 00 00 00 00 00 01 02 03 04 05 06 07 08 09 0A 0B FF C4 00 B5
11 00 02 01 03 03 02 04 03 05 05 04 04 00 00 01 7D 01 02 03 00 04 11 05 12 21 31 41 06 13 51
61 07 22 71 14 32 81 91 A1 08 23 42 B1 C1 15 52 D1 F0 24 33 62 72 82 09 0A 16 17 18 19 1A 25
26 27 28 29 2A 34 35 36 37 38 39 3A 43 44 45 46 47 48 49 4A 53 54 55 56 57 58 59 5A 63 64 65
66 67 68 69 6A 73 74 75 76 77 78 79 7A 83 84 85 86 87 88 89 8A 92 93 94 95 96 97 98 99 9A A2
A3 A4 A5 A6 A7 A8 A9 AA B2 B3 B4 B5 B6 B7 B8 B9 BA C2 C3 C4 C5 C6 C7 C8 C9 CA D2 D3 D4
D5 D6 D7 D8 D9 DA E1 E2 E3 E4 E5 E6 E7 E8 E9 EA F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FF DA 00
0C 03 00 00 01 00 02 00 00 3F 00 D3 DD 4E DD 59 BE 75 4B E6 D4 39 A5 C5 5F 06 9D BA A8
F9 94 EF 32 96 8A B7 BA 8D D5 57 7D 1B E8 A4 AB 1B A9 BB AA 1D D4 6E A4 A2 A4 CD 30 9A
66 69 A4 D2 D1 4B 9A 69 34 DC D3 0B 51 45 47 23 63 35 CB 6A 3F 3C AC 4F 65 15 D0 4A D9
06 B9 EB C3 F3 E4 F7 EB F4 02 A3 35 3C 63 8A E5 E4 E5 CD 48 23 E9 40 23 61 6E E5 8F F3
A6 34 A4 8F A5 4F 51 9A 95 C8 C7 15 5C B5 47 BA 92 8C 51 45 25 25 25 2D 36 96 8A 4A 5A 5A
2A DD A5 C3 5B CA 24 1F 42 3D 45 76 96 77 71 DC C6 19 7F 11 5C 15 68 58 5C F9 13 AE 4E 15
B8 6A 63 0C D1 5D E8 35 28 35 82 BA 94 3E AD F8 8A BF 6F 70 B7 01 8C 2C AF B3 EF 60 F4
A8 69 4A D6 F5 B3 0D DF 85 5E DE 33 5C DC 37 91 A9 39 71 C5 5A 8E F5 24 C9 56 0C 17 A9
07 34 E0 69 A5 6B A0 56 AB 69 5C E4 37 F1 FF 00 7D 71 F5 AD E8 5C 32 86 1D 0D 3C 1A 4C 55
BA 5A 8C 1A 76 6A 4A 4A 92 9D 50 87 07 BD 3E 8A 29 C6 B8 2B B3 FE 95 71 FF 00 5D 9A BB
A2 6B CF E7 39 9E 63 FF 00 4D 5F F9 D3 4D 28 AC 5D 60 FF 00 A1 BF FB CB FC EB 3E 2F F8
F7 FC 6A E6 B3 FF 00 1E C0 7A CA A2 A9 AF FA 85 FA 9F E9 48 3A 52 D3 2A 07 6A 94 9A 84 E2
8A 70 15 E8 32 47 28 E1 40 DC 3A F6 AA 13 4D 32 1C 0C 66 B5 E5 6C 29 72 0B 7A E7 F2 AC 67
62 FF 00 31 DC 7F 1A 65 22 F3 50 FD BE 75 3F 75 7F 5A D6 8E 7D C0 13 5C FB 37 3D 6B 46
23 C5 34 D4 86 B5 BC DA 70 7A CE 0D 52 86 A6 E6 9B 57 F7 53 B3 54 C3 54 9B E9 73 4D A9
F3 4D CD 56 79 F6 D4 32 CE 53 B6 4D 2E 69 33 57 37 54 4E F5 9E 6E CF F1 2E 29 BE 76 EA
75 2D 0E F9 95 17 D4 D6 4E A3 C2 48 7D 10 FE BC 56 84 64 7D A4 67 A0 52 6B 23 55 61 F3 FE
03 F4 FF 00 EB D4 47 EF D5 94 FB 95 CE 67 B5 32 94 D3 BD 2A DD 57 A4 09 9A B5 F6 75 55
05 C9 CB 7F 08 F4 F5 CD 3E 35 1D 2A D6 A1 20 DE 15 06 31 C3 7F C0 57 02 A3 26 A7 8D 06
32 6B 22 44 DB F4 35 15 5A 23 35 0E 29 C0 D4 6C 29 94 B8 A9 C2 52 11 8A 33 4D C5 45 4A BD
69 2A 44 42 C4 00 33 4B 49 5A C1 76 AF D4 66 A1 B6 32 27 98 62 62 99 CA B6 3B 8C D4 C4 F6
F6 A2 DF FD 54 87 FE 9A 55 3A B7 4A 77 14 65 DD D4 73 4C B5 2C AA FB 09 00 F0 D4 E3 4F
B4 38 82 E7 FD E1 FC E9 07 4A 52 06 6A 5F DE 6D 20 48 71 FD DA F4 4D 26 4D D6 36 ED FE
C5 79 C8 35 E8 7A 38 C6 9B 6D FE ED 4B 19 A8 26 15 7E 2B D8 DE E1 ED C1 F9 D3 AF E5 9A
BF 5C 4E 87 29 9B 57 BB 90 9F E3 98 FE 03 81 5B D0 EA 91 CC 92 B7 F7 77 E3 19 FE 1C D4
E2 A0 35 4F 47 BD 6B 9B FB D4 24 ED 49 26 C7 E0 71 5B 33 EA 10 5B CD 1C 12 3E D9 25 19
5F A6 71 5C 97 85 4E EB B9 9B FB E2 47 FC DA AB 78 82 5C EB 60 03 FE A2 14 5F C4 F3 FD
69 71 45 7A 21 E9 5C 03 F2 EE 7D 5D BF 9D 77 48 73 6D 1B 7F D3 10 7F F1 DA E0 BD 7D C9
FE 74 DA 41 58 7A CF FA A8 87 FD 37 1F CA AA B1 C4 11 FE 3F D2 AC EB 1D 2D C7 FD 35 FE
95 42 43 F2 28 F6 A3 B5 2D 52 91 D8 D4 19 6A 9F 6D 31 85 2E 69 D5 EE 53 58 5D B8 3F 75 F2
39 C9 15 91 36 95 A9 7F CB 3B 78 FF 00 EF A4 AE D2 99 49 B4 53 73 5E 7B FD 89 AA 67 E6 B4
1F 83 27 F8 D3 BF B2 B5 15 FF 00 97 47 FC D6 BB EC D2 52 6D A3 71 AE 0F FB 3E F8 75 B5
96 97 EC 77 63 AD B4 DF F7 C5 76 F9 A6 9A 36 51 BA B8 BF 22 71 D6 09 BF EF 83 49 E5 CB

CHAPTER TWO

2D GLITCH ART

"Cubism, Surrealism, Constructivism, Abstract Expressionism all represented a 'new' aesthetic influenced by science, psychology, optics and metaphysics, and their assertion on the world was steeped in revolutionary zeal." (Gannis, 2012)

Glitch is an artistic movement, a reaction to our new technology and the digital world we work in.

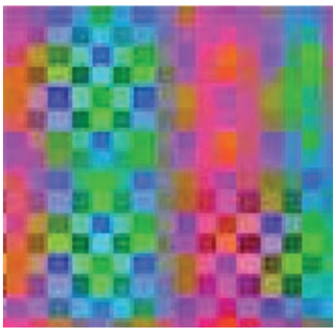


Figure 3.15 Architectural Graduate and designer Raluca Struzu's art focuses on technologies shift in reality through programming and digital rendering. The 2d glitch artwork plays on perception through a process of classical oil paintings of old masters being reduced to RBG fields of pixels, inputs become nothing more than data and the computer becomes an equalizer. (Pascu, 2014)

Figure 3.16 Robert Schlaug's photographs in his series 'Limited Area' are digitally manipulated to instigate a stop, a consideration for a simple photograph. Schlaug's work deals with the human experience of limitation. His 2d glitches appear like sections in the landscape changing the three dimensional perception of depth within the composition. (Schlaug, 2015)

Figure 3.17 Olivier Ratsi's series 'Anarchitecture in Grand Paris (WYSI*not*WYG project)' uses simple photo editing techniques to manipulate familiar buildings creating new uncanny versions. This work successfully plays in the grey area between fiction and fact in the way the architecture remaining to attain a sense of viability and legibility while being completely the opposite. (Ratsi, 2015)


ROCKY ROAD


ROCKY ROAD
Fruju
CHOC BAR
TOP NOTCH
Crispy Mint
Tip Top

Figure 3.18 2d Glitch Experiments using a photograph of ice creams taken at the Fix store, glitched in HexEditor.

3D GLITCH ART

Artists have started to explore glitch in 3d physical space. When digital ideas were provoked analogously this was named 'The New Aesthetic' (NA) by James Bridle. (Bridle, 2011) Bridle defines NA as "a series of artefacts of the heterogeneous network, which recognises differences, the gaps in our distant but overlapping realities." (Bridle, 2011) Disapprovingly Gannis writes that NA is a "disappointingly stuffy name for a potentially vanguard development in the tweeted and post(ed) Modern World." (Gannis, 2012) Regardless, there is no doubt it is happening, but is it meaningful?

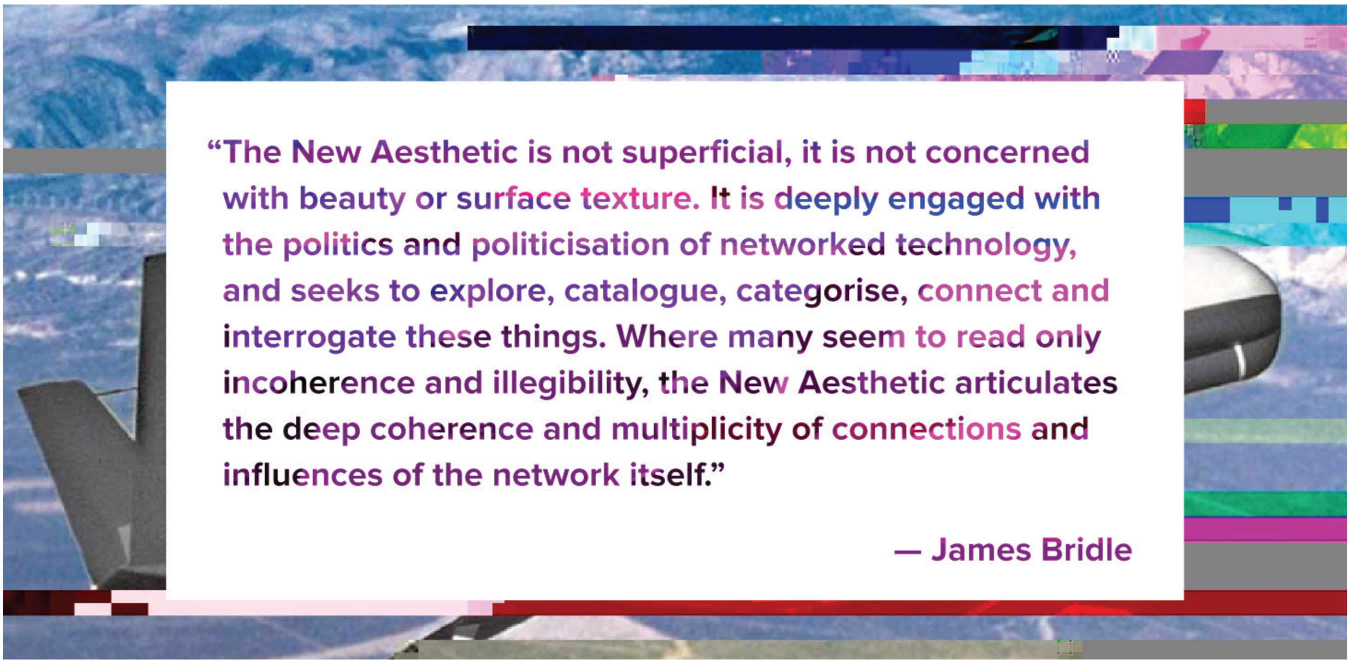


Figure 3.19 James Bridle Quote image (Balbus, 2013)

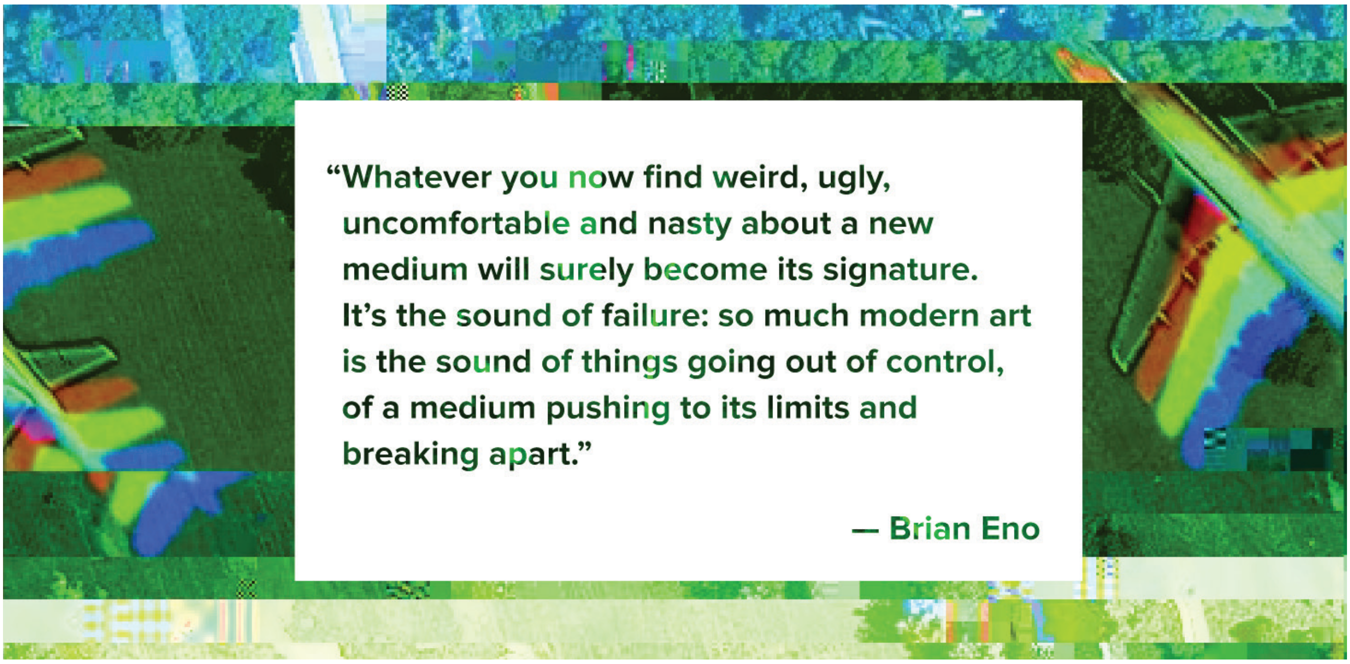


Figure 3.20 Brian Eno Quote image (Balbus, 2013)

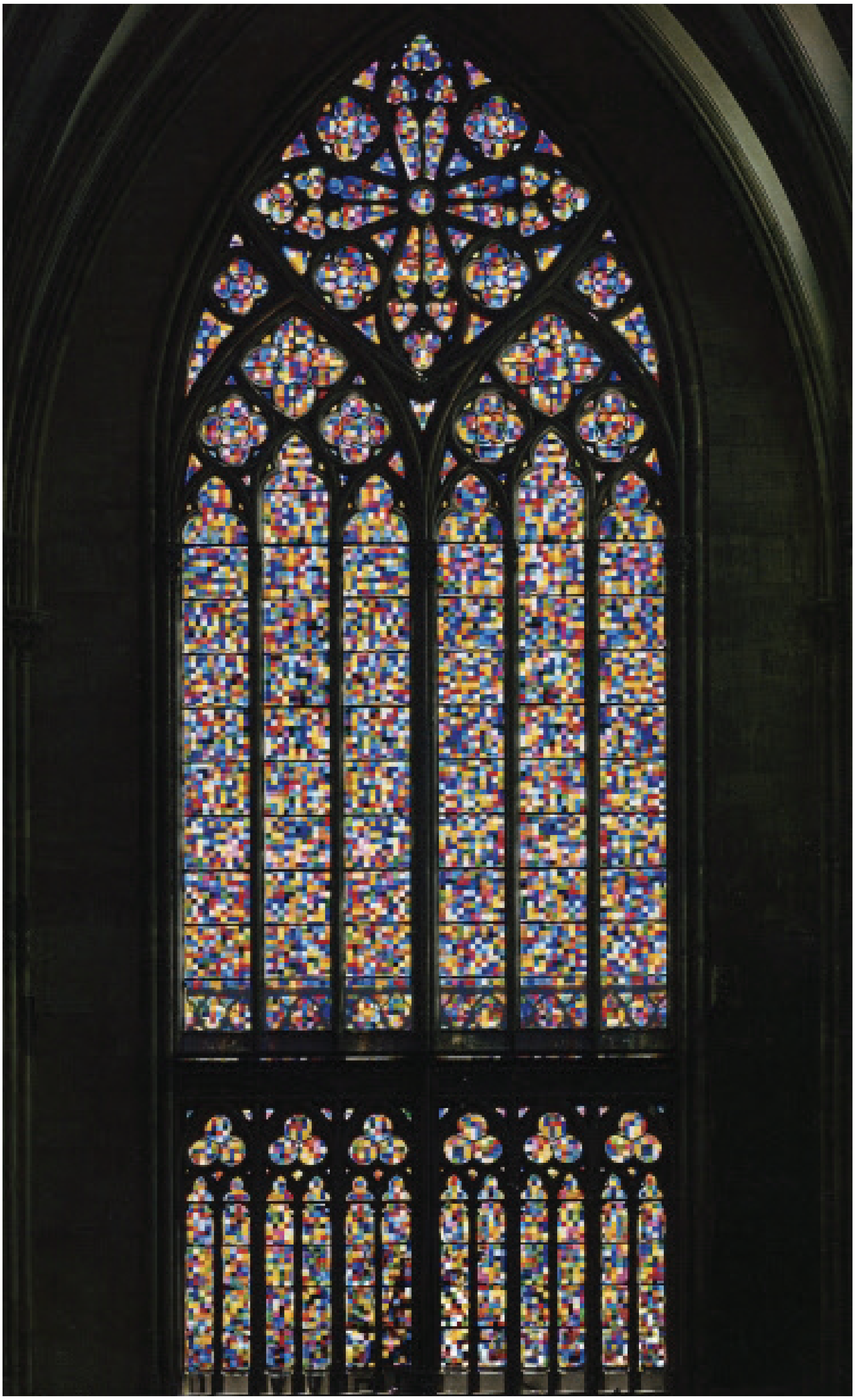
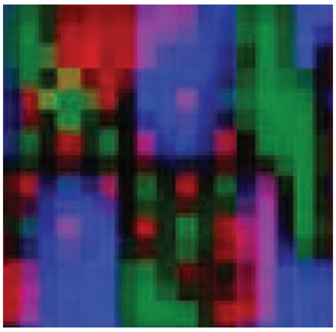
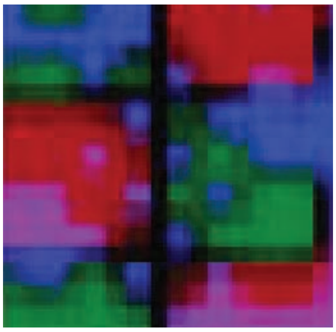


Figure 3.21 Cologne Cathedral's stained glass windows was designed by Gerhard Richter using a mixture of traditional gothic stain glass techniques mixed with computer generated random square sequences. The design is based off an earlier painting of Richter's '4096 Farben.' (Richter, 2004) This beautiful architectural elements employs both past and contemporary design to create a colourful assemblage of gothic pixels. (Richter, 2007)

Figure 3.22 Luke Jerram modelled a 3d pixelated portrait of his daughter Maya. From afar the pixelated sculpture can be easily read but as you get closer the lack of detail is apparent. The work deals with ideas around perception, optical illusions and the digital age we live in. (Jerram, 2013)



With pixel's existing exclusively within the digital realm, pixel translation has become an increasingly exhausted mechanism to express digital ideas within the physical. 'New Aesthetic, New Anxieties' authors write on how pixels in our physical environment "seem to say not much more than something in the vein of 'we look perfectly normal on a computer screen, so what are you looking at?!' Beside perhaps provoking awareness regarding the low resolution of the digital realm in comparison to the world offline, these sculptures do not influence our behavior when we engage with pixels." (Berry, 2012) Presenting digital representation in the analogue does not advance the understanding of the digital nor tease out new interpretations, it simply highlights the differences between the two. Dismissal of analogous pixel sculpture precedents is not the itention, however this research strives to engage in a further understanding beyond this point.



The House of Electronic Arts (HEK) located in Switzerland is “a place for creative and critical discourse on the aesthetic, socio-political and economic impact of media technologies.” (HEK, 2016) Designers ‘!Mediengruppe Bitnik’ applied a digital image error directly onto the façade of the original building and consequently physically built exactly this. The designers feel the glitch “misaligns the elements of the façade, bringing disturbance to an otherwise settled structure.” (!Mediengruppe Bitnik, 2015) This is an attempt to express glitch in a 3d physical environment however the interpretation is ultimately still read as a corrupt flat image. Even further so, viewing this architecture over the internet it is read through angled 2D photographs with the facade of the building presented convincingly as a corrupted 2d image leading some to believe it is simply a website error, misconstruing the glitch in the fixed architecture all together.

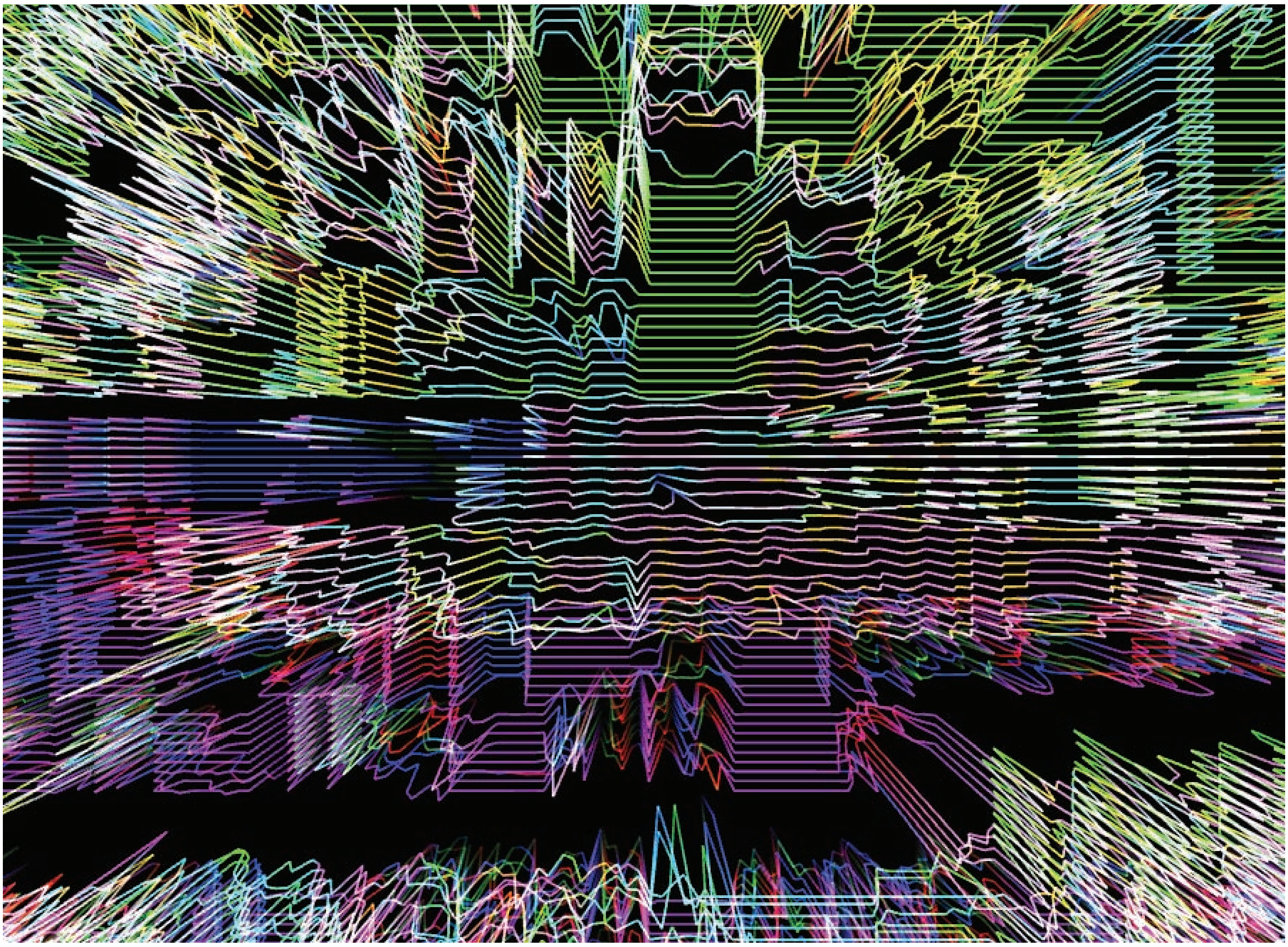
Figure 3.23 House of Electronic Arts Basel (HEK, 2015)

Figure 3.24 Similarly, Banksy's Ariel mermaid located in his controversial 'Dismaland' exhibition embodies a corrupted image of the familiar Disney Princess in a 3d physical sculpture. From all angles the 3d sculpture remains to read as if presented as a corrupted digital file on a flat digital screen. (Banksy, 2016)

Figure 3.25 Furthermore, Studio Laviani's 'Good Vibrations Storage Unit' furniture design is a three dimensional representation of a glitched 2d image. The flat image is modeled in 3d physical space however it is ultimately apprehended in the same way the 2d image is. (Laviani, 2013)

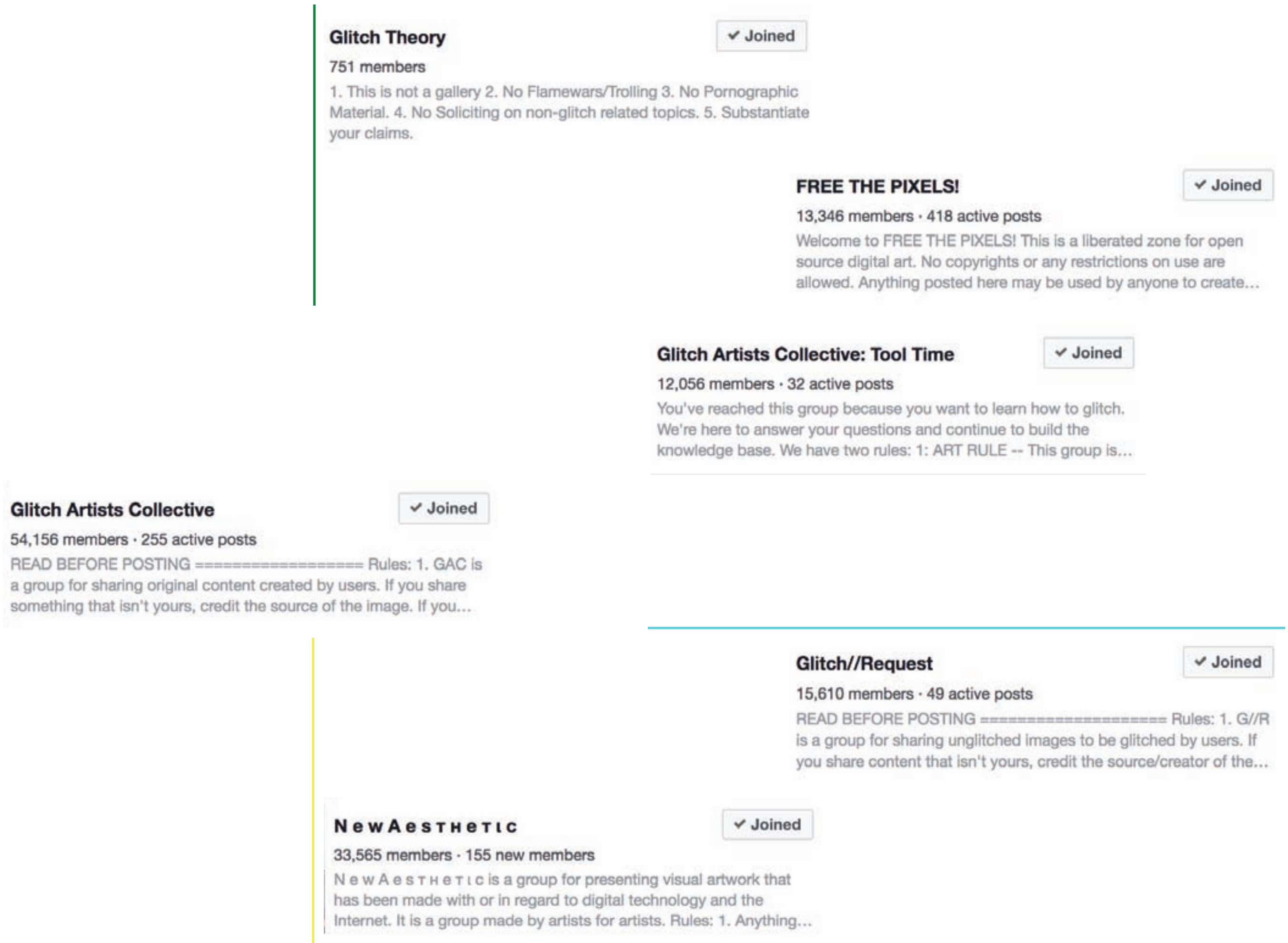
In this digital age, architecture is often viewed globally over the internet. 3d physical form is experienced through flat photographs online while virtual architecture is interpreted through 2d render shots. Resultantly, architectural design on the topic of glitch requires a deeper meaning than simply displaying a translation of 2d aesthetic.These samples do not explore the inventive role of glitch as an encroachment on the multidimensionality of 3d space, there is opportunity to explore further than the figuration of glitch as a 3d articulation.

Figure 3.26 Glitch App effects (Rutt-Etra-Izer, 2016)



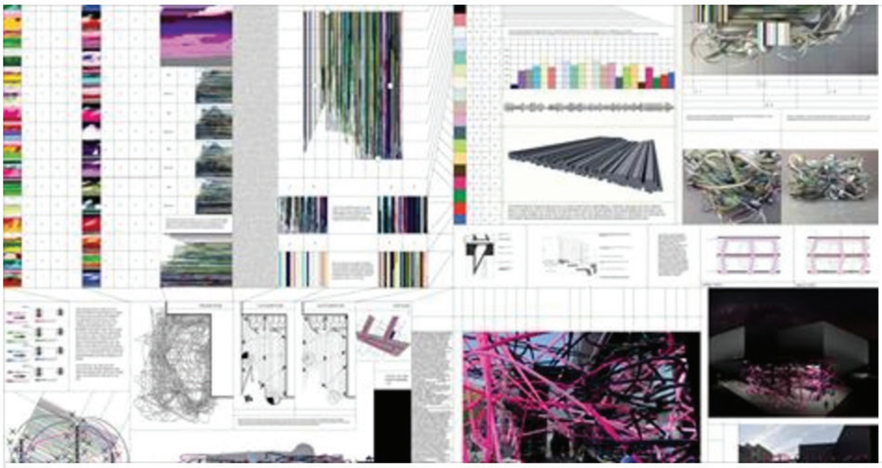
DIGITAL PLATFORM

The glitch art community exists almost entirely in the digital realm globally connected via the internet as a moderately fringe community sharing glitch work in a network of Facebook groups and Tumblr pages. The community seems to act in a rebellious manner while withholding integrity, there is a mixture of both humor and somber in their work. Glitch Artist Collective is the main public group. (GAC, 2016) There are rules within the glitch community Facebook groups with specific content only being displayed in specific groups such as; image / glitch requests are submitted to 'GlitchRequest', physical new media art is posted in the group 'New Aesthetic' and questions surrounding glitch methods are discussed on 'GACToolTime' all of which are Facebook groups allowing still and GIF images in a very compressed format.



Blaire Haslop shared a link.
4 April 2016 · Wellington

I am currently starting my Masters of Architecture thesis on Glitch. Please join me on the journey through my blog linked below and feel free to contact me to discuss anything on glitch and architecture!



Yoshisherbertland

Blaire Haslop - Architecture Master's Student at Victoria University of Wellington - Thesis blog for...

YOSHISHERBERTLAND.TUMBLR.COM

72 · 10 Comments

Like · Comment · Share

[redacted] wow, sounds awesome.
Like · Reply · 4 April 2016 at 16:50

[redacted] Very cool.
Like · Reply · 4 April 2016 at 16:55

[redacted] Cool. Check out "Sundays" by post panic for some inspiration.
Like · Reply · 5 April 2016 at 00:04

> **Blaire Haslop** Sundays looks really interested! I am interested to understand what connects you drew from my work to this film work?
> Like · Reply · 6 April 2016 at 19:05
>
> Write a reply...

[redacted] Very fascinating! thanks for sharing, will be following your progress!
Like · Reply · 5 April 2016 at 04:40

[redacted] Following....sounds great
Like · Reply · 5 April 2016 at 05:26

[redacted] I love this so much
Like · Reply · 6 April 2016 at 01:37

Blaire Haslop Thank you!
Like · Reply · 6 April 2016 at 19:05

[redacted] I've just been getting into grasshopper in the past month or so, really interesting seeing how it's being applied here. would love to talk to you about this more in detail at some point! (except not right now because i have a big review in 2 days and am frantically trying to finish some site mapping)
Like · Reply · 6 April 2016 at 19:24

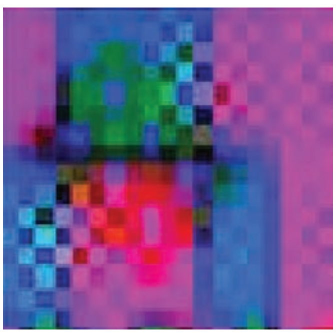
Figure 3.27 Personal Posts on Glitch Artist Collective Facebook page gaining some humorous and helpful feedback from other glitch artists in the group (GAC, 2016)

MORTALITY OF DIGITAL MEDIUM

‘Fading Memories and Digital Decay’ (Almond, 2009) discussing two very important metaphors between human characteristics and digital realm being memory and decay. Throughout the text Almond references Melanie Wein, creator of the website ‘Fleetingness of Bites in 2000.’ Wein’s website was not only named ‘Fleetingness of bites,’ the bites that made up her words did exactly that, perhaps on purpose. Fleetingness of Bites is now forever ‘temporarily unavailable’ and her personal portfolio has been renovated into a yoga website. (Wein, 2016) We curiously enquired about this, Almond replied, “I remember Melanie Wein’s work… I can’t be sure but I like to think she embraced the ephemerality of her project, maybe she left it to decay, didn’t pay the bill to renew her domain and eventually a yoga teacher bought it up and reused it. Kind of full circle, ashes to ashes, but of course a shame that her work is now lost to the abyss of the internet. I’m afraid I don’t have any more information on Melanie, it seems her digital presence has indeed decayed completely.” (Almond, pers. Comm. April 26, 2016) Similarly as perviously metioned James Bridle coined the term ‘New Aesthetic’ on the domain ‘RigLondon’ which is now 403 Forbidden on permanent hiatus, (Bridle, 2011) along with his Tumblr ‘The New Aesthetic’ which he closed exactly a year to the date it was created. In the text ‘New Aesthetic, New Anxieties’ the authors write, “it would be risky to make assumptions, but Bridle’s sudden decision to close the New Aesthetic Tumblr on May 6th this year feels like his response to the debate sparked by his ideas.” (Berry, 2012) Perhaps Wein and Bridle proved the authenticity of their work through decaying it on the very medium they were discussing.

DIGITAL ARCHITECTURAL PROCESSES

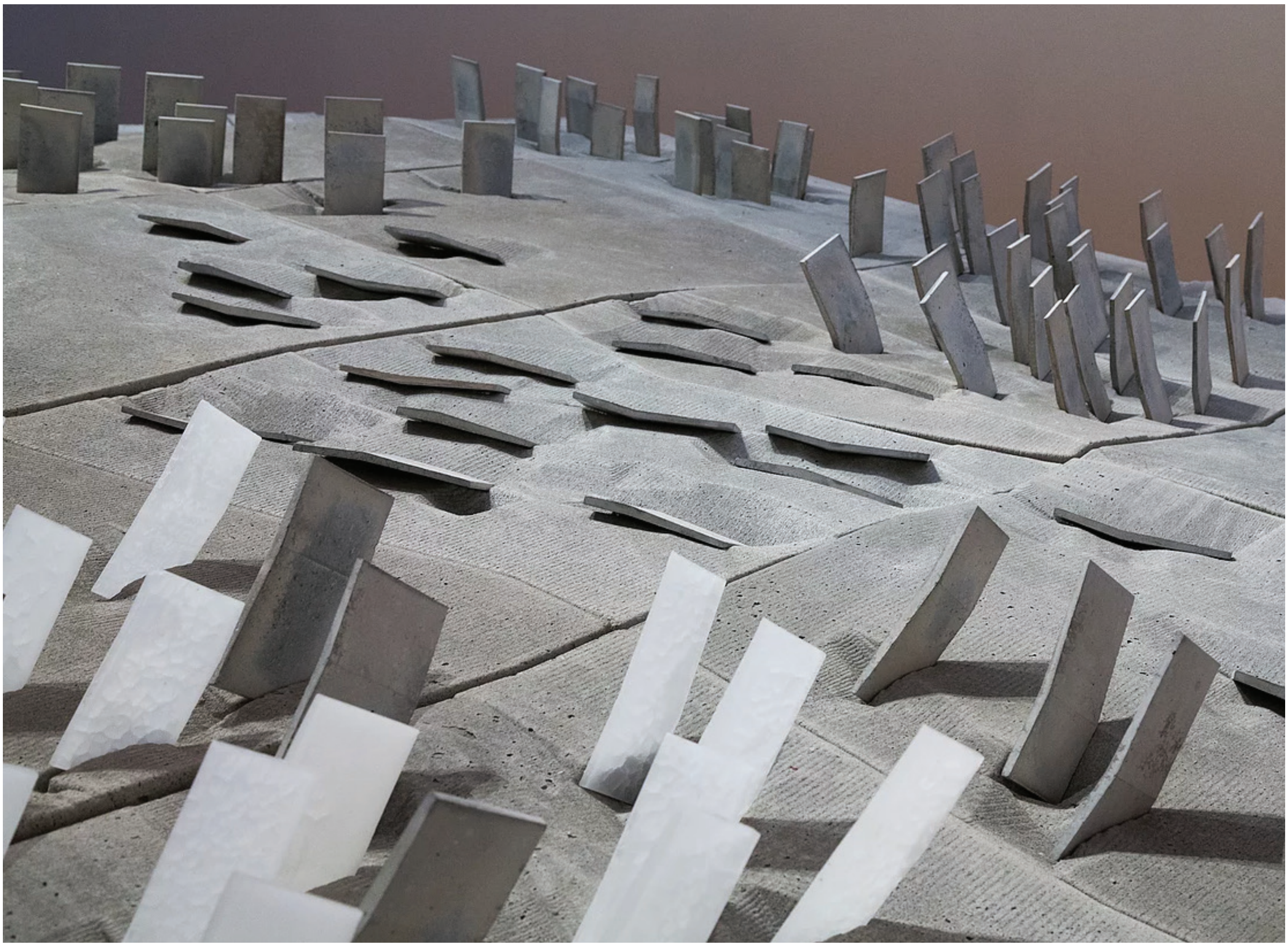
Architectural design processes and production are now more likely to be produced through pixel's arrays and printers than pen and paper. (Austin, 2015) Architects need to begin to realize how prominently they work within the digital realm and the constraints that impede it. All aspects of the architectural work flow are digital until physical construction, resulting in the digital models of buildings being almost as resolved as the physical output. Austin writes, "the glitch has been neglected as a field of research because its output cannot be easily instrumentalised. The inability to predict and control the process means it circumvents known formal outcomes." (Austin, 2015) There is an opportunity within architectural design to acknowledge an understanding of the digital medium we work with. Shipwright writes, "it's curious then to consider what this might mean for architecture as a discipline that is primarily concerned with the physical production of very solid form. How might the influence of the aestheticisation of error affect the manifestation of the built environment?" (Shipwright, 2015) Glitch is currently explored solely in 2d as an accident rather than the inevitable natural occurrence. Rosa Menkman, a highly regarded contributor to the glitch art community, takes a strong viewpoint in her 'Vernacular of File Formats' describing the current glitch aesthetic as, "no more than a brightly coloured bubble-gum wrapper that doesn't ask for any involvement, or offers any stimulus" (Menkman, 2010 p.2). Glitch has potential to be employed as a system and pushed from its current 2d representation that perhaps lack stimulus, into 3d meaningful interpretations through architectural form. There is opportunity to change this perspective and add authenticity to the field of glitch by gaining an understanding of digital decay through three dimesional architectural form.



CONCRETE / CLOUD PRECEDENT

An inspiring precedent for design that extends from 2d to 3d is Simon Twose Concrete/Cloud exhibited at the 2016 Venice Biennale. (Twose, 2016) Concrete/Cloud presents a concrete wall surface peeled away from its 2d context intended to be constructed as a full sized drawing, a concrete sketch becoming its own landscape. (CCANZ, 2016) The work has a powerful prescence intending to engage with people in a more direct manner than images. The goal for this research is achieve the same success interpreting 2d idea's in three dimensional form.The comparative difference between the works are the analogue and digital realms.

Figure 3.28 CONCRETE/
CLOUD (Twose, 2016)



REFLECTION

There is a representational problem when art or architecture is conceptually grounded in the physical while expressing a digital representation to then be documented back in the digital realm. For example, Aram Bartholl's artwork Maps. (Bartholl, 2006) The artist placed "incredibly large physical red balloons in public spaces to question the digital aesthetic of the oversized red map location markers on Google Maps." (Bartholl, 2006) In reality, the overwhelming size of these balloons is the impact of the artwork communicating the awkward relative scale enabled in the digital. This awkwardness is very apparent in real life however when the work is documented and posted on the internet, the red balloon markers are re-introduced to the digital realm and the proportionate scales are acceptable again, consequently decreasing the impact of the artwork and its communicative power. (Berry, 2012)

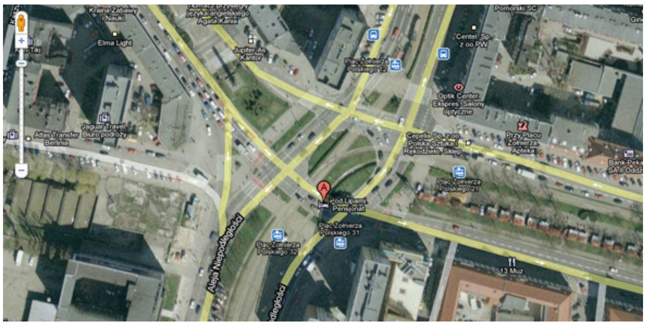


Figure 3.29 Google Maps location point physically built (Bartholl, 2006)

This bring us to reflect and question whether 3d architectural interpretations of glitch should be bought into physical reality or remain in the digital. It is important as a digital designer to understand the digital as a medium. Digital artists understand their internet platforms as their medium and stretch it like a painter stretches canvas to a frame. Cloning explains, “resizing the browser window yields different formal compositions. Separate elements of the page load at different rates depending on the speed of the user’s internet connection. All of these technical considerations invite the immanent event into the art.” (Cloning, 2010) Digital programs hold particular constraints, digital artists understand their media and entertain their platforms constraints just in the way analogue artists do. We start to see a meaningful trajectory of digital architectural interpretation of glitch in Dutch director Mischa Rozema’s short film ‘Sundays.’ (Rozema, 2015) The film is set 50,000 years in the future where he imagines the built environment is able to repair itself in the way a glitch in technology sometimes repairs itself. Rozema is using digital ideas of glitches healing themselves without human intervention, and tiny mistakes that accumulate and change files to envisage this future environment. (Shipwright, 2015) The architectural interpretation of digital decay in this film is meaningful because it displays more than just glitch aesthetic, it is “forcing us to reposition the notion of glitch not just as mere curiosity but instead as something we should be on the lookout for- before the mistakes get too difficult to spot.” (Shipwright, 2015) The medium of film also remains within the digital allowing the architectural expression to remain authentic. This research intends to remain in the digital throughout all design explorations and output to authentically employ glitch in digital architectural work flows, staying true to the medium in which it occurs to interpret digital decay with integrity.

Figure 3.30 Sundays Film
Glitch healing architecture
(Rozema, 2015)

Figure 3.31 Sundays Film
Glitch healing architecture
(Rozema, 2015)

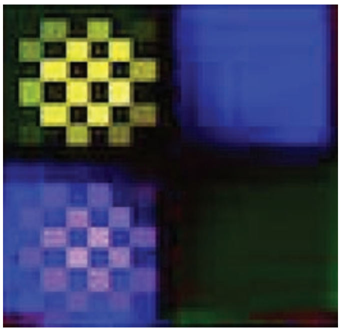
“Glitch aesthetics instead is an underexplored process that exploits immediate transformations of binary information outside that of the figured form. In this way glitch aesthetics is a new procedural avenue of formal exploration within digital architecture. This new avenue is related to the algorithmic, however, the vital difference being that the designer cannot hone in on a particular solution. By extension, the glitch requires a rethinking of ‘control’, ‘choice’ and ‘chance’ within the production of digital architecture.”

(Austin, 2015)

METHODOLOGY

The methodology for this research is based on Donald Schön's model 'The Reflective Practitioner' (Schön, 1983) and its further refinement by Argyris and Schön (1974). This reflective approach of inquiry by design is characterized by three main transformational changes (governing valuables, action strategy and consequences) that lead to an alteration in the governing variables. The methodology is a loop of actions, reflections and reactions that engages in a process of continuous design enquiry, learning and development. This progression will generate not only a repertoire of designs, but through the critical reflection of the design process evaluate the outcomes for its fitness of further development.

The methodology undertaken is a reflective approach of inquiry by design that is characterised transformational changes that lead to an alteration in governing variables. The final test of the glitch is really its authenticity. Perhaps we dismiss a glitch so willingly because the digital does not hold the same level of authority as the analogue. Within this research we employ the methodology of transformational change to explore design emergence on the base of glitches or decayed files to generate a contemporary architectural interpretation of decayed data. By doing so, we aim to distil a certain degree of 'digital authenticity' that is inherit in both the digital code and the architectural design that the code represents. (Haslop, 2016)



‘The Hackaton’ project led by Gilles Retsin (Retsin, 2014) is responsive to the appreciation of glitch aesthetics. Their methodology requires a single form to systematically change to develop an unexpected final design outcome, starting with a mesh figure and building upon this original geometry through iterative cloning, mirroring, adjusting and rotating each consequent piece of geometry. This is an additive process that generates a very unique form (Retsin, 2014), adding incentive for further deploying discrete elements such as glitch.

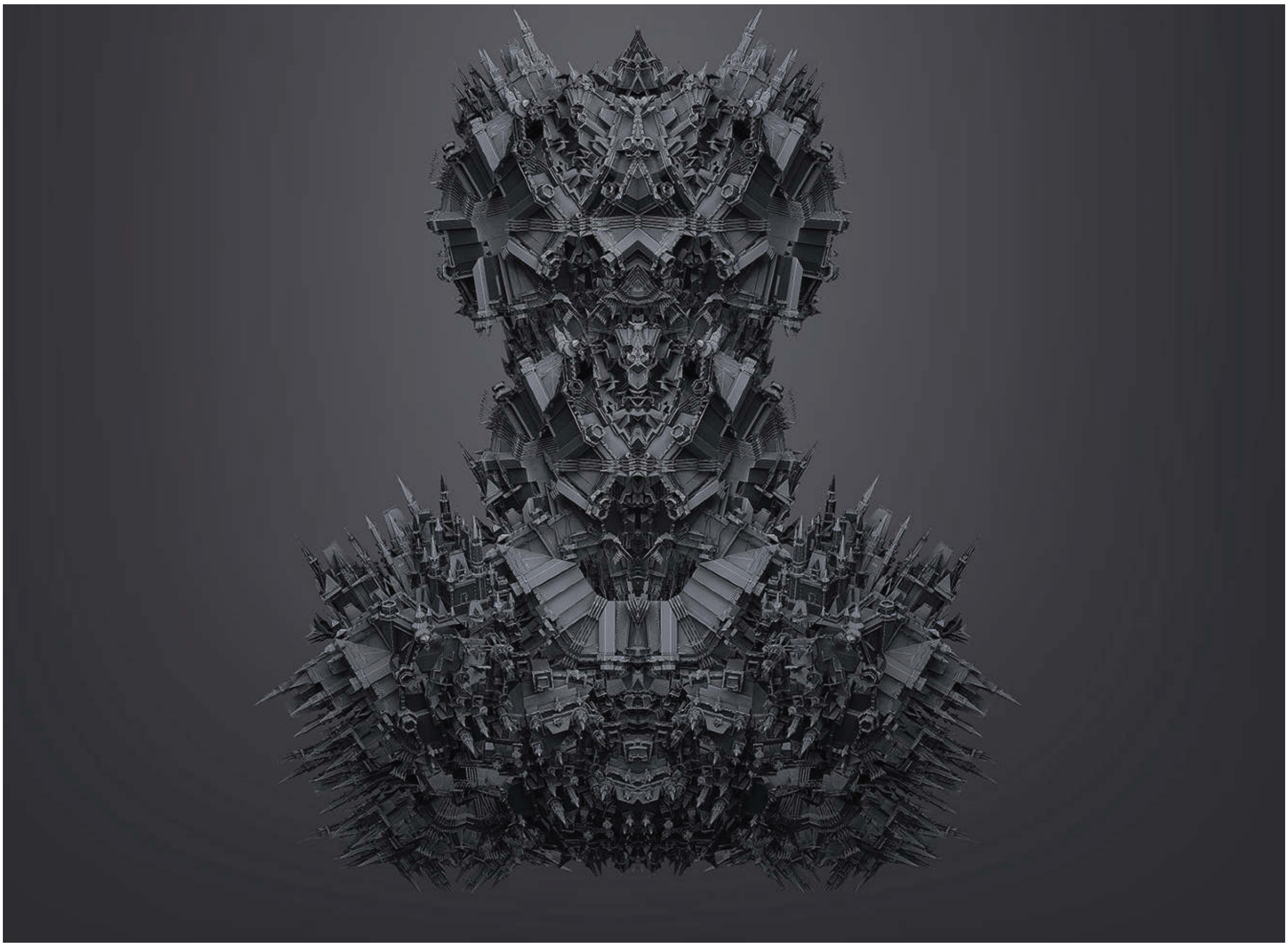


Figure 3.32 The Hackaton by Gilles Retsin (Retsin, 2014)

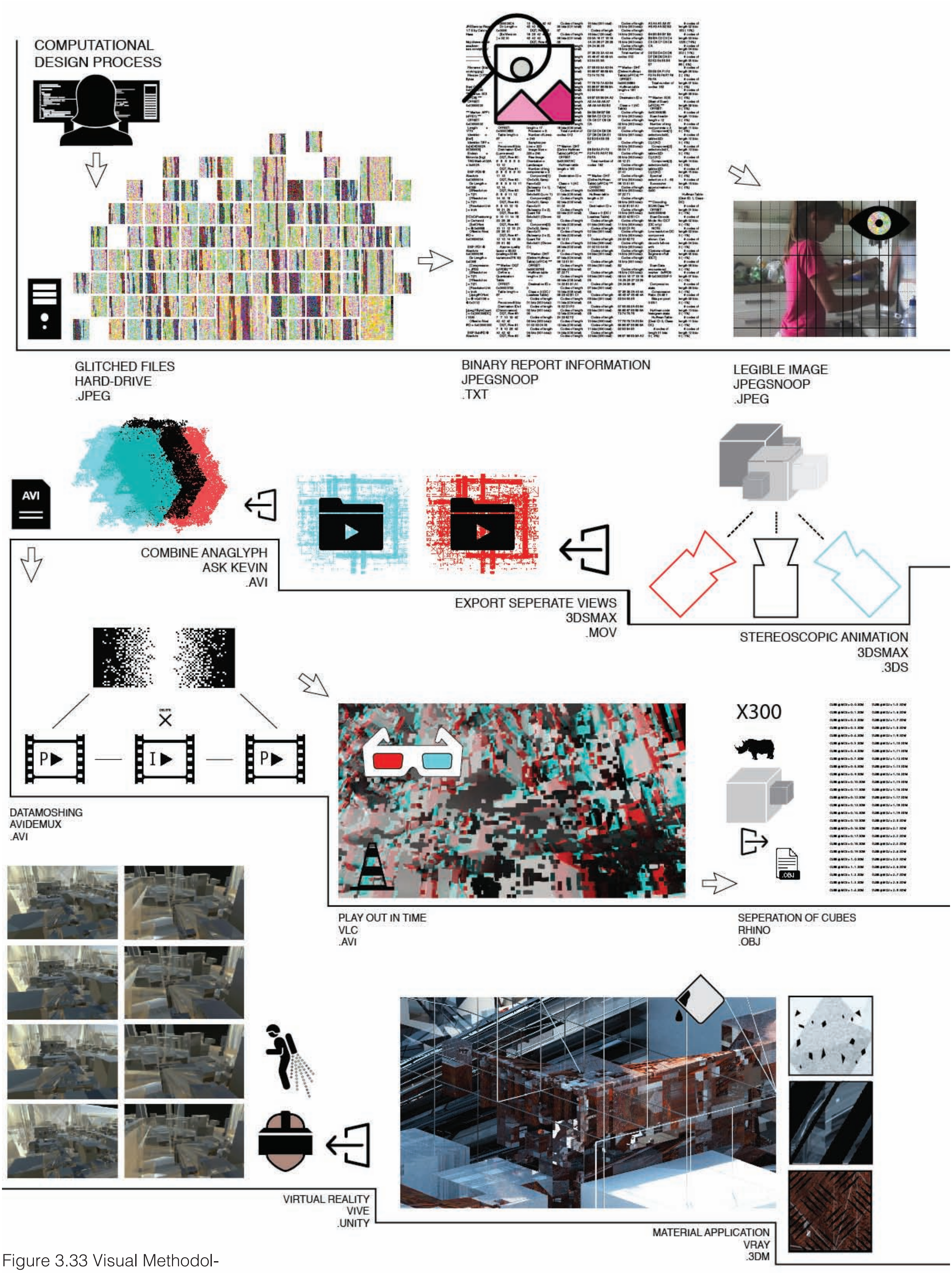
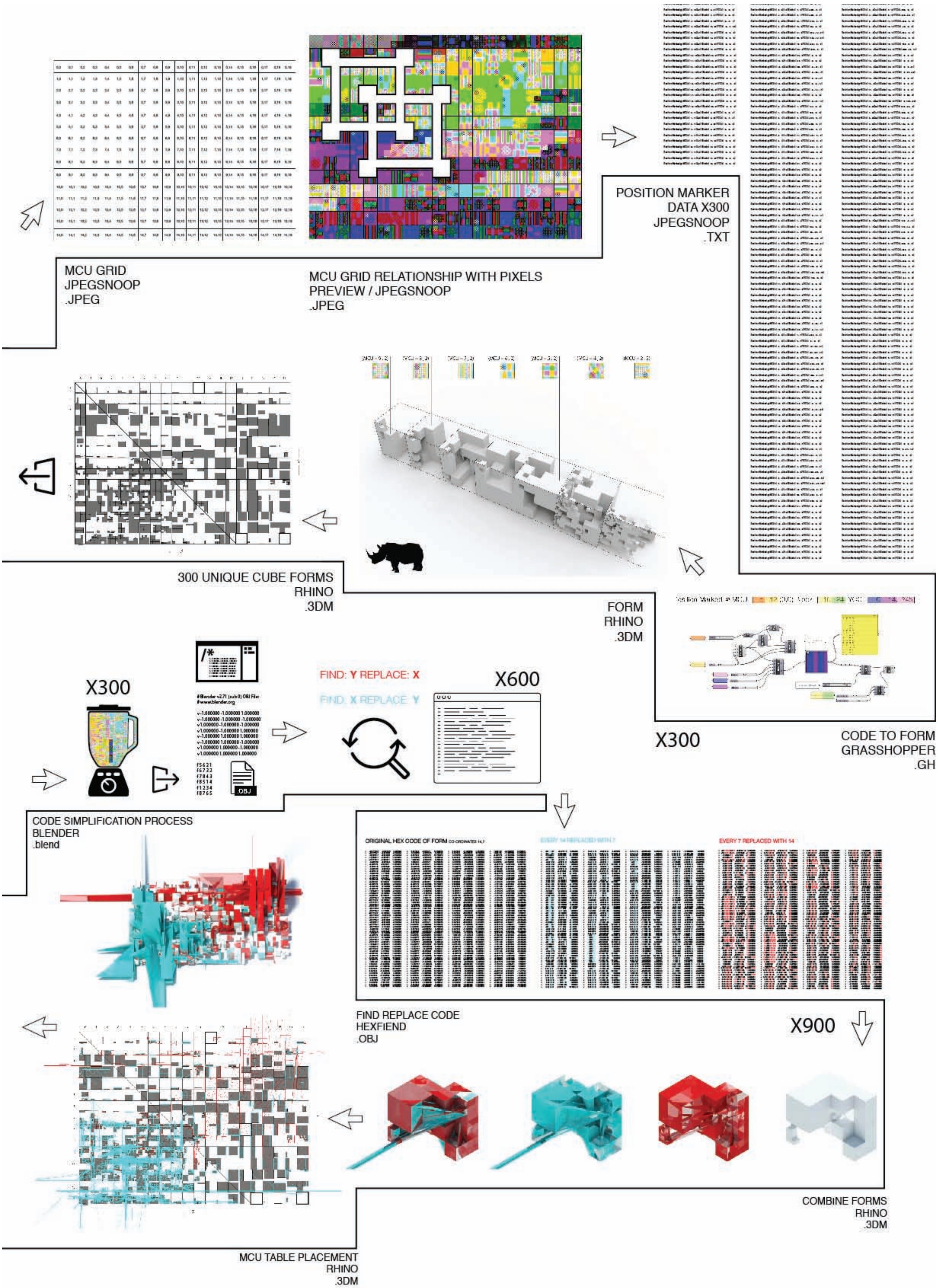
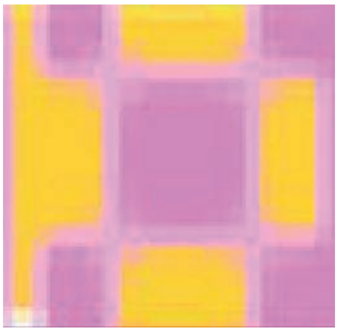


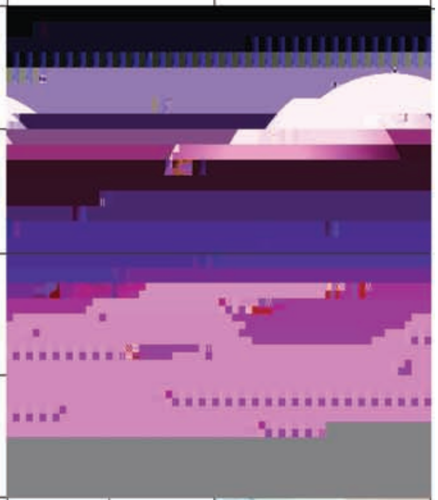
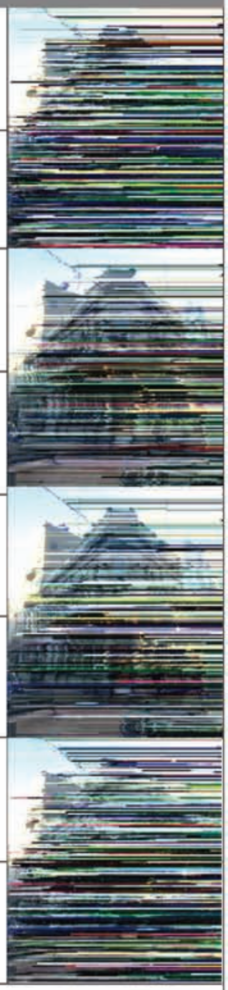
Figure 3.33 Visual Methodology Design Process


MCU GRID
JPEGSNOOP
.JPEG
MCU GRID RELATIONSHIP WITH PIXELS
PREVIEW / JPEGSNOOP
.JPEG
POSITION MARKER
DATA X300
JPEGSNOOP
.TXT
300 UNIQUE CUBE FORMS
RHINO
.3DM
FORM
RHINO
.3DM
X300
CODE TO FORM
GRASSHOPPER
.GH
X300
FIND: Y REPLACE: X
FIND: X REPLACE: Y
X600
.OBJ
CODE SIMPLIFICATION PROCESS
BLENDER
.blend
ORIGINAL HEX CODE OF FORM
FIND REPLACE CODE
HEXFIEND
.OBJ
X900
COMBINE FORMS
RHINO
.3DM
MCU TABLE PLACEMENT
RHINO
.3DM



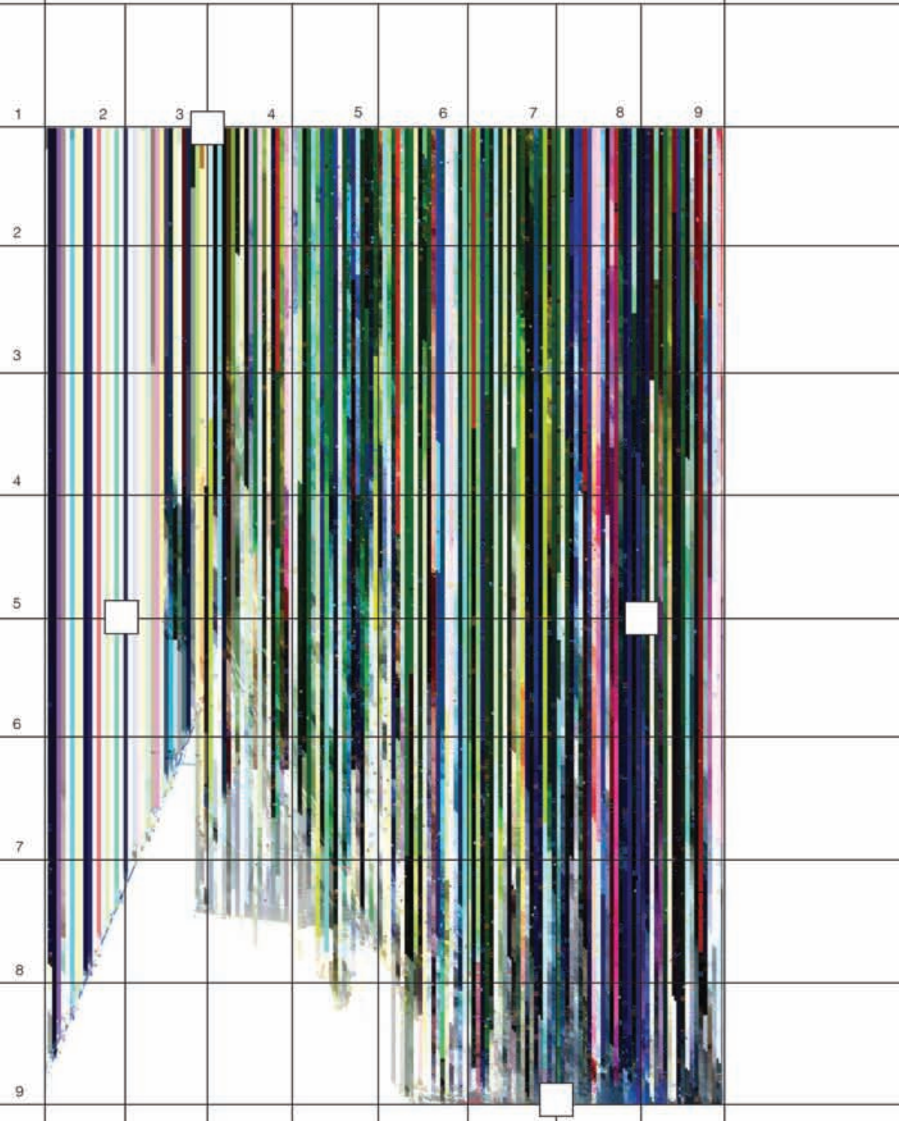
PILOT STUDY

To test our approach, we conducted a pilot study as an initial design inquiry. The generative process began from creating a transformative method through which a glitched file was reinterpreted continuously until it resulted in a meaningful design outcome. The pilot study has helped us to understand how a circular reflective process can be brought into a digital architectural and multi-dimensional realm. With the help of a code we read a decayed file, translate it into an image, image into code and finally code to a form. The pilot study demonstrated that our methodology is in principle leading to a meaningful result. This work is included in the paper "Transcoding of Game Design into Museology: An Object-Oriented Perspective" proceedings for the Design Communications European Conference 2016 held in Istanbul. The paper describes, "photographs taken from the site assigned are hacked through their colour codes. Photography is turned into a platform for a two-way communication between pixels and the decoder. The simplicity of the process is aligned with algorithmic methods of object-orientated programming. Compartmentalization of a photo into pixels through hexadecimal (HEX) colour codes indicated a procedural generation outweighed by its aesthetics. The innocence of unknown pixels retrospectively changes the images by imposing new outcomes. Resulting in a floor slab, the glitches are presentative to a gap in knowledge that users must project their own understands in order to complete it." (Aydin, Schnabel, Moleta, 2016)

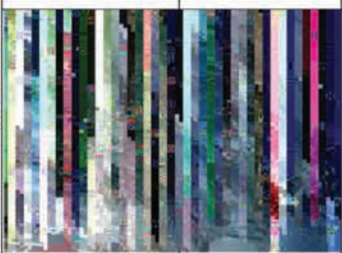
CUBE GLITCH	AMOUNT	SEED	ITERATIONS	QUALITY	SPHERE GLITCH	AMOUNT	SEED	ITERATIONS	QUALITY	MOST SUCCESSFULL GLITCH CODE	85 79 31 25	
	62	70	49	40		83	54	44	1			
	79	65	31	14		52	21	32	19			
	86	15	49	5		41	61	39	8			
	30	58	26	51		69	92	14	33			
	43	20	49	10		56	70	38	19	HEX	8	
	60	15	30	66		31	39	47	11	REPLACE	5	
	43	10	49	17		83	79	31	25	HEX	7	
	56	34	38	17		1	98	49	82	REPLACE	9	
	15	43	27	10		38	58	22	89	HEX	3	
	77	59	39	73		85	79	31	25	REPLACE	1	
	48	47	30	6		11	95	7	14	HEX	2	
	65	71	29	42		59	85	34	90	REPLACE	5	
	87	35	40	14		35	11	32	84	MOST SUCCESSFUL GLITCH CODE = 85 79 31 25. A SITE PHOTOGRAPH HEX CODE IS ACCESSED. EVERY HEX DIGIT 8 IS CHANGED TO 5, THEN EVERY 7 TO 9, EVERY 3 TO 1 AND EVERY 2 TO 5. THE FINAL RESULT BELOW HAS ALL OF THESE HEX DIGITS CHANGED IN THE ONE FILE.		
	75	53	16	7		17	0	6	5			
	70	35	50	2		65	5	13	35			
	96	17	33	1		32	31	44	6			

GLITCHED HEX CODE

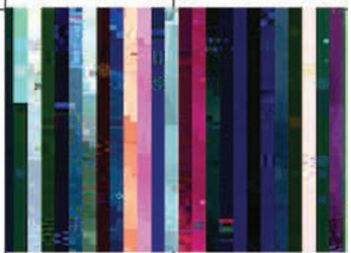
HEX CODE RESULT AS ARCHITECTURAL PLAN



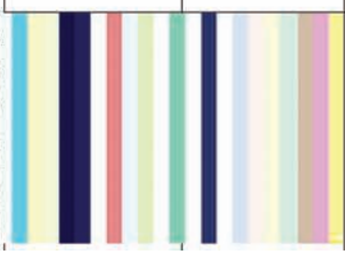
7 9 8 5



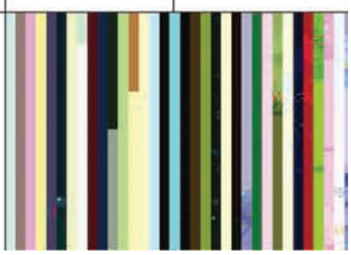
THE PLAN IS MAPPED WITH CO-ORDINATES. THE GLITCH CODE 85 79 31 25 DETERMINES THE KEY POINTS ON THE PLAN. THESE KEY MOMENTS ARE ZOOMED IN ON AND DOCUMENTED.

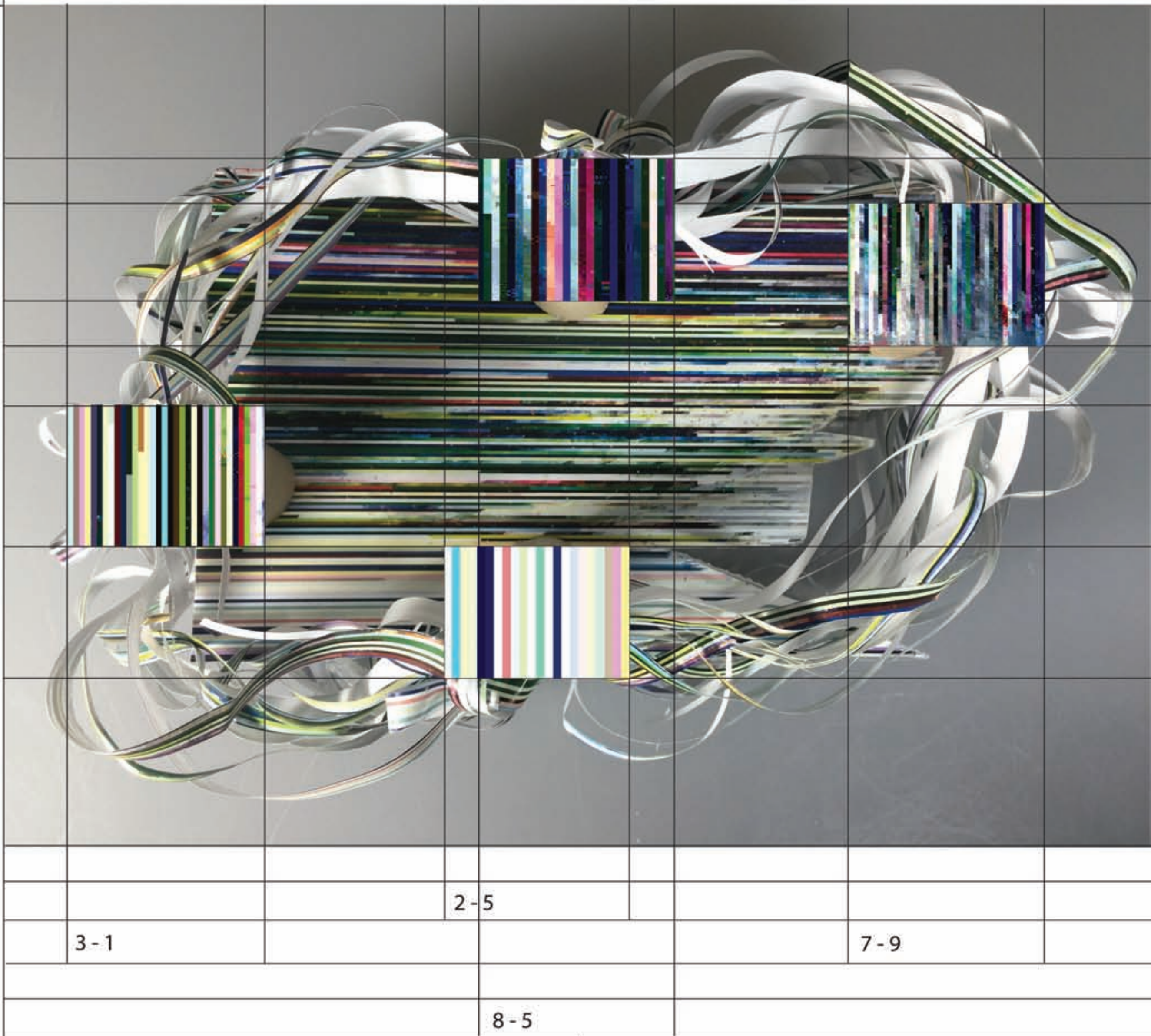


2 5 3 1



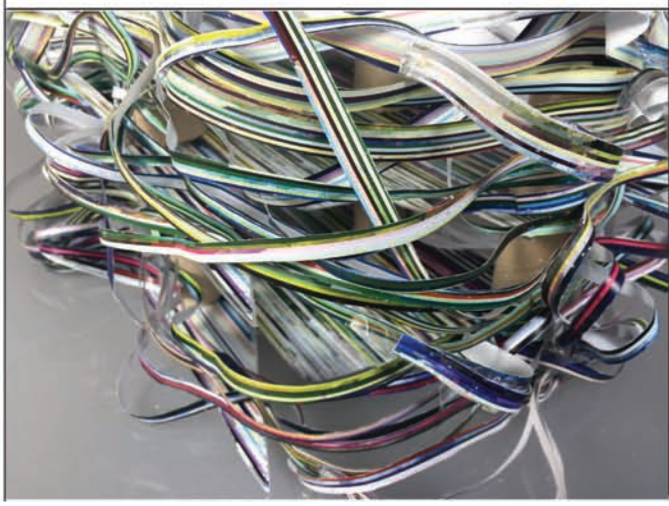
EACH OF THESE COLOURED STRANDS HAS AN RGB VALUE. RGB IS AN ADDITIVE COLOUR MODEL IN WHICH RED, GREEN AND BLUE LIGHT ARE ADDED TOGETHER IN VARIOUS WAYS. EG. RGB VALUE FOR FUSHIA IS R- 220, G- 61, B-128.

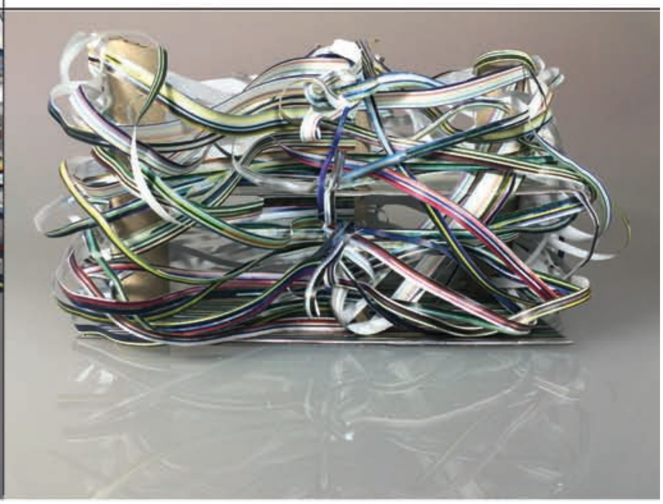




VISUAL DATA GLITCH STRANDS ARE WRAPPED AROUND THE KEY MOMENTS OF THE FLOOR PLAN IN A HAND MADE PAPER MODEL.

THE KEY MOMENT CODES TAKEN FROM ORIGINAL DATA GLITCHING DO NOT ONLY INFORM KEY POINTS IN THE FLOOR PLAN BUT ALSO INFORM THE FACADE FORM.

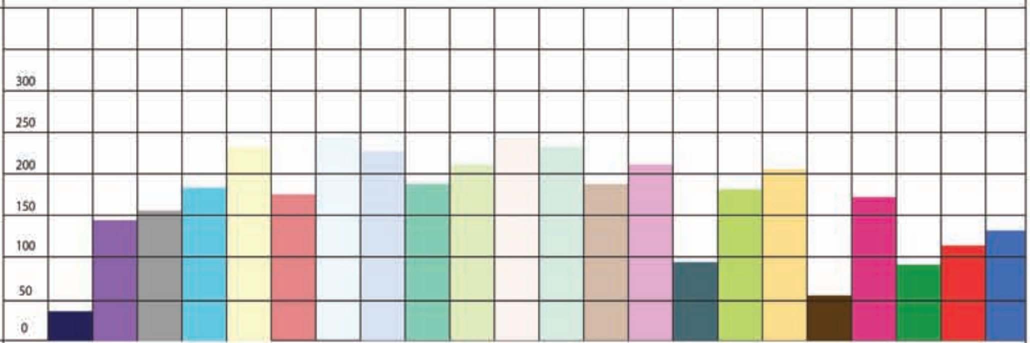


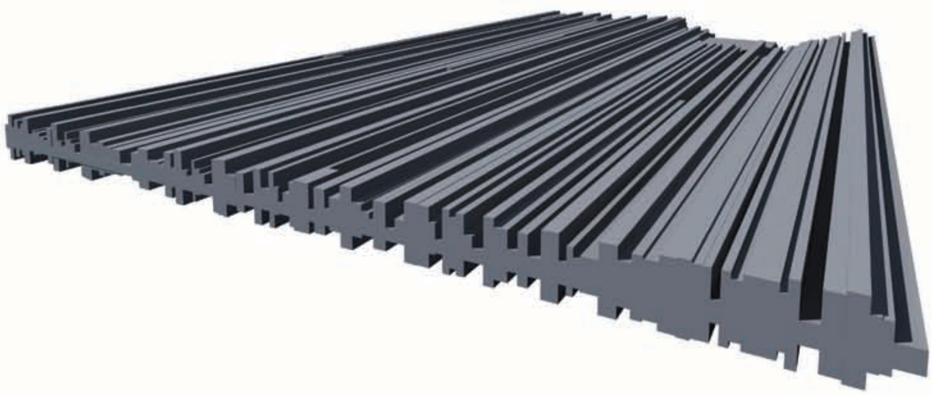


COLOUR	R	G	B	AVERAGE
	255	255	255	255
	5	10	96	37
	147	99	194	146
	155	155	155	155
	105	199	244	182
	251	254	199	234
	0	0	0	0
	229	135	137	167
	233	255	255	247
	213	225	245	227
	100	247	199	182
	227	254	192	224
	254	240	232	242
	207	254	234	231
	213	187	167	189
	253	168	248	223
	68	107	115	96
	183	253	113	183
	254	222	140	205
	92	58	11	53
	220	61	128	129
	22	149	72	81
	251	50	47	116
	31	111	251	131

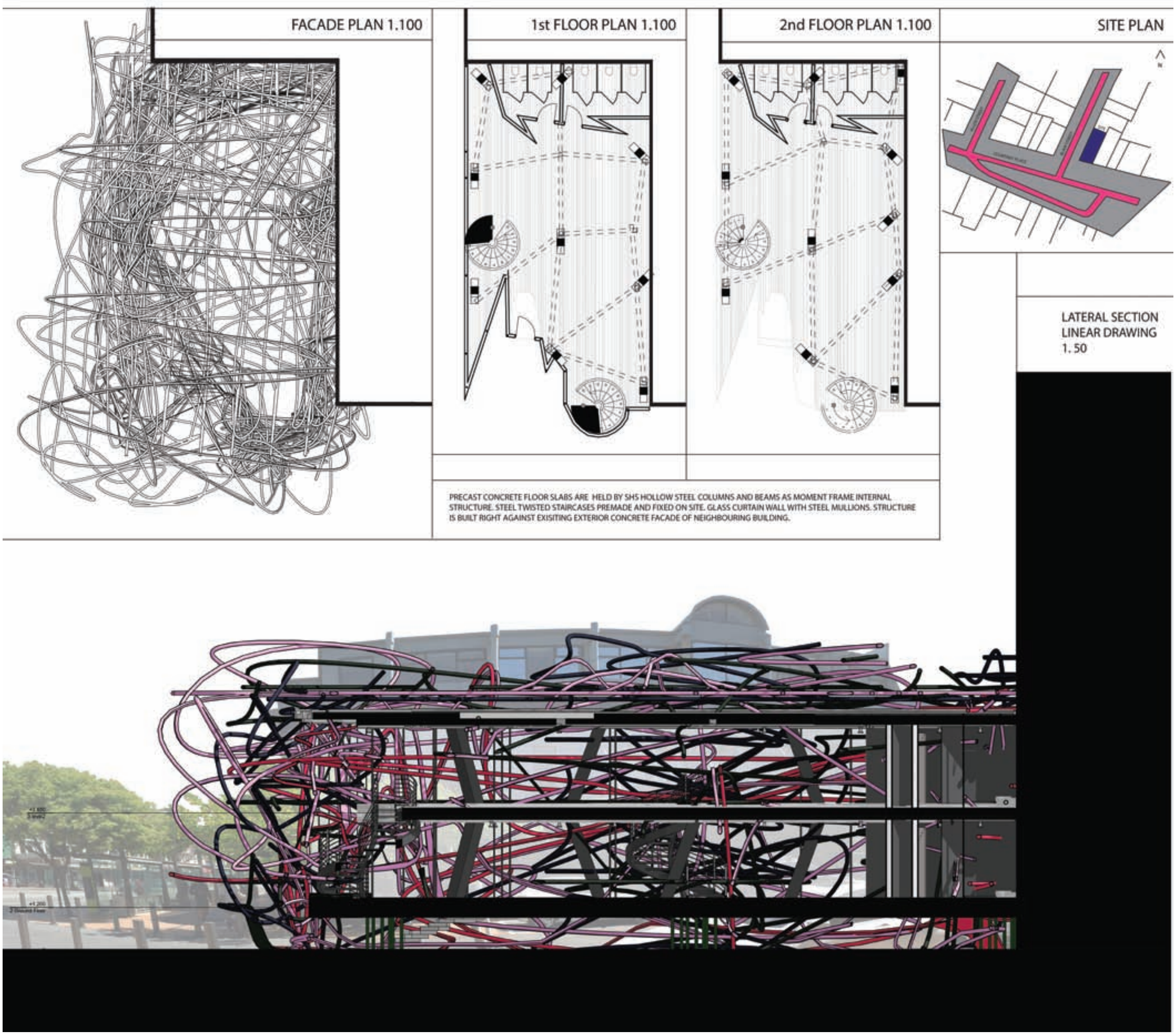
LINEAR FLOOR SLAB

THE GLITCHED IMAGE IS TRANSLATED TO A CONCRETE FLOOR SLAB. THE GLITCH IS MADE UP OF STRANDS OF COLOURS.
THE AVERAGE RGB VALUE FOR EACH STRAND OF COLOUR IS CALCULATED. THIS AVERAGE RGB VALUE DETERMINES THE HEIGHT OF EACH STRAND.





THIS METHODICAL PROCESS RESULTS IN A FLOOR SLAB THAT IS ABNORMALLY UNEVEN. WALKING ON THIS SURFACE WOULD CREATE AN AFFECT FEELING OF UNCERTAINTY DUE TO THE DISORDER, THE SAME IMMEDIATE FEELINGS ONE WOULD HAVE VIEWING AN AGED FILE THAT HAS GLITCHED. THE UNBALANCED SURFACE IS INTENDED TO DISTURB THE OCCUPANT AND ENCOURAGE AN ATMOSPHERIC GLITCH IN THE WAY WE MOVE THROUGH ARCHITECTURE.



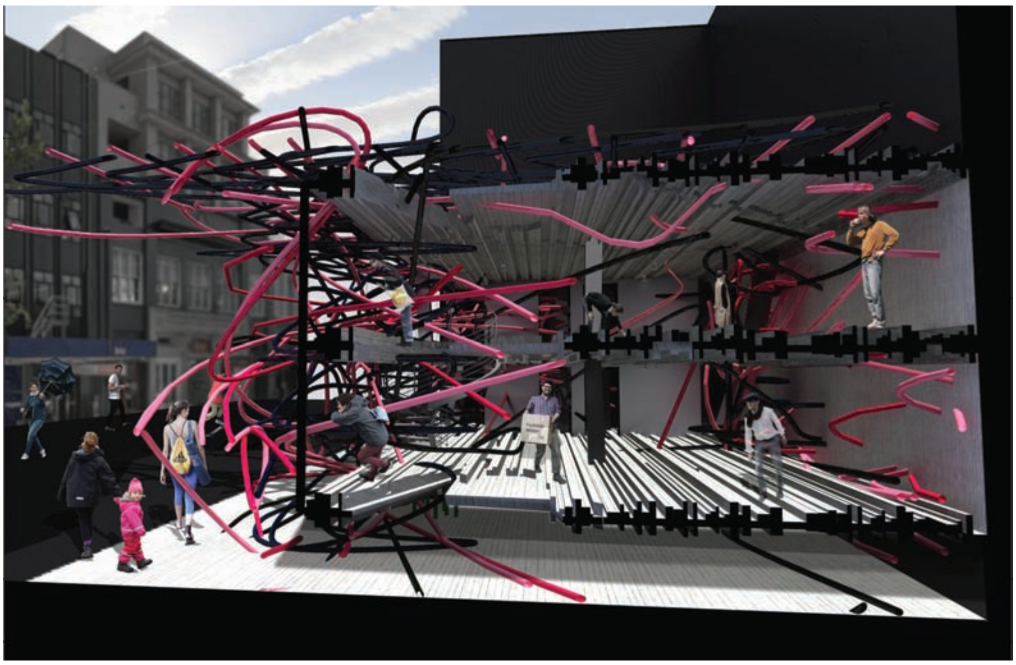


Figure 3.34 Pilot Study Design Process

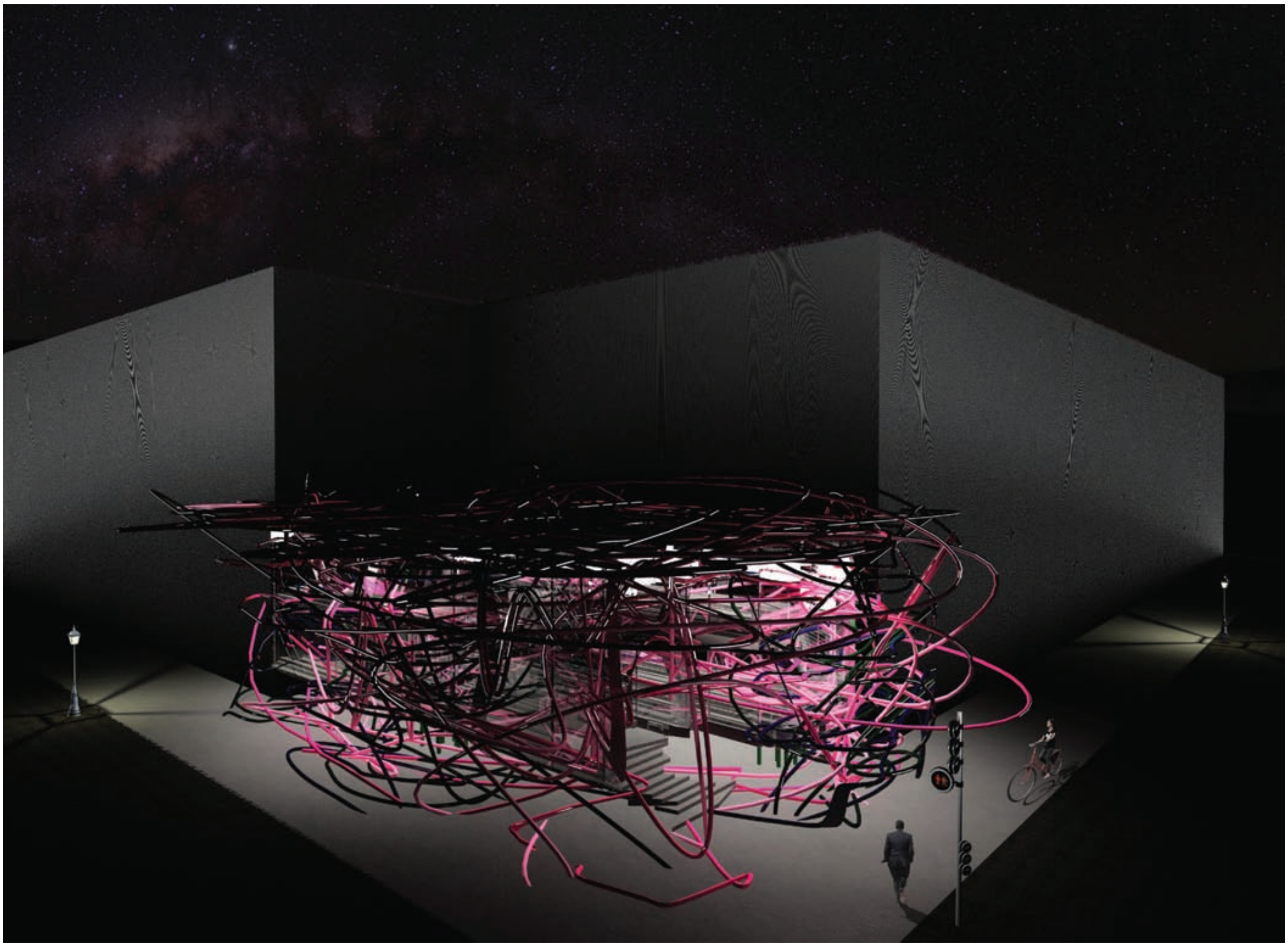


Figure 3.35 Pilot Study final render images

FF 00 3C A4 FF 00 BE 0D 76 7F 8D 32 9B B2 93 35 C3 C8 AF D7 63 FF 00 DF 26 A0 6D D2 90
3C B6 DC 07 A1 E9 5D EE 6A 33 F8 53 B6 D3 48 CD 79 DC 84 02 37 06 5F AE 45 47 2B 2A F5
07 F5 AF 43 20 1E A1 7F EF 91 50 4A 8B B4 FC 89 FF 00 7C 8A 31 46 2B 86 B7 F9 F3 26 DC 0F
BA 2B 1F 55 FE 64 FF 00 3A EB E7 C7 9B C2 80 3E 73 D3 D2 B8 6D 49 BE 70 99 CE 46 6A 01
CC 95 77 A4 75 95 47 7A 71 E8 0D 32 AD 55 7A BF 0F 4A B3 22 46 F1 3C 9B C2 95 4C E0 F5 2C
3B 7E 35 52 33 C5 58 52 2A 23 D6 AC 2F 4A A6 17 22 9D E5 D4 E6 99 4B 46 29 98 A8 4A D5 A3
50 E0 EE A5 14 D6 A8 36 1A BD 68 52 36 72 FD E2 60 3F DE 3D 2B AD D3 F4 7B 4B 8B 4B 79
A5 0F B9 C1 3C 1F 7A B7 FF 00 08 F6 9B E9 3F FD FC A5 CD 43 9A E3 07 20 9A 6C 6D 84 2B
FE DE 6B B6 FF 00 84 7E C3 18 DD 72 07 FB E3 FC 29 9F F0 8E 69 E3 A4 97 43 FE 04 BF E1
51 ED A7 F9 D5 C7 31 A5 B7 60 11 D4 FF 00 11 07 F2 AE BD BC 3B 65 FF 00 3D 6E 7F 35 FF
00 0A 8B FE 11 DB 3E D3 5C 7E 62 90 27 14 BE 7D 73 59 F4 AF 45 B3 3E 56 91 13 7F 72 D8 B7
E9 58 89 E1 CB 62 7F E3 E2 7F D2 BA 4D 46 11 6D A2 32 FF 00 CF 44 F2 01 FF 00 7B 8C D3
95 6A 39 24 DD 5C 66 87 71 F6 73 73 29 FF 00 9F 59 5B F1 35 15 8C AC B6 92 93 FF 00 3C E5
AA 0A C6 11 71 1A F3 B9 3C 8C FD 79 CD 2C 12 11 1B 44 06 43 93 1F E7 53 1A 6E 6B A5 F0 90
FF 00 49 3F F5 C3 FA D6 4E A4 7C DD 62 F1 BF E9 B6 C1 F8 00 29 34 FD 4A 4D 2A 76 74 87
CF FD DE CD B9 C7 7A 74 11 BD ED E9 6E 15 E6 92 49 CE 7B 63 F7 84 71 ED 40 A4 CD 7A 61
52 96 83 DA DB FF 00 64 AE 00 74 AF 43 9B 9D 3C C9 D3 75 99 6F CD 2B CF BB 0F A5 36 90
56 0E A7 F7 E0 1E ED 59 32 93 5A DA 8F FA F8 87 B3 56 54 C2 9B 9A 78 A8 37 8A 6B 54 46 8E
D4 EC 52 D7 B5 79 D3 7F CF 59 3F 3A 6F DA 27 FF 00 9E CF 46 29 B8 A4 A8 E9 DF 68 B8 FF
00 9E CD 47 DA AE 7F E7 A9 FC 85 47 8A 6D 25 15 2F DA EE 7F E7 AF FE 3A 29 3E D9 73 FD
FF 00 D2 A1 C5 21 A2 8A 9B ED B7 3F DE 5F FB E6 93 ED B7 3E A9 FF 00 7C D4 14 98 A2 8A
9B ED B7 1F EC 7F DF 34 C3 7B 71 FE C7 E5 FF 00 D7 A8 B1 4C 22 92 96 A6 FB 6D C7 FD 33
FF 00 BE 7F FA F4 9F 6D 94 8E 89 FA D4 14 CA 0D 28 15 4A 69 3F D2 B6 7A C4 3F EF A9 0D
71 5A A6 3E D8 E0 7F 0A A0 AD FB 89 9B ED D7 6C 3F E5 D6 58 78 F5 09 F2 91 58 7A AA 15
BD 9F DF 6B 7E 6B 9A 8A 21 F3 66 AD B7 DD AA 07 FD 5F D0 D4 22 A6 5F 4A 8C 8C 55 9A AF
53 AD 4C A6 AB AD 3F 38 A6 54 A2 A6 CD 25 33 34 B9 A4 A7 53 E8 02 9C 8A 5D 82 A8 CB 37
41 5D 5D A5 A2 43 12 6E 8D 7C E3 CB 93 C9 CF A5 2D 31 9A AF 69 B7 3B 2C 6D 91 91 B7 2A
FE 99 AB DF 6B 4F 46 AA 78 A5 DB 49 55 EA E7 DA 93 D1 A8 FB 52 7A 35 54 C5 3B 6D 14 95
6C 4C 1B D6 9D 9A 8A 25 E2 AC 84 A7 53 73 52 44 E0 1E 86 AE EB 7C E8 79 FE E3 A9 C7 FC
0A 8B 78 39 15 26 BA DE 5E 93 27 BB C4 BF 4F 98 53 C0 A4 1C 9A F3 23 1F CB 2C 8C 71 B5
F3 50 C2 3A 1C F4 7D D5 39 94 36 F8 70 78 1C FB 8A CE 57 6F 37 19 E3 D2 8A 7D 74 3A 76 93
3E A7 71 22 C3 22 45 B5 03 12 DD 31 9A 9A 08 2E 2C 75 28 E2 75 46 6F 35 E0 1C F0 DB C6
CD DC FD 6B 7B C2 0B 9B 9B 9E 43 7F A3 C7 D3 DD 8D 57 94 17 F1 05 B2 9E 7F D3 E4 1F 93
F1 4B 4D AE D2 FE 3F 27 4C 99 7F E7 9D 9E DF C4 2D 79 CF 61 F4 AF 4E D6 86 34 DB CF FA
E3 8F D6 BC CF 1C 0F A5 34 D2 D7 3B 7F FF 00 1F 68 3F E9 9F F5 AA 33 AD 69 5D C4 CD 77
B8 74 11 0F E7 54 67 46 A6 53 C5 64 91 CD 3B 03 15 26 C3 42 A1 CD 3E 96 BD 8C 8A 6E 29 E6
9B 4D A6 53 29 31 4E A4 A2 96 99 8A 6E 2A 4A 4A 29 2A 2C 52 62 A4 A6 D2 51 51 62 9B 8A 96
9B 45 2D 43 8A 63 FF 00 07 FD 74 5F D3 9A 9E AA CB 27 5F 48 D5 B3 FE F1 E9 51 C9 D2 A6
84 7C D5 C6 C1 70 06 A3 75 2C 83 74 52 19 16 50 3D 37 1E 95 7A F6 D9 2F 22 12 C0 CB 31 45
19 64 E7 A7 F7 BB F4 AC C8 50 95 0F 8E 64 90 BF FC 04 9E D5 D4 5A 69 C9 6E BB F9 F3 24
E7 F3 A5 DB E9 5A B6 56 2F 74 76 8A E5 7E CB 0E 3E F6 5B D2 A4 1A 63 B8 DD 8F 2D 3D 64
E2 BA DF B3 C5 1F EF 18 28 DB C9 35 9A D9 93 F7 B2 74 FF 00 96 71 F6 0B EA 7D 73 52 81
5A 9F D8 4B 1F DE 35 CC 4D 69 E5 E3 CB 25 FD 4E 0E 2A BE C6 24 2E 3E 63 D2 B6 2E 9F 39
F6 AC 9D DC D1 59 57 36 C8 87 E5 A6 B2 B2 1D AE 0A 9F 7E 2A 58 A2 69 18 2A 0D C4 FA 55
A8 2E A6 C8 47 10 DC A7 F7 27 C7 E8 D5 D2 DB 49 10 18 58 3E CC DD D7 6F F5 A4 35 9C DF
2D 32 D7 4C 8A 0D 92 1C B4 CB CF 5F 94 1F 6A D3 C5 30 1A 97 34 DA 80 D1 8A 76 28 A7 52
D3 68 C5 3B 6D 28 A7 D1 49 56 21 4E 2A E2 2D 45 07 DC AB 91 8A 78 15 19 AB D6 E9 54 7C
4C 3F E2 4F 2F FD 74 8F FF 00 42 AD 68 05 45 AB E9 B2 EA 96 6B 6B 14 A9 17 EF 91 DC BF
42 AB DB 8F 7A 7D 28 AF 20 B7 4D F3 DD FB 44 6B 34 FC AE D5 D5 5B E9 D7 31 EA 3A 95 AF
D9 E5 69 3F D5 26 14 F2 57 BF D0 F5 AB 17 BE 14 9A D7 49 9F 56 9E 70 A6 34 66 36 CC 98 6E
38 C7 E2 68 C7 34 FC D6 B7 80 97 32 DD FF 00 D7 08 7F 99 AB 0B 16 7C 55 02 8F E0 BB 76
3E DD 68 F8 7A 39 BD 6F FA 61 6D FA E6 BB 0B 4D 06 3B 6D 4A 6D 48 CC 65 92 57 91 C0 2B
F7 7C CE D9 CF 6E 9D 29 4F 14 CC 51 E2 2E 34 AB B3 EC A3 F3 71 5E 69 8A F4 BF 13 1C 69
13 FB BC 63 FF 00 1F 15 E7 03 AD 30 D4 98 AA B2 5A 3B 65 94 67 8A A2 F6 0E 7B 57 65 04 63
67 D4 53 85 B8 CF DD 15 28 4D C2 9A 4E DA E0 0E 99 21 3C 0A 91 74 89 7A E2 BD 0C 5A A7
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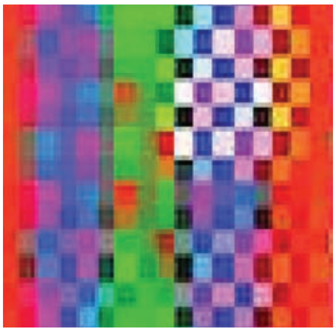
CHAPTER THREE



FATEFULL FINDINGS

A folder of 211 photographs taken on a fuchsia Motorola razr in 2007 were stored on a hardrive, today 9 years later every single one of these files open glitched. The files remained untouched, stored on a hardrive for 9 years subsequently opened to find new visual interpretations of wild colours and dramatic shifts in pixels due to digital decay. With zero human intervention or manipulation to the binary code of these images, the new visual interpretations present us with rich visual information discussing natural digital decay as oppose to forced intentional glitching. Digital files are made up of a binary code of 1's and 0's. The combination and assemblage of these 1's and 0's code the visuals that we view on screen. We must understand that the code does not alter through digital decay, the shift is in the visual interpretation (how the code is read). With constant digital updates we neglect to consider how the old binary codes may continue to be read, and this reveals glitch as a reinterpretation of code, an opportunity for a digital antique. Goodwin discusses in the paper 'Architecture And Consciousness - God In Reverse' an old suitcase in one of Liebskind's buildings forming a powerful extension to the meaning of architecture, going on to write, "but imagine today's suitcase uncovered in the future, holding a laptop computer, iPhone and other fragments of technological memory, waiting to have their software deciphered and plugged into the memory banks of a new consciousness enhancing architecture." (Goodwin, 2013) Upon finding this folder of glitched images there were no feelings of loss or panic but instead feelings of curiosity and opportunity. This is not the general consensus as digital restoration is the favored reaction, however these finding were fateful in that we could see glitch as a potential test within architectural design as Goodwin suggests.

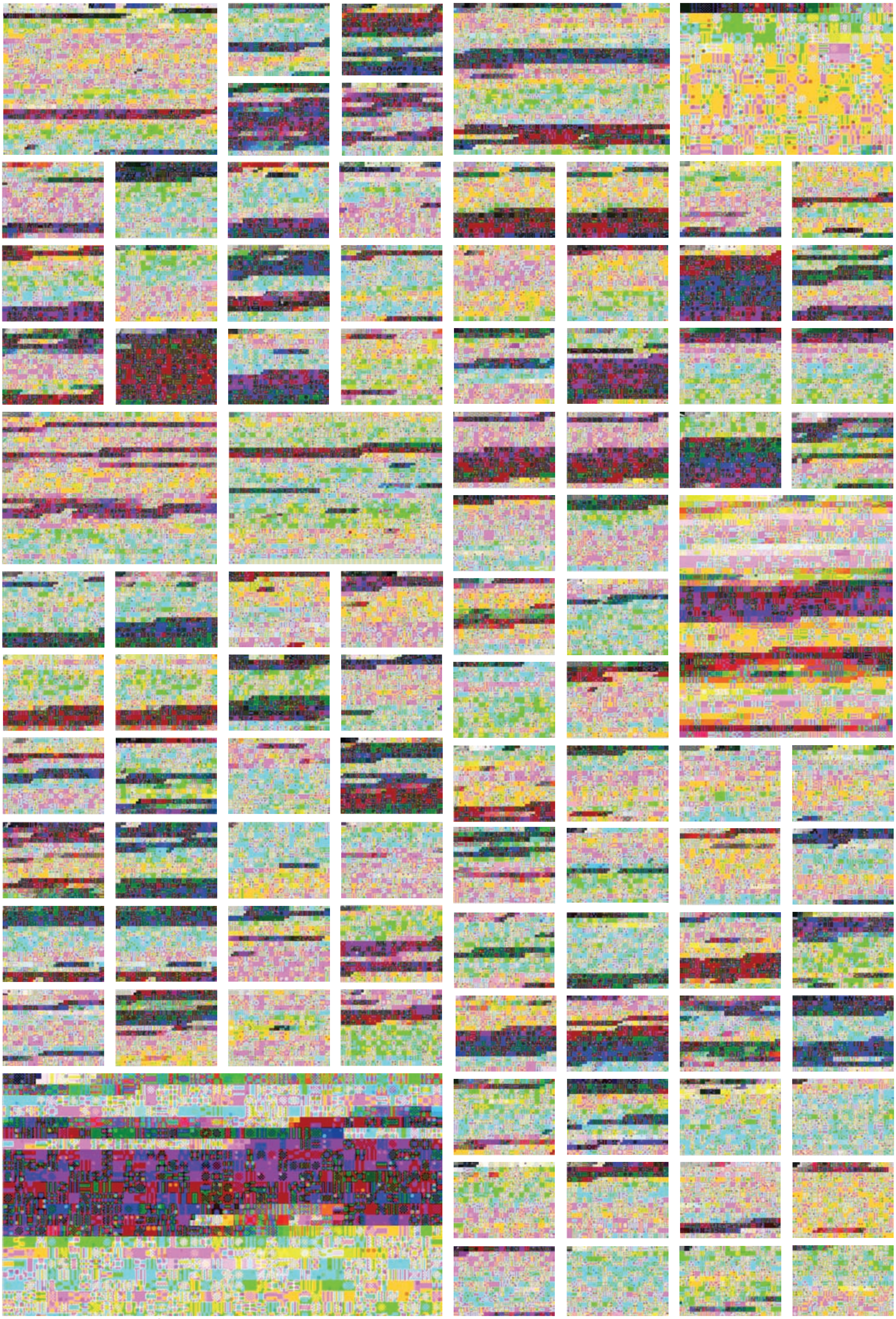
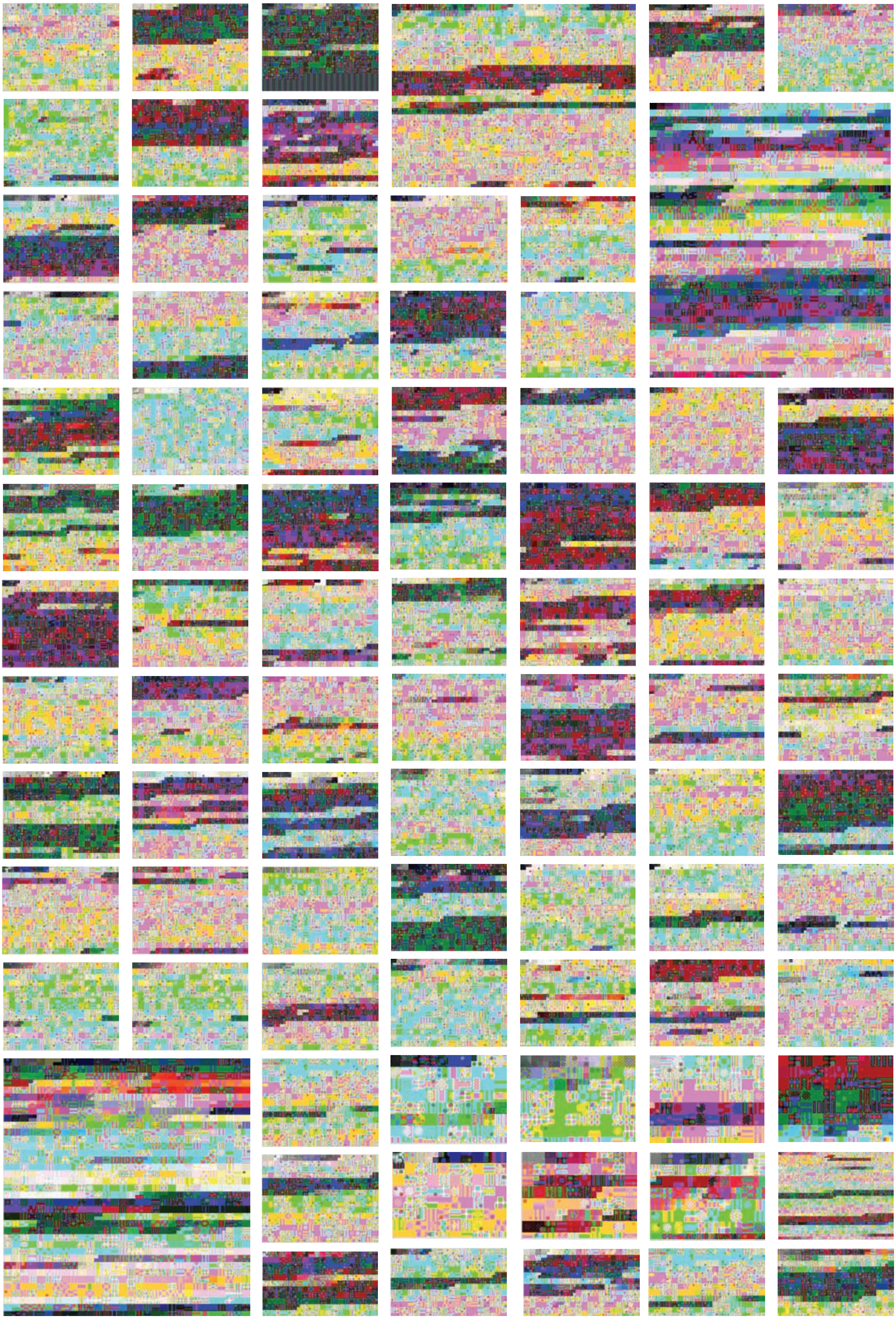
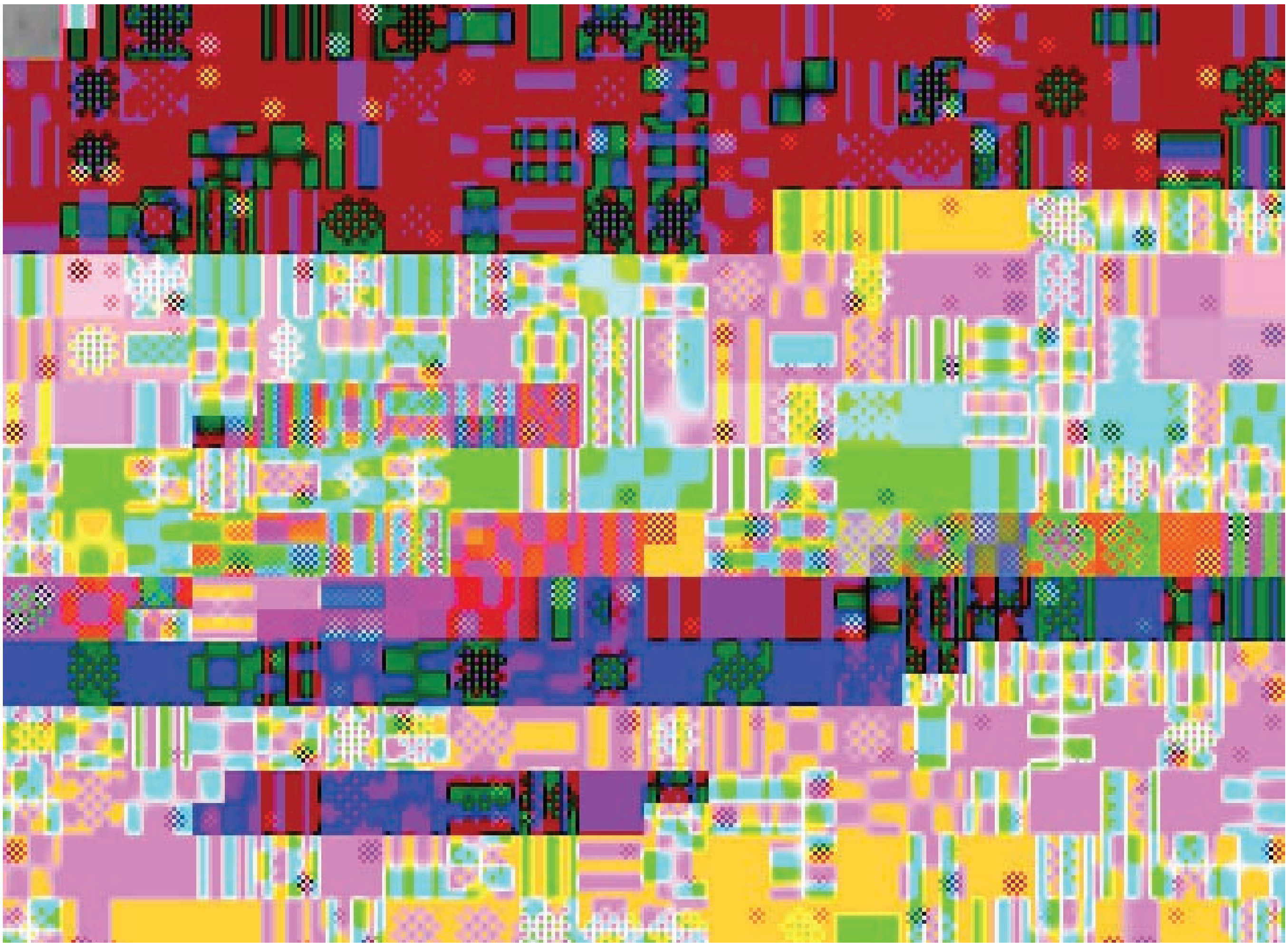
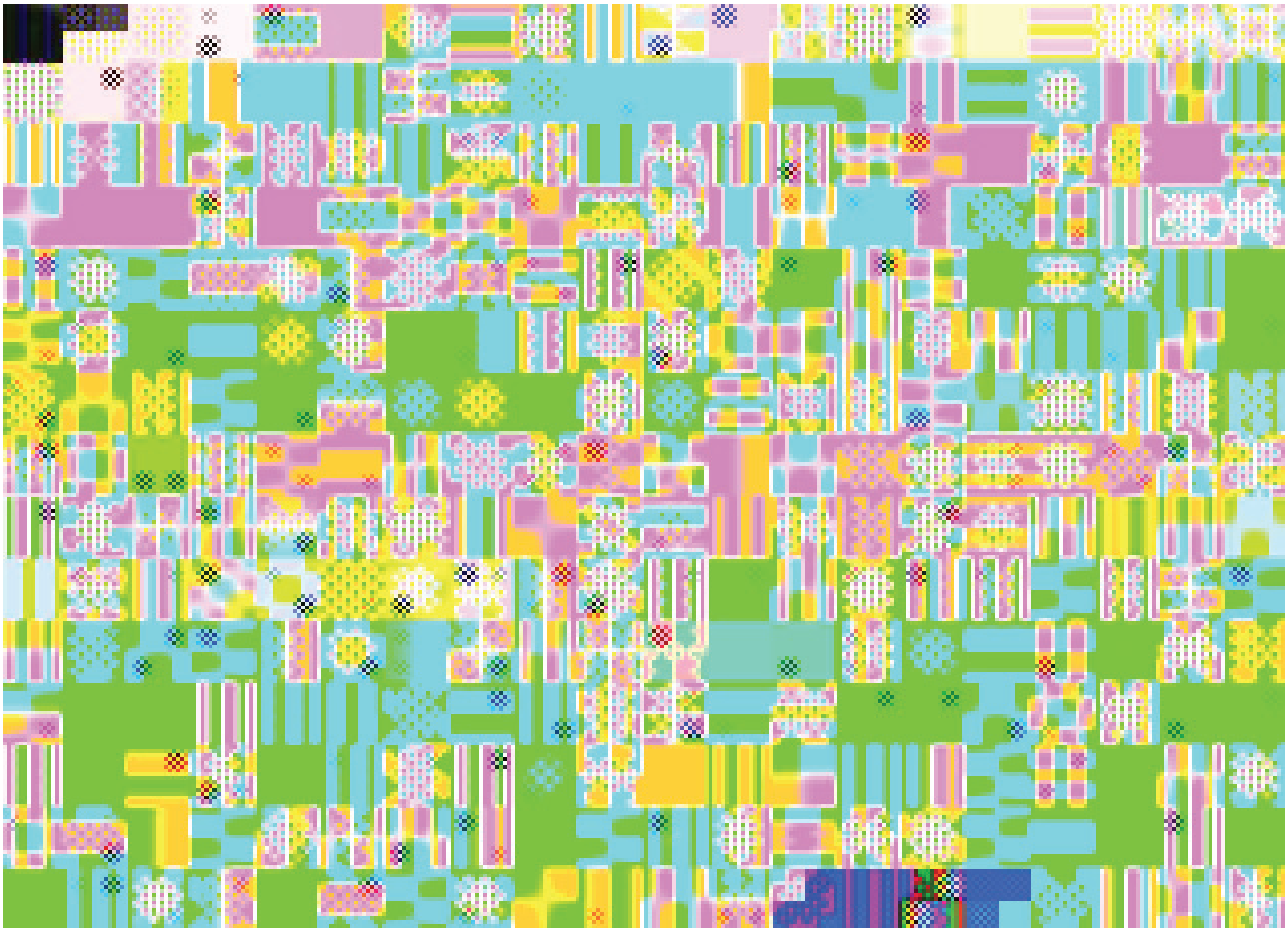
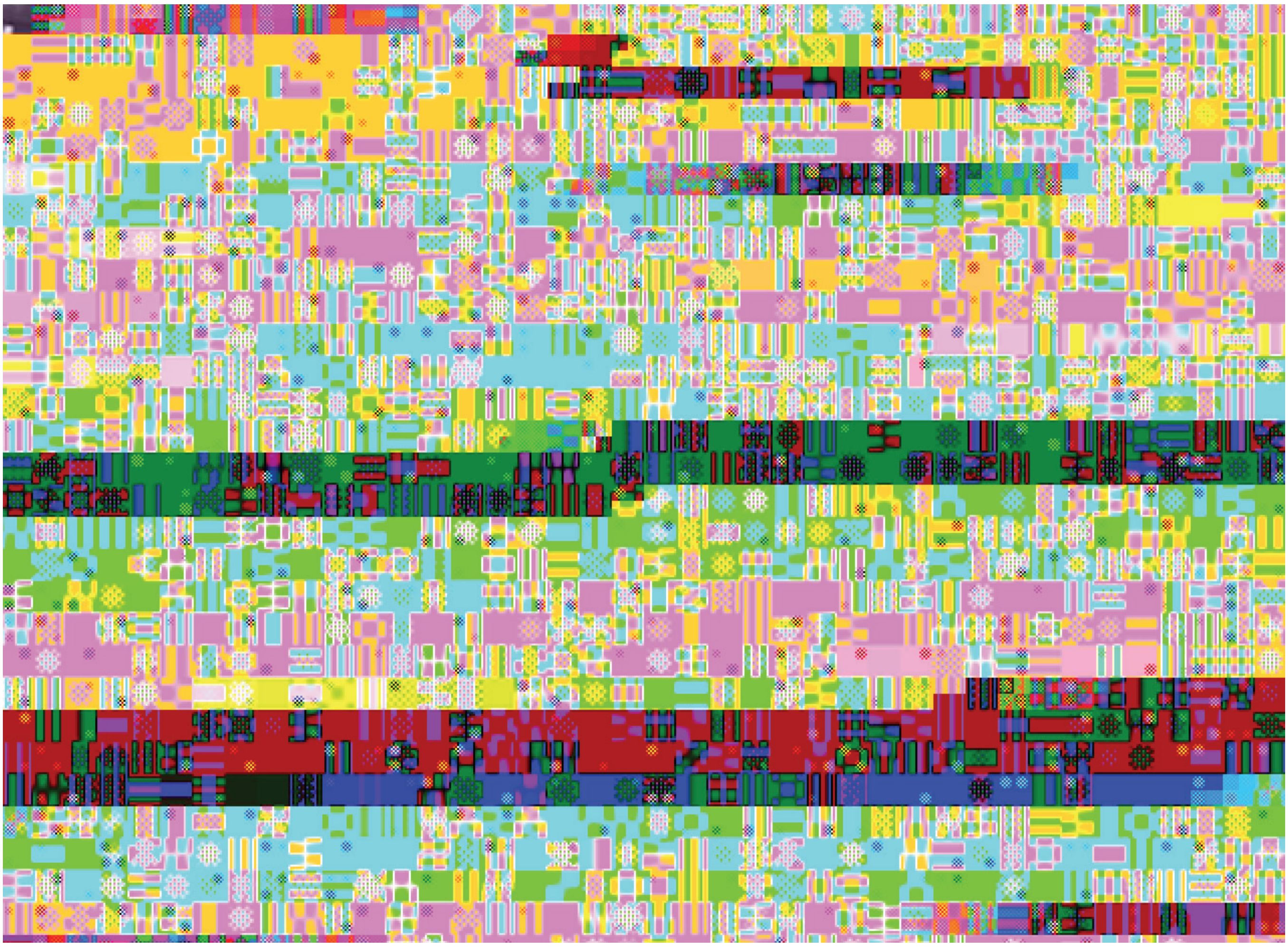


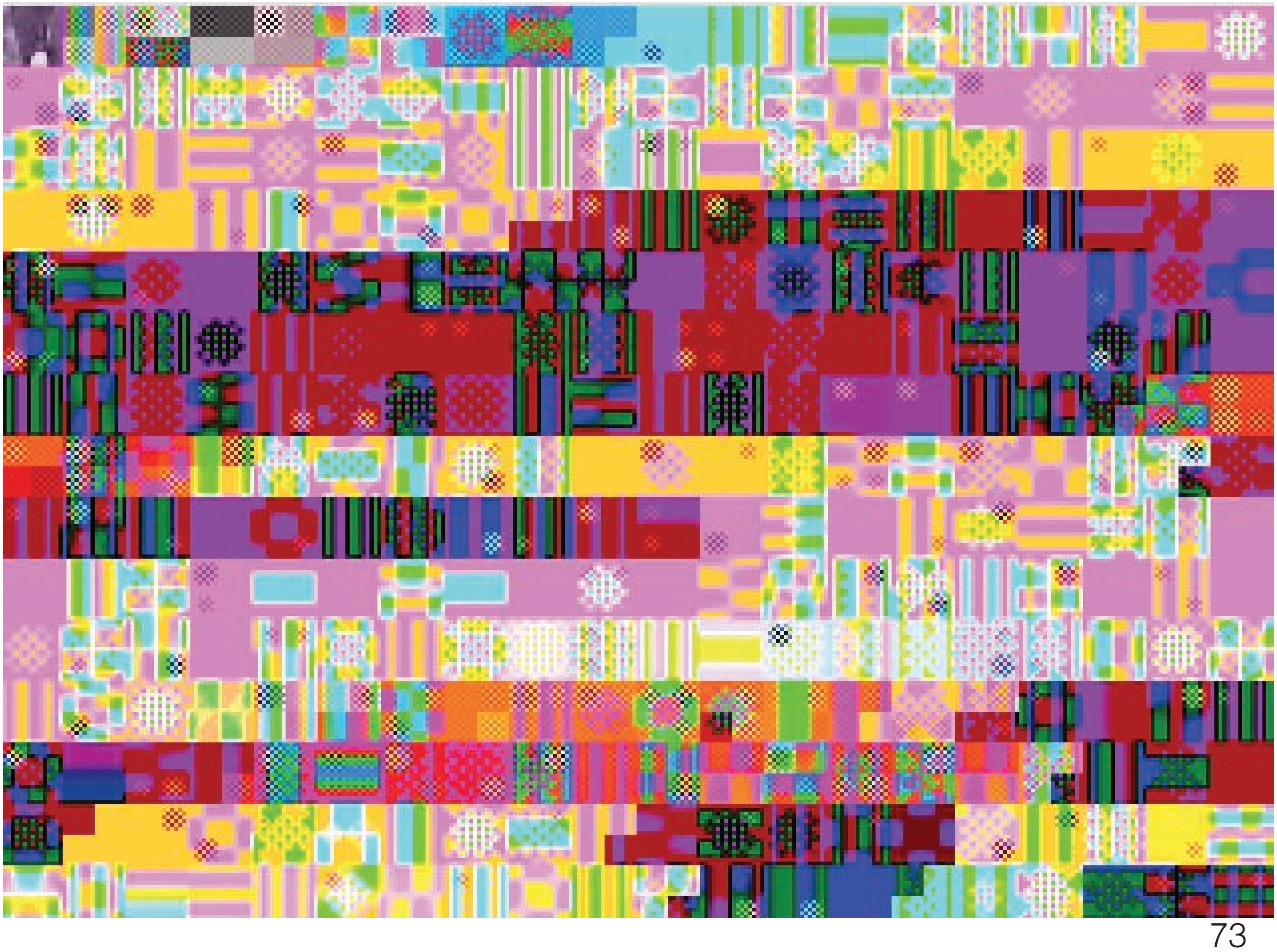
Figure 4.36 Natural Glitches found on a hardrive device, opened on a Macbook Pro

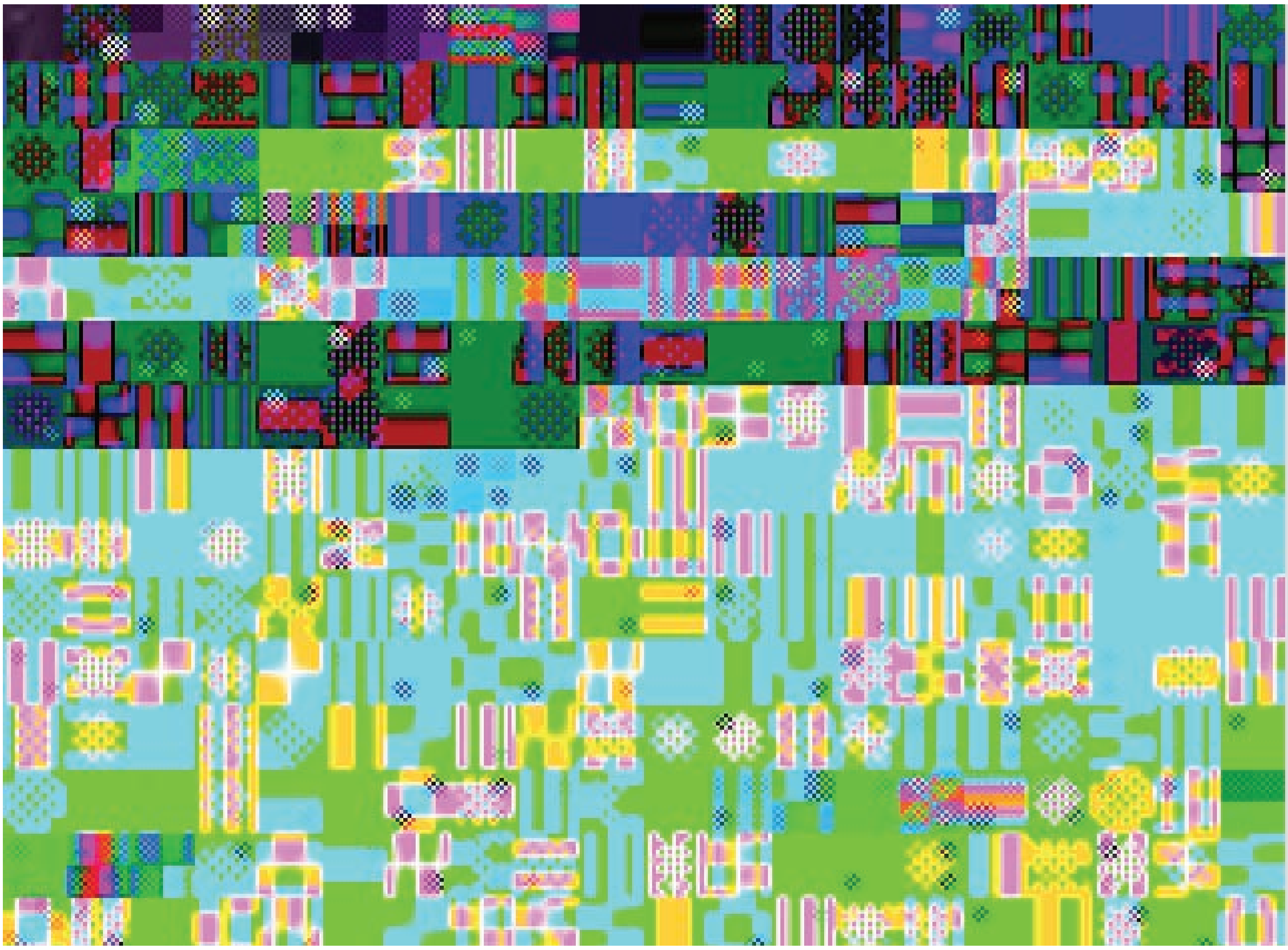


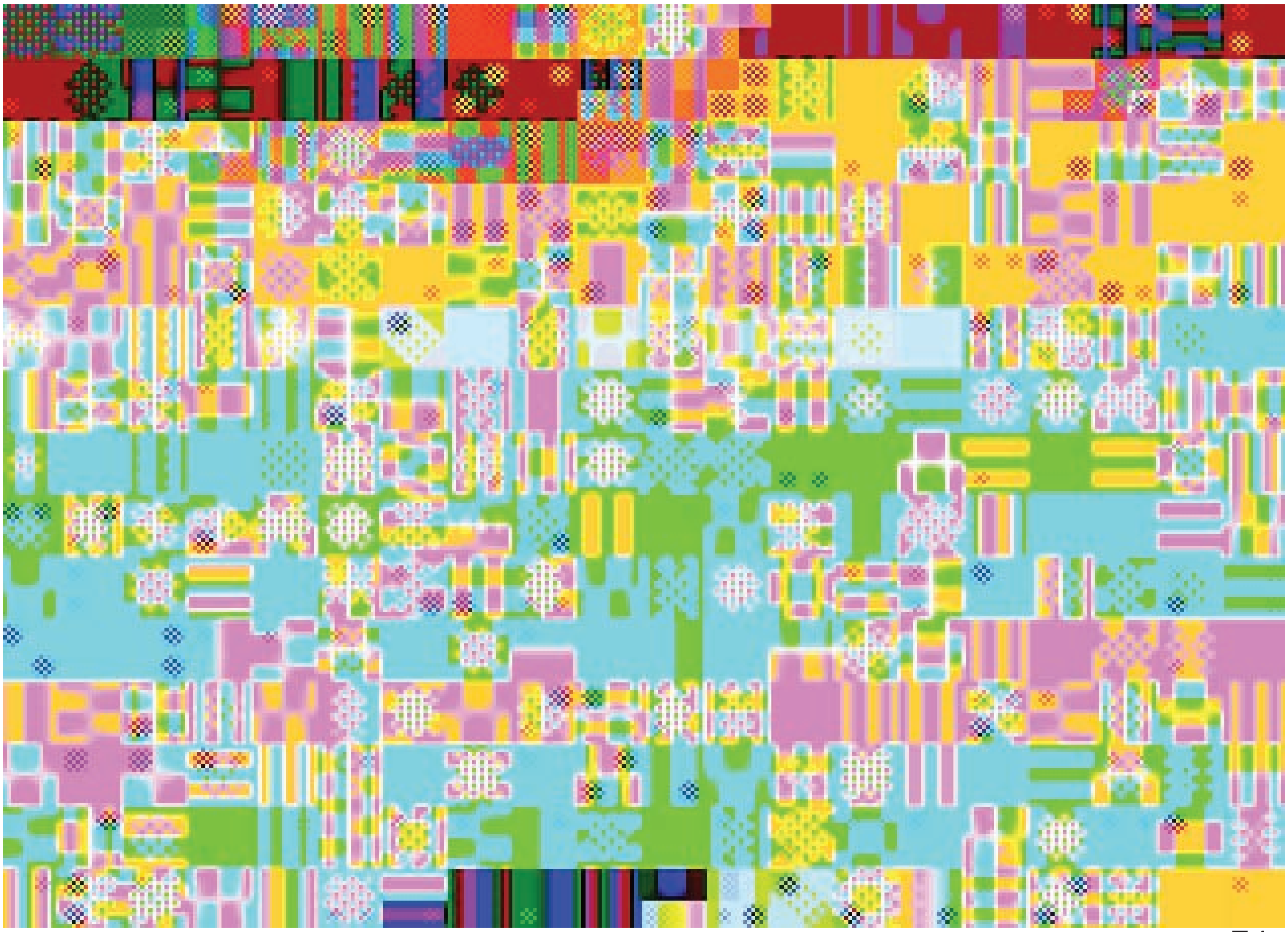


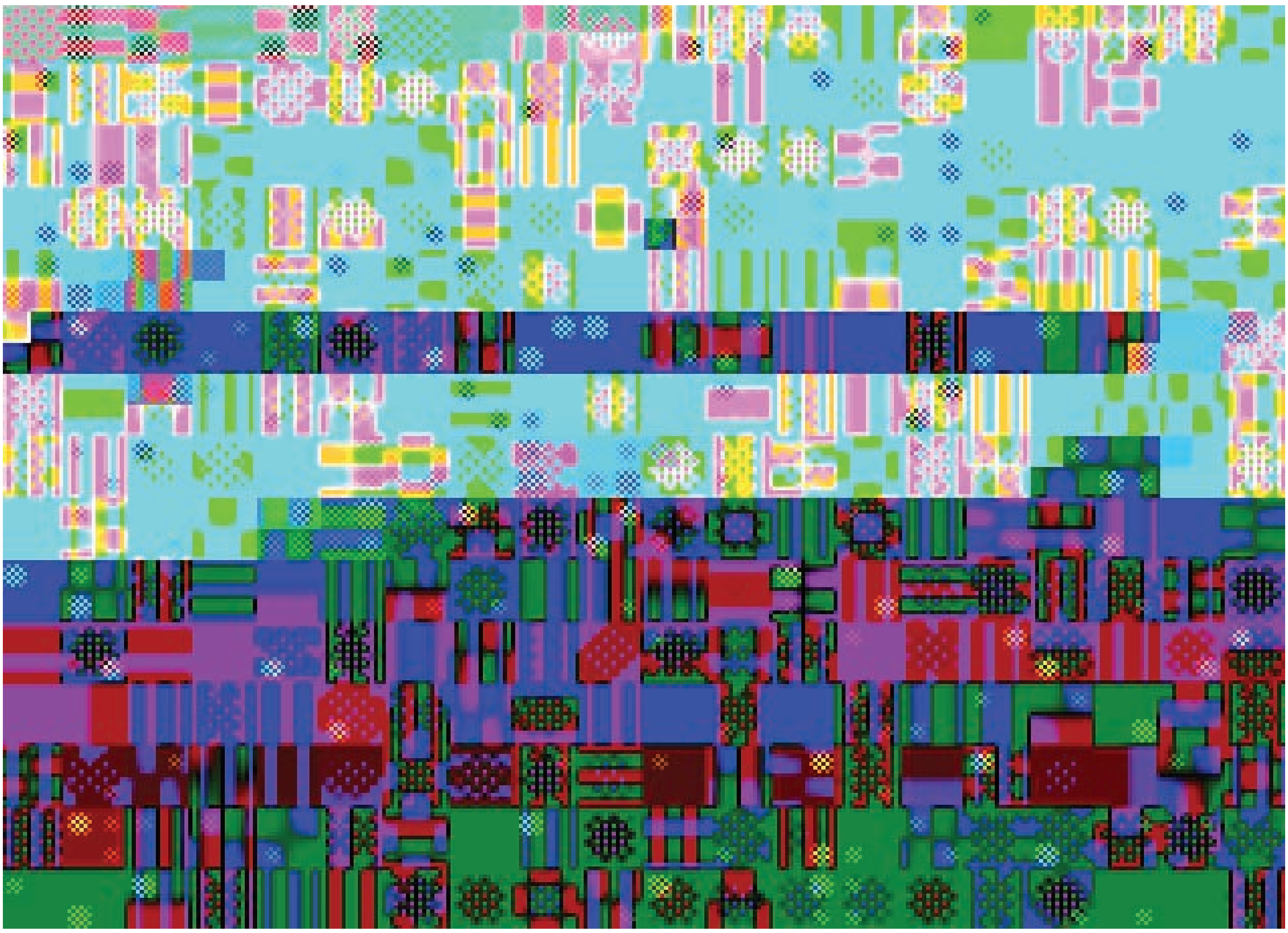












JPEGSNOOP

JPEGsnoop freeware decodes digital files providing a detailed report to analyze the source or perhaps put a particular files digital binary to a test of authenticity. Creator of JPEGsnoop Calvin Hass writes, "every digital photo contains a wealth of hidden information. JPEGsnoop was written to expose these details to those who are curious." (Hass, 2015) We randomly selected one image from the 211 files found glitched on a hardrive. Blairecooking.jpeg was created on the 24th March 2007. JPEGsnoop was able to produce the visually legible original image and provide a full report detailing the binary code of this specific digital file that was naturally appearing glitched.

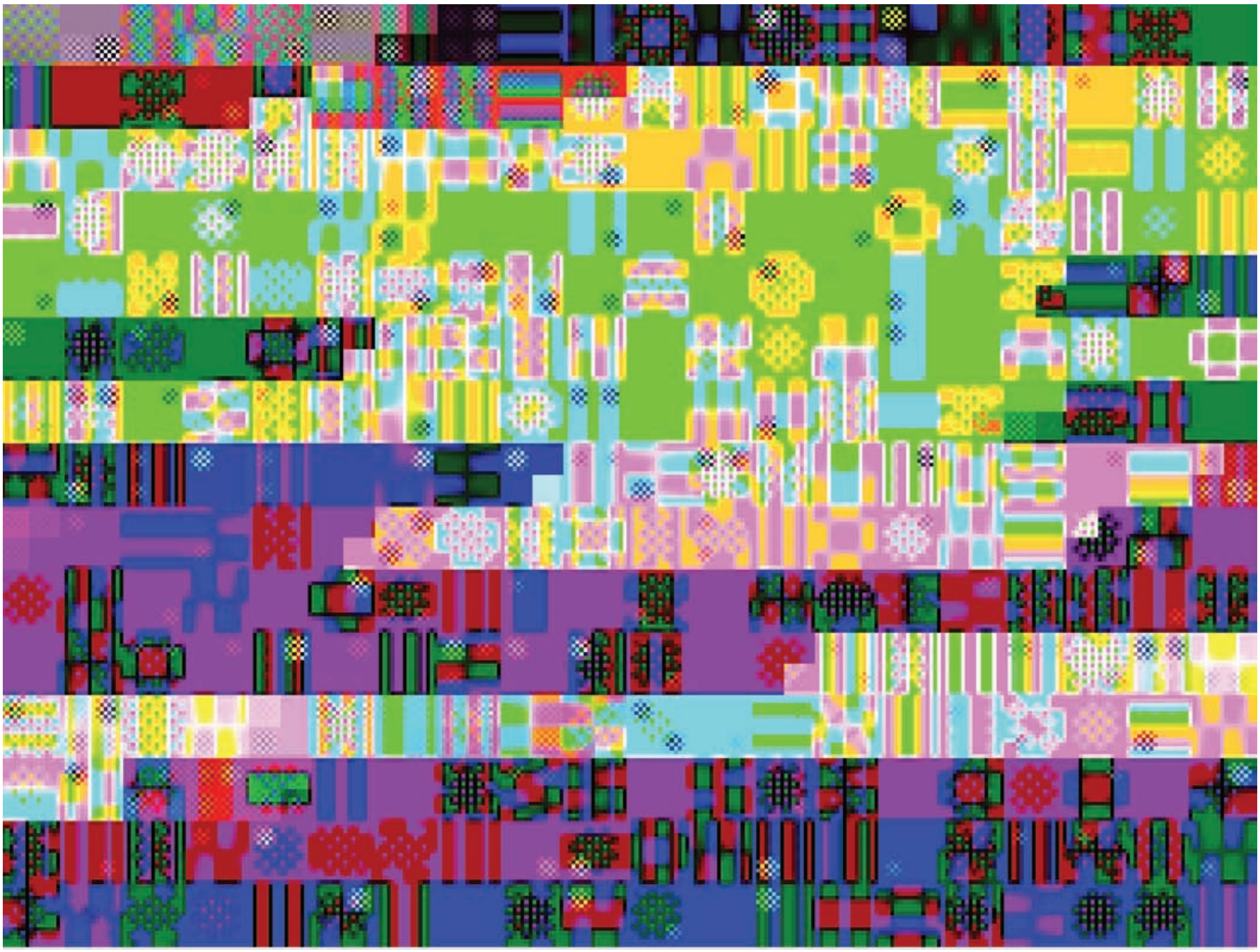


Figure 4.37 Blairecooking.jpeg natural glitch perception

Information can be conceptualised as “an entity distinct from the substrates carrying it.” (Hayles, 1999) One can think of information as a “kind of bodiless fluid that could flow between different substrates without loss of meaning or form.” (Hayles, 1999) The detailed background information provided by JPEGsnoop can serve as this ‘bodiless fluid’ much more meaningful that the numerical data we began with, information can be taken into new interpretation through computation design processes to then create meaningful form.

Figure 4.38 Blairecooking.jpeg legible image retrieved through JPEGsnoop

Calvin Haas program JPEGsnoops provides a full report on any JPEG file to understand almost every possible detail to the file. In order to understand this report however an extensive knowledge behind the JPEG compression file format is required.

```
JPEGsnoop 1.7.5 by Calvin Hass
  http://www.impulseadventure.com/photo/
  -------------------------------------

  Filename: [blaire cooking.jpg]
  Filesize: [11793] Bytes

Start Offset: 0x00000000
*** Marker: SOI (xFFD8) ***
  OFFSET: 0x00000000

*** Marker: APP1 (xFFE1) ***
  OFFSET: 0x00000002
  Length          = 1770
  Identifier      = [Exif]
  Identifier TIFF = 0x[4D4D002A 00000008]
  Endian          = Motorola (big)
  TAG Mark x002A  = 0x002A

  EXIF IFD0 @ Absolute 0x00000014
    Dir Length = 0x0005
    [XResolution                         ] = 72/1
    [YResolution                         ] = 72/1
    [ResolutionUnit                      ] = Inch
    [YCbCrPositioning                    ] = Centered
    [ExifOffset                          ] = @ 0x00B8
    Offset to Next IFD = 0x0000005A

  EXIF IFD1 @ Absolute 0x00000066
    Dir Length = 0x0006
    [Compression                         ] = JPEG
    [XResolution                         ] = 72/1
    [YResolution                         ] = 72/1
    [ResolutionUnit                      ] = Inch
    [JpegIFOffset                        ] = @ +0x0106 = @ 0x0112
    [JpegIFByteCount                     ] = 0x[000005DC] / 1500
    Offset to Next IFD = 0x00000000

  EXIF SubIFD @ Absolute 0x000000C4
    Dir Length = 0x0006
    [ExifVersion                         ] = 02.10
    [ComponentsConfiguration             ] = [Y Cb Cr .]
    [FlashPixVersion                     ] =
    [ColorSpace                          ] = sRGB
    [ExifImageWidth                      ] = 0x[00000140] / 320
    [ExifImageHeight                     ] = 0x[000000F0] / 240

*** Marker: DQT (xFFDB) ***
  Define a Quantization Table.
  OFFSET: 0x000006EE
  Table length = 67
  ----
  Precision=8 bits
  Destination ID=0 (Luminance)
    DQT, Row #0:   8   8   8   8   8   9  10  12
    DQT, Row #1:   8   8   8   8   9  10  11  13
    DQT, Row #2:   8   8   8   9  10  11  12  14
    DQT, Row #3:   8   8   9  11  12  14  15  18
    DQT, Row #4:   8   9  10  12  15  18  21  25
    DQT, Row #5:   9  10  11  14  18  23  28  36
    DQT, Row #6:  10  11  12  15  21  28  36  51
    DQT, Row #7:  12  13  14  18  25  36  51  63
    Approx quality factor = 83.53 (scaling=32.95 variance=276.19)
```

Quantitization Table displays sensitivity in frequency, one for luminance and one for chromiance.

Quality factor shows how well the image is extracted, scaling of 32.95 means the trade off between efficiency, smoothness and sharpness of the image. Variance shows the level of truth, if variance is 1 it would mean that it is a match, however this image variance is 276.19. The quality factor is calculated by the scaling and variance values.

```
*** Marker: DQT (xFFDB) ***
  Define a Quantization Table.
  OFFSET: 0x00000733
  Table length = 67
  ----
  Precision=8 bits
  Destination ID=1 (Chrominance)
    DQT, Row #0:   7   7  10  19  42  42  42  42
    DQT, Row #1:   7   8  10  28  42  42  42  42
    DQT, Row #2:  10  10  23  42  42  42  42  42
    DQT, Row #3:  19  28  42  42  42  42  42  42
    DQT, Row #4:  42  42  42  42  42  42  42  42
    DQT, Row #5:  42  42  42  42  42  42  42  42
    DQT, Row #6:  42  42  42  42  42  42  42  42
    DQT, Row #7:  42  42  42  42  42  42  42  42
    Approx quality factor = 79.00 (scaling=42.00 variance=1.19)

*** Marker: SOF0 (Baseline DCT) (xFFC0) ***
  OFFSET: 0x00000778
  Frame header length = 17
  Precision = 8
  Number of Lines = 240
  Samples per Line = 320
  Image Size = 320 x 240
  Raw Image Orientation = Landscape
  Number of Img components = 3
    Component[1]: ID=0x00, Samp Fac=0x22 (Subsamp 1 x 1), Quant Tbl Sel=0x00 (Lum: Y)
    Component[2]: ID=0x01, Samp Fac=0x11 (Subsamp 2 x 2), Quant Tbl Sel=0x01 (Chrom:
Cb)
    Component[3]: ID=0x02, Samp Fac=0x11 (Subsamp 2 x 2), Quant Tbl Sel=0x01 (Chrom:
Cr)

*** Marker: DHT (Define Huffman Table) (xFFC4) ***
  OFFSET: 0x0000078B
  Huffman table length = 31
  ----
  Destination ID = 0
  Class = 0 (DC / Lossless Table)
    Codes of length 01 bits (000 total):
    Codes of length 02 bits (001 total): 00
    Codes of length 03 bits (005 total): 01 02 03 04 05
    Codes of length 04 bits (001 total): 06
    Codes of length 05 bits (001 total): 07
    Codes of length 06 bits (001 total): 08
    Codes of length 07 bits (001 total): 09
    Codes of length 08 bits (001 total): 0A
    Codes of length 09 bits (001 total): 0B
    Codes of length 10 bits (000 total):
    Codes of length 11 bits (000 total):
    Codes of length 12 bits (000 total):
    Codes of length 13 bits (000 total):
    Codes of length 14 bits (000 total):
    Codes of length 15 bits (000 total):
    Codes of length 16 bits (000 total):
    Total number of codes: 012
```

DHT Class = 0 ID = 0 Used for DC component of Lumiance (Y)

One of the most significant contributors to a JPEG file is it's compression through Huffman Table which is a method that takes sumbols and encodes them with variable length codes.

```
*** Marker: DHT (Define Huffman Table) (xFFC4) ***
  OFFSET: 0x000007AC
  Huffman table length = 181
  ----
  Destination ID = 0
  Class = 1 (AC Table)
    Codes of length 01 bits (000 total):
```

DHT Class = 1 ID = 0 Used for AC component of Lu-miance (Y)

```
    Codes of length 02 bits (002 total): 01 02
    Codes of length 03 bits (001 total): 03
    Codes of length 04 bits (003 total): 00 04 11
    Codes of length 05 bits (003 total): 05 12 21
    Codes of length 06 bits (002 total): 31 41
    Codes of length 07 bits (004 total): 06 13 51 61
    Codes of length 08 bits (003 total): 07 22 71
    Codes of length 09 bits (005 total): 14 32 81 91 A1
    Codes of length 10 bits (005 total): 08 23 42 B1 C1
    Codes of length 11 bits (004 total): 15 52 D1 F0
    Codes of length 12 bits (004 total): 24 33 62 72
    Codes of length 13 bits (000 total):
    Codes of length 14 bits (000 total):
    Codes of length 15 bits (001 total): 82
    Codes of length 16 bits (125 total): 09 0A 16 17 18 19 1A 25 26 27 28 29 2A 34 35
36
                                          37 38 39 3A 43 44 45 46 47 48 49 4A 53 54 55
56
                                          57 58 59 5A 63 64 65 66 67 68 69 6A 73 74 75
76
                                          77 78 79 7A 83 84 85 86 87 88 89 8A 92 93 94
95
                                          96 97 98 99 9A A2 A3 A4 A5 A6 A7 A8 A9 AA B2
B3
                                          B4 B5 B6 B7 B8 B9 BA C2 C3 C4 C5 C6 C7 C8 C9
CA
                                          D2 D3 D4 D5 D6 D7 D8 D9 DA E1 E2 E3 E4 E5 E6
E7
                                          E8 E9 EA F1 F2 F3 F4 F5 F6 F7 F8 F9 FA
    Total number of codes: 162


*** Marker: DHT (Define Huffman Table) (xFFC4) ***
  OFFSET: 0x00000863
  Huffman table length = 31
  ----
  Destination ID = 1
  Class = 0 (DC / Lossless Table)
    Codes of length 01 bits (000 total):
    Codes of length 02 bits (001 total): 00
    Codes of length 03 bits (005 total): 01 02 03 04 05
    Codes of length 04 bits (001 total): 06
    Codes of length 05 bits (001 total): 07
    Codes of length 06 bits (001 total): 08
    Codes of length 07 bits (001 total): 09
    Codes of length 08 bits (001 total): 0A
    Codes of length 09 bits (001 total): 0B
    Codes of length 10 bits (000 total):
    Codes of length 11 bits (000 total):
    Codes of length 12 bits (000 total):
    Codes of length 13 bits (000 total):
    Codes of length 14 bits (000 total):
    Codes of length 15 bits (000 total):
    Codes of length 16 bits (000 total):
    Total number of codes: 012


*** Marker: DHT (Define Huffman Table) (xFFC4) ***
  OFFSET: 0x00000884
  Huffman table length = 181
  ----
  Destination ID = 1
  Class = 1 (AC Table)
    Codes of length 01 bits (000 total):
```

DHT Class = 0 ID = 1 Used for DC component of Chromiance (Cb & Cr)

DHT Class = 1 ID = 1 Used for AC component of Chromiance (Cb & Cr)

```
    Codes of length 02 bits (002 total): 01 02
    Codes of length 03 bits (001 total): 03
    Codes of length 04 bits (003 total): 00 04 11
    Codes of length 05 bits (003 total): 05 12 21
    Codes of length 06 bits (002 total): 31 41
    Codes of length 07 bits (004 total): 06 13 51 61
    Codes of length 08 bits (003 total): 07 22 71
    Codes of length 09 bits (005 total): 14 32 81 91 A1
    Codes of length 10 bits (005 total): 08 23 42 B1 C1
    Codes of length 11 bits (004 total): 15 52 D1 F0
    Codes of length 12 bits (004 total): 24 33 62 72
    Codes of length 13 bits (000 total):
    Codes of length 14 bits (000 total):
    Codes of length 15 bits (001 total): 82
    Codes of length 16 bits (125 total): 09 0A 16 17 18 19 1A 25 26 27 28 29 2A 34 35
36
                                         37 38 39 3A 43 44 45 46 47 48 49 4A 53 54 55
56
                                         57 58 59 5A 63 64 65 66 67 68 69 6A 73 74 75
76
                                         77 78 79 7A 83 84 85 86 87 88 89 8A 92 93 94
95
                                         96 97 98 99 9A A2 A3 A4 A5 A6 A7 A8 A9 AA B2
B3
                                         B4 B5 B6 B7 B8 B9 BA C2 C3 C4 C5 C6 C7 C8 C9
CA
                                         D2 D3 D4 D5 D6 D7 D8 D9 DA E1 E2 E3 E4 E5 E6
E7
                                         E8 E9 EA F1 F2 F3 F4 F5 F6 F7 F8 F9 FA
    Total number of codes: 162


*** Marker: SOS (Start of Scan) (xFFDA) ***
  OFFSET: 0x0000093B
  Scan header length = 12
  Number of img components = 3
    Component[1]: selector=0x00, table=0(DC),0(AC)
    Component[2]: selector=0x01, table=0(DC),0(AC)
    Component[3]: selector=0x02, table=0(DC),0(AC)
  Spectral selection = 0 .. 63
  Successive approximation = 0x00


*** Decoding SCAN Data ***
  OFFSET: 0x00000949
  Scan Decode Mode: No IDCT (DC only)
    NOTE: Low-resolution DC component shown. Can decode full-res with [Options->Scan
Segment->Full IDCT]

  Scan Data encountered marker   0xFFD9 @ 0x00002E0F.0

  Compression stats:
    Compression Ratio: 24.48:1
    Bits per pixel:     0.98:1

  Huffman code histogram stats:
    Huffman Table: (Dest ID: 0, Class: DC)
      # codes of length 01 bits:        0 (  0%)
      # codes of length 02 bits:      183 ( 10%)
      # codes of length 03 bits:     1325 ( 74%)
      # codes of length 04 bits:      202 ( 11%)
      # codes of length 05 bits:       88 (  5%)
      # codes of length 06 bits:        2 (  0%)
      # codes of length 07 bits:        0 (  0%)
```

```
  # codes of length 08 bits:        0 (  0%)
  # codes of length 09 bits:        0 (  0%)
  # codes of length 10 bits:        0 (  0%)
  # codes of length 11 bits:        0 (  0%)
  # codes of length 12 bits:        0 (  0%)
  # codes of length 13 bits:        0 (  0%)
  # codes of length 14 bits:        0 (  0%)
  # codes of length 15 bits:        0 (  0%)
  # codes of length 16 bits:        0 (  0%)

Huffman Table: (Dest ID: 1, Class: DC)
  # codes of length 01 bits:        0 ( -1%)
  # codes of length 02 bits:        0 ( -1%)
  # codes of length 03 bits:        0 ( -1%)
  # codes of length 04 bits:        0 ( -1%)
  # codes of length 05 bits:        0 ( -1%)
  # codes of length 06 bits:        0 ( -1%)
  # codes of length 07 bits:        0 ( -1%)
  # codes of length 08 bits:        0 ( -1%)
  # codes of length 09 bits:        0 ( -1%)
  # codes of length 10 bits:        0 ( -1%)
  # codes of length 11 bits:        0 ( -1%)
  # codes of length 12 bits:        0 ( -1%)
  # codes of length 13 bits:        0 ( -1%)
  # codes of length 14 bits:        0 ( -1%)
  # codes of length 15 bits:        0 ( -1%)
  # codes of length 16 bits:        0 ( -1%)

Huffman Table: (Dest ID: 0, Class: AC)
  # codes of length 01 bits:        0 (  0%)
  # codes of length 02 bits:     3970 ( 36%)
  # codes of length 03 bits:     1293 ( 12%)
  # codes of length 04 bits:     3253 ( 29%)
  # codes of length 05 bits:      966 (  9%)
  # codes of length 06 bits:      362 (  3%)
  # codes of length 07 bits:      451 (  4%)
  # codes of length 08 bits:      181 (  2%)
  # codes of length 09 bits:      280 (  3%)
  # codes of length 10 bits:      108 (  1%)
  # codes of length 11 bits:       86 (  1%)
  # codes of length 12 bits:       80 (  1%)
  # codes of length 13 bits:        0 (  0%)
  # codes of length 14 bits:        0 (  0%)
  # codes of length 15 bits:       12 (  0%)
  # codes of length 16 bits:      138 (  1%)

Huffman Table: (Dest ID: 1, Class: AC)
  # codes of length 01 bits:        0 ( -1%)
  # codes of length 02 bits:        0 ( -1%)
  # codes of length 03 bits:        0 ( -1%)
  # codes of length 04 bits:        0 ( -1%)
  # codes of length 05 bits:        0 ( -1%)
  # codes of length 06 bits:        0 ( -1%)
  # codes of length 07 bits:        0 ( -1%)
  # codes of length 08 bits:        0 ( -1%)
  # codes of length 09 bits:        0 ( -1%)
  # codes of length 10 bits:        0 ( -1%)
  # codes of length 11 bits:        0 ( -1%)
  # codes of length 12 bits:        0 ( -1%)
  # codes of length 13 bits:        0 ( -1%)
  # codes of length 14 bits:        0 ( -1%)
  # codes of length 15 bits:        0 ( -1%)
  # codes of length 16 bits:        0 ( -1%)
```

```
  YCC clipping in DC:
    Y  component: [<0=    0] [>255=    0]
    Cb component: [<0=    0] [>255=    0]
    Cr component: [<0=    0] [>255=    0]

  RGB clipping in DC:
    R  component: [<0=    0] [>255=    0]
    G  component: [<0=    0] [>255=    0]
    B  component: [<0=    0] [>255=    0]

  Average Pixel Luminance (Y):
    Y=[106] (range: 0..255)

  Brightest Pixel Search:
    YCC=[  768,    0,   -7] RGB=[222,224,224] @ MCU[ 16,  5]

  Finished Decoding SCAN Data
    Number of RESTART markers decoded: 0
    Next position in scan buffer: Offset 0x00002E0E.5


*** Marker: EOI (End of Image) (xFFD9) ***
  OFFSET: 0x00002E0F


*** Searching Compression Signatures ***

  Signature:           01C61C96C4E7C1C3E4D439B14FAA65A5
  Signature (Rotated): 01C61C96C4E7C1C3E4D439B14FAA65A5
  File Offset:         0 bytes
  Chroma subsampling:  2x2
  EXIF Make/Model:     NONE
  EXIF Makernotes:     NONE
  EXIF Software:       NONE

  Searching Compression Signatures: (3347 built-in, 0 user(*) )

          EXIF.Make / Software        EXIF.Model                            Quality
Subsamp Match?
          -------------------------   -----------------------------------
----------------  --------------

  Based on the analysis of compression characteristics and EXIF metadata:

  ASSESSMENT: Class 1 - Image is processed/edited

  This may be a new software editor for the database.
  If this file is processed, and editor doesn't appear in list above,
  PLEASE ADD TO DATABASE with [Tools->Add Camera to DB]
```

JPEGsnoop also divides the image up into an MCU table which stand for minimum code Unit. We can see in the images above that the pixels in the glitched image seem to have glitched within this MCU grid. Using JPEGsnoop's positioned marker tool we are able to get data from each MCU square. The MCU values show the X and Y co-ordinates within the grid. The ID values show the DHT (Defined Huffman Table) class

Figure 4.39 JPEGsnoop Report for Blairecooking.jpeg file (Hass, 2016)

MCU GRID

Interestingly JPEGsnoop automatically visually overlaid a minimum coded unit grid (MCU grid) the typical compression format for most JPEG files. Hass writes, “JPEG images are partitioned into MCUs before they are encoded (the basic JPEG compression algorithm works on these MCUs independently).” (Hass, pers. Comm. December 8, 2016) There is a noticeable visual relationship between the way in which the digital file has glitched and the organizational structure of the MCU grid employed in jpeg file compression. The glitched perception is a seemingly random arrangement of wild colourful pixels, however JPEGsnoop’s MCU system has confirmed that the arrangement is not random (computers never are.) The arrangement of glitched pixels sits roughly within this MCU grid.

Hass writes, “because of the way JPEG compression is designed, images are stored in tightly-packed streams of binary bits. Each pixel can be represented by as few as 2 bits to as many as 26 bits. To make matters worse, in an effort to keep the compression as efficient as possible, there is virtually nothing to indicate where you are in the stream of bits (unless Restart Markers are used). Therefore, as soon as a single bit is encountered wrong, the millions of bits that follow will be decoded incorrectly as well. The manner in which DC and AC coefficients are arranged in MCUs means that this corruption often shows up in shearing, wild colour shifts and many other visual phenomena.” (Hass, 2015) Wading through the jargon of this sentence we conclude the image is coded as a string of bits where if one goes wrong then consequently they all do, and that there is no way to find where in the image that corrupt ‘bit’ is unless a specific tool called ‘restart marker’ is utilized. Restart marker tool was employed to generate a numerically ordered dataset to refine the binary code behind each MCU square.

E.g. Position Marked @ MCU=[2,   0] (1,0) Block=[5,   0] YCC=[88,   0,   0]

In this equation the MCU values show the X and Y co-ordinates within the grid. The ID values show the DHT (Defined Huffman Table) class, which can be one of four options; 0, 0- used for DC component of luminance, 1, 0- used for AC component of luminance, 0, 1- used for DC component of chrominance (Cb & Cr) and 1, 1- used for AC component of chrominance (Cb & Cr.) The block value shows the discrete cosine transform coefficients (DCT) and finally the YCC values being, Y = luminance, Cb = chrominance, and Cr = chrominance.

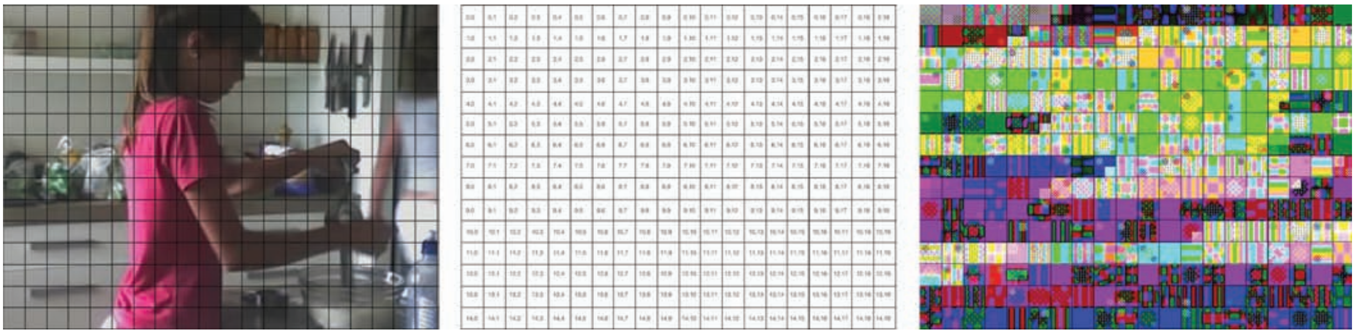


Figure 4.40 Legible image automatically overlayed with Jpegsnoops MCU grid (left), MCU grid numerical ordering system (middle) Glitched image manually overlayed with MCU grid to show visual relationship (right).

What can we do with this data to start to interpret digitally decayed code through architectural form? How can the breakdown of a code that builds a visual image become a code that builds a visual form? How can we use the code to shift the visual perception from two dimension to three dimensional interpretations?

POSITION MARKER DATA

Position Marked @ MCU=[0, 0](1,0) Block=[1, 0] YCC=[184, 0, 0]
Position Marked @ MCU=[1, 0](0,0) Block=[2, 0] YCC=[192, -35, 7]
Position Marked @ MCU=[2, 0](1,0) Block=[5, 0] YCC=[88, 0, 0]
Position Marked @ MCU=[3, 0](1,0) Block=[7, 0] YCC=[-656, 0, 0]
Position Marked @ MCU=[4, 0](1,1) Block=[9, 1] YCC=[-696, 0, 0]
Position Marked @ MCU=[5, 0](0,1) Block=[10, 1] YCC=[-728, 0, 0]
Position Marked @ MCU=[6, 0](1,0) Block=[13, 0] YCC=[64, 0, 0]
Position Marked @ MCU=[7, 0](0,0) Block=[14, 0] YCC=[224, -14, 21]
Position Marked @ MCU=[8, 0](0,0) Block=[16, 0] YCC=[384, -14, 21]
Position Marked @ MCU=[9, 0](1,0) Block=[19, 0] YCC=[-504, 0, 0]
Position Marked @ MCU=[10, 0](0,0) Block=[20, 0] YCC=[-560, 0, 7]
Position Marked @ MCU=[11, 0](1,0) Block=[23, 0] YCC=[0, 0, 0]
Position Marked @ MCU=[12, 0](1,1) Block=[25, 1] YCC=[0, 0, 0]
Position Marked @ MCU=[13, 0](0,0) Block=[26, 0] YCC=[0, -49, 0]
Position Marked @ MCU=[14, 0](0,0) Block=[28, 0] YCC=[0, -28, -7]
Position Marked @ MCU=[15, 0](0,0) Block=[30, 0] YCC=[0, 0, -14]
Position Marked @ MCU=[16, 0](0,0) Block=[32, 0] YCC=[0, 0, -14]
Position Marked @ MCU=[17, 0](0,0) Block=[34, 0] YCC=[0, -14, -7]
Position Marked @ MCU=[18, 0](0,1) Block=[36, 1] YCC=[0, 0, 0]
Position Marked @ MCU=[19, 0](0,0) Block=[38, 0] YCC=[0, -21, 14]
Position Marked @ MCU=[0, 1](1,1) Block=[1, 3] YCC=[144, 0, 0]
Position Marked @ MCU=[1, 1](1,1) Block=[3, 3] YCC=[120, 0, 0]
Position Marked @ MCU=[2, 1](1,0) Block=[5, 2] YCC=[-248, 0, 0]
Position Marked @ MCU=[3, 1](1,0) Block=[7, 2] YCC=[-696, 0, 0]
Position Marked @ MCU=[4, 1](1,0) Block=[9, 2] YCC=[-632, 0, 0]
Position Marked @ MCU=[5, 1](1,1) Block=[11, 3] YCC=[-104, 0, 0]
Position Marked @ MCU=[6, 1](1,0) Block=[13, 2] YCC=[-528, 0, 0]
Position Marked @ MCU=[7, 1](1,0) Block=[15, 2] YCC=[-264, 0, 0]
Position Marked @ MCU=[8, 1](1,1) Block=[17, 3] YCC=[408, 0, 0]
Position Marked @ MCU=[9, 1](1,1) Block=[19, 3] YCC=[-664, 0, 0]
Position Marked @ MCU=[10, 1](1,0) Block=[21, 2] YCC=[0, 0, 0]
Position Marked @ MCU=[11, 1](1,0) Block=[23, 2] YCC=[0, 0, 0]
Position Marked @ MCU=[12, 1](1,0) Block=[25, 2] YCC=[0, 0, 0]
Position Marked @ MCU=[13, 1](0,1) Block=[26, 3] YCC=[0, 0, 0]
Position Marked @ MCU=[14, 1](1,1) Block=[29, 3] YCC=[0, 0, 0]
Position Marked @ MCU=[15, 1](0,1) Block=[30, 3] YCC=[0, 0, 0]
Position Marked @ MCU=[16, 1](0,0) Block=[32, 2] YCC=[0, -7, 0]
Position Marked @ MCU=[17, 1](1,0) Block=[35, 2] YCC=[0, 0, 0]
Position Marked @ MCU=[18, 1](1,0) Block=[37, 2] YCC=[0, 0, 0]
Position Marked @ MCU=[19, 1](0,0) Block=[38, 2] YCC=[0, -14, 14]
Position Marked @ MCU=[0, 2](1,0) Block=[1, 4] YCC=[144, 0, 0]
Position Marked @ MCU=[1, 2](1,1) Block=[3, 5] YCC=[104, 0, 0]
Position Marked @ MCU=[2, 2](0,0) Block=[4, 4] YCC=[56, -28, 0]
Position Marked @ MCU=[3, 2](0,0) Block=[6, 4] YCC=[-432, -42, -7]
Position Marked @ MCU=[4, 2](0,0) Block=[8, 4] YCC=[-552, -28, -21]
Position Marked @ MCU=[5, 2](1,1) Block=[11, 5] YCC=[-72, 0, 0]
Position Marked @ MCU=[6, 2](1,0) Block=[13, 4] YCC=[88, 0, 0]
Position Marked @ MCU=[7, 2](1,0) Block=[15, 4] YCC=[-384, 0, 0]
Position Marked @ MCU=[8, 2](1,0) Block=[17, 4] YCC=[496, 0, 0]
Position Marked @ MCU=[9, 2](0,0) Block=[18, 4] YCC=[-152, -35, 70]
Position Marked @ MCU=[10, 2](0,1) Block=[20, 5] YCC=[184, 0, 0]
Position Marked @ MCU=[11, 2](1,0) Block=[23, 4] YCC=[0, 0, 0]
Position Marked @ MCU=[12, 2](0,1) Block=[24, 5] YCC=[0, 0, 0]
Position Marked @ MCU=[13, 2](1,1) Block=[27, 5] YCC=[0, 0, 0]
Position Marked @ MCU=[14, 2](1,1) Block=[29, 5] YCC=[0, 0, 0]
Position Marked @ MCU=[15, 2](0,1) Block=[30, 5] YCC=[0, 0, 0]
Position Marked @ MCU=[16, 2](0,1) Block=[32, 5] YCC=[0, 0, 0]

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Figure 4.41 Blairecooking.jpeg legible image with MCU
grid autmoatically overlayed in JPEGsnoop (Hass, 2016)

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1,0	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8	1,9	1,10	1,11	1,12	1,13	1,14	1,15	1,16	1,17	1,18	1,19
2,0	2,1	2,2	2,3	2,4	2,5	2,6	2,7	2,8	2,9	2,10	2,11	2,12	2,13	2,14	2,15	2,16	2,17	2,18	2,19
3,0	3,1	3,2	3,3	3,4	3,5	3,6	3,7	3,8	3,9	3,10	3,11	3,12	3,13	3,14	3,15	3,16	3,17	3,18	3,19
4,0	4,1	4,2	4,3	4,4	4,5	4,6	4,7	4,8	4,9	4,10	4,11	4,12	4,13	4,14	4,15	4,16	4,17	4,18	4,19
5,0	5,1	5,2	5,3	5,4	5,5	5,6	5,7	5,8	5,9	5,10	5,11	5,12	5,13	5,14	5,15	5,16	5,17	5,18	5,19
6,0	6,1	6,2	6,3	6,4	6,5	6,6	6,7	6,8	6,9	6,10	6,11	6,12	6,13	6,14	6,15	6,16	6,17	6,18	6,19
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14,0	14,1	14,2	14,3	14,4	14,5	14,6	14,7	14,8	14,9	14,10	14,11	14,12	14,13	14,14	14,15	14,16	14,17	14,18	14,19

Figure 4.42 MCU Grid system with position marker data co-ordinates

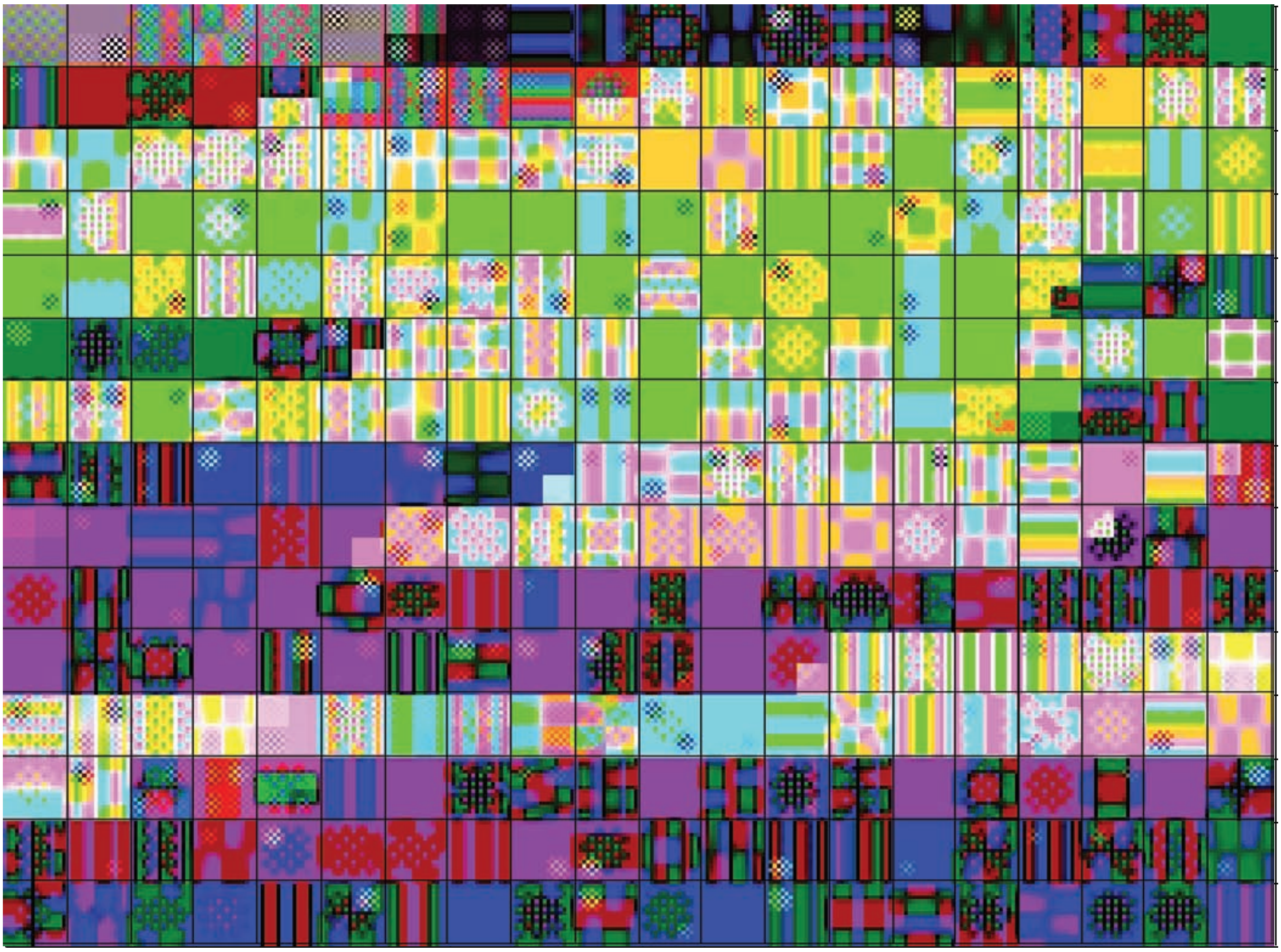


Figure 4.43 Glitched image with MCU grid manually overlayed showing a visual relationship between the calculated MCU grid and the way in which the pixels have glitched

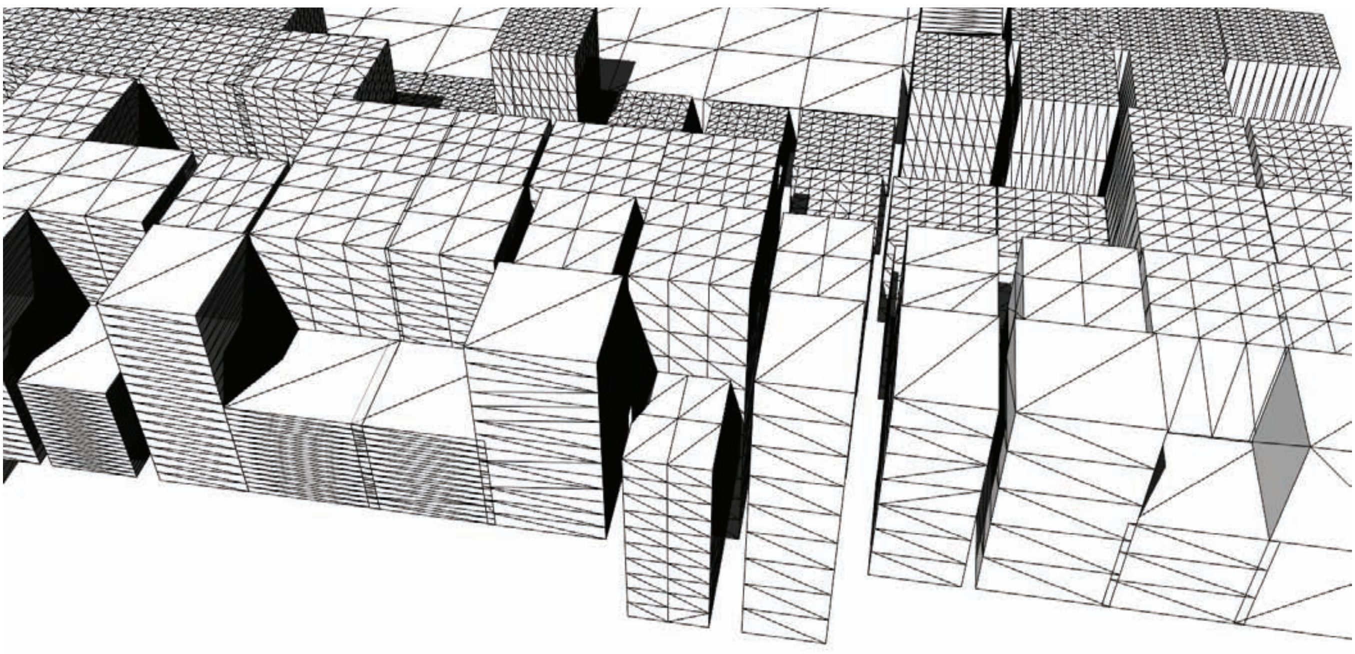
MCU CITY PLAN

Reading the MCU grid as a conventional architectural plan, we can begin to perceive each separate MCU square as separate cubes. In a dense urban city buildings sit tightly packed side by side. As each building goes up they must react to one another and form according to their neighbors. If we were to treat the MCU grid as a city plan and each MCU cube as a building, we can employ the position marker datasets to dictate unique spatial manipulations specific to each MCU square building, beginning to interpret how these MCU cubes sit next to one another in a 3d environment. This is comparative to real life city planning such as New York. Schumacher believes “our ambition as architects and urban designers must be to spatially unfold more simultaneous choices of communicative situations in dense, perceptually palpable, and legible arrangements.” (Schumacher, 2012) Treating the MCU grid as a city plan and the position marker data as an entity distinctive from the substrates carrying it, (Hayles, 1999) we can begin to unfold dense architectural formations with a vast variety of choices of communicative spatial situations. (Schumacher, 2012) The MCU grid is not constrained to any specific scale as it remains ambiguously in the digital resulting in the viewer being able to imagine these cubes at numerous different scales.

CODE TO FORM

Grasshopper3D (GH) as a computational spatial generation and design instrument enables us to define a code, turning decayed file data values into 3D spatial outcomes. For example; the MCU grid draws 300 square sections on the glitched image. Using the function 'image sampler' within GH, the RGB colour values for each glitched MCU square are translated to XYZ co-ordinates. Every input in the GH definition is dictated by the position marker data retrieved from JPEGsnoop for each particular MCU square, creating 300 unique cubes that not only truly represent digital decay but reinterpret it into form. Weisskopf from H3K wrote, "as soon as you understand a tool enough to use it in a way not originally intended, you also understand the politics that are incorporated into its design." (H3K, 2015) Through this specific custom method GH as a parametric design tool is put to an authenticity test. GH is often employed as a tool to spit out numerous different solutions to a problem from one code much more rapidly than a human could; contrastingly here GH is employed very differently in the way all inputs in the code are dictated by the position marker data of that specific cube, therefore there is only one possible outcome per MCU square. The GH code instead is applied to all 300 cubes and inputs are shifted by specific position marker data, comparative to one GH code creating 300 unique outputs as usually demonstrated. Through our methodology, human intervention is excluded and there is no selection of best or worst form, instead an authentic formal interpretation of decayed data. The initial glitched image represents the unexpected and unforeseen occurrences that in reality test the resilience of contemporary urban design methods. The results of the here-applied methodology is exemplary to taming the wild impacts of the decomposing a rigid structure. To respond to glitches with flexibility, associations should be improved further between the design and context elements.

Figure 4.44 3d diagrammatic studies



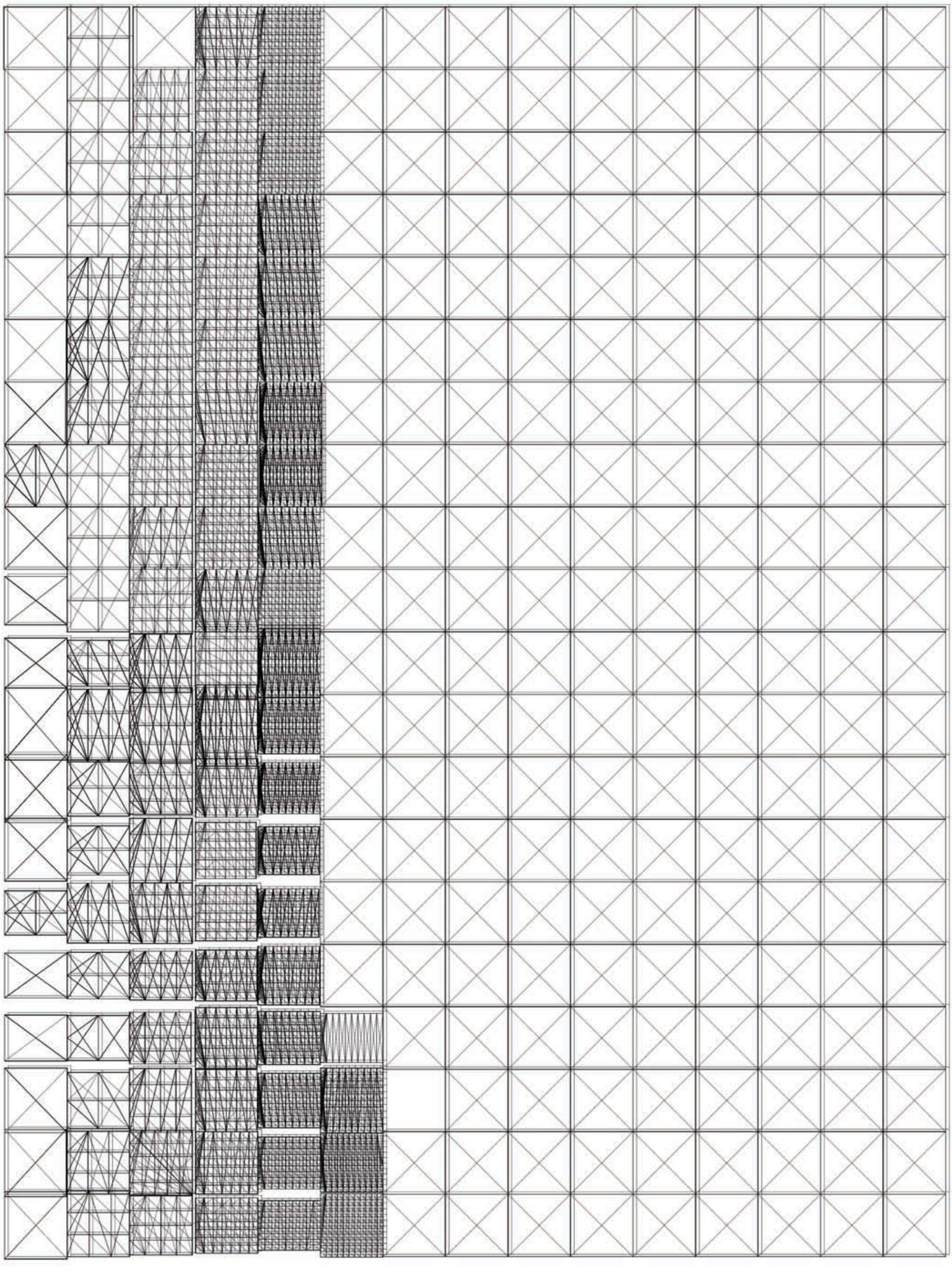


Figure 4.45 2d diagrammatic studies incomplete

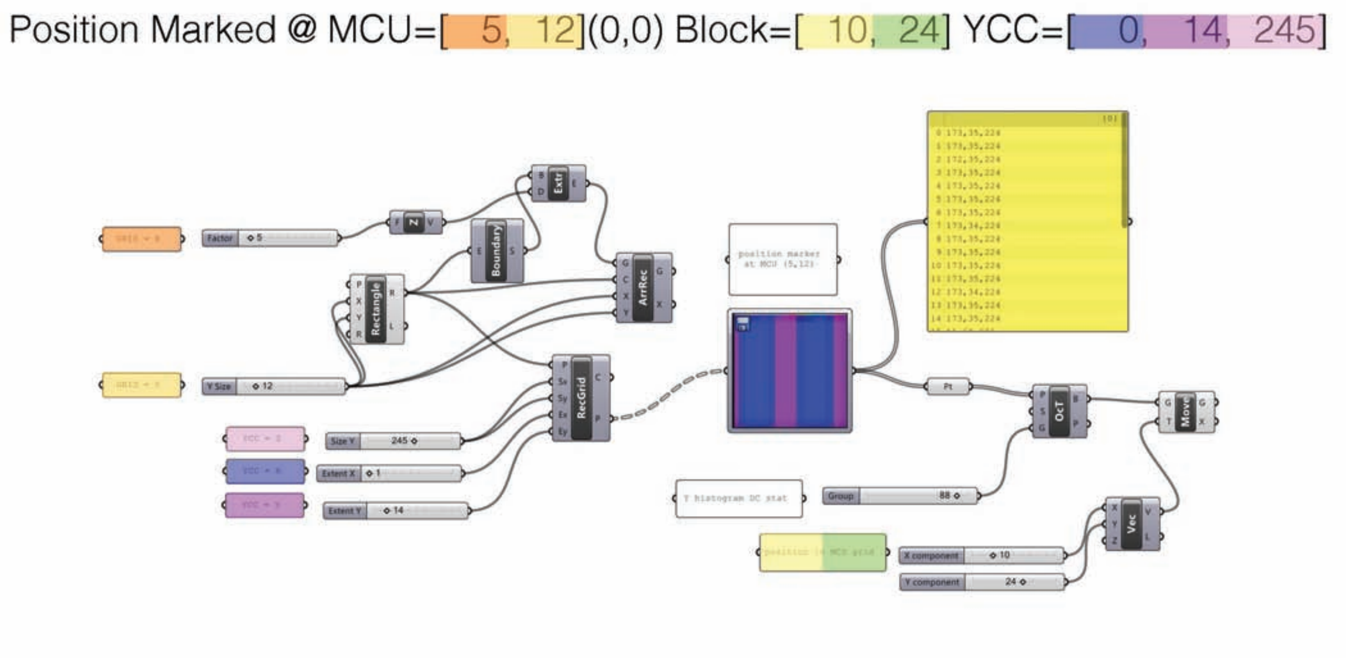


Figure 4.46 Grasshopper3d Code, colour coded to explain specific inputs dictated by the position marker data

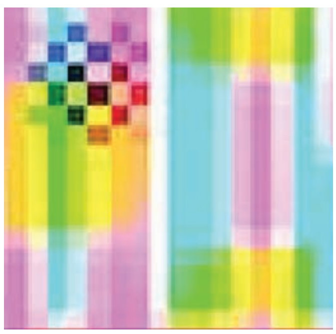
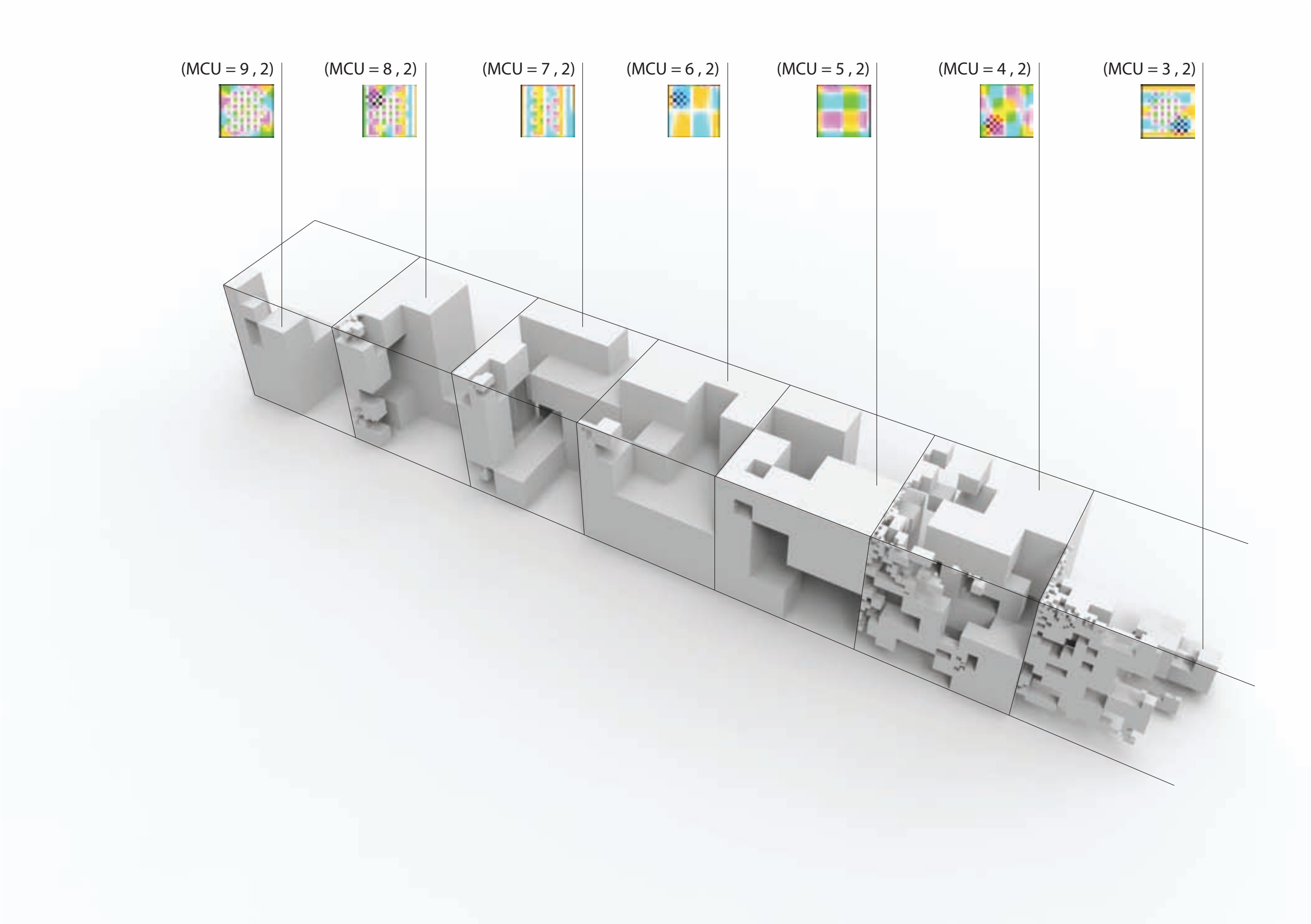


Figure 4.47 MCU grid system defines individual visual squares of glitch perception that through GH dictate differentiating individual 3d cube forms due to their unique position marker data input into GH code



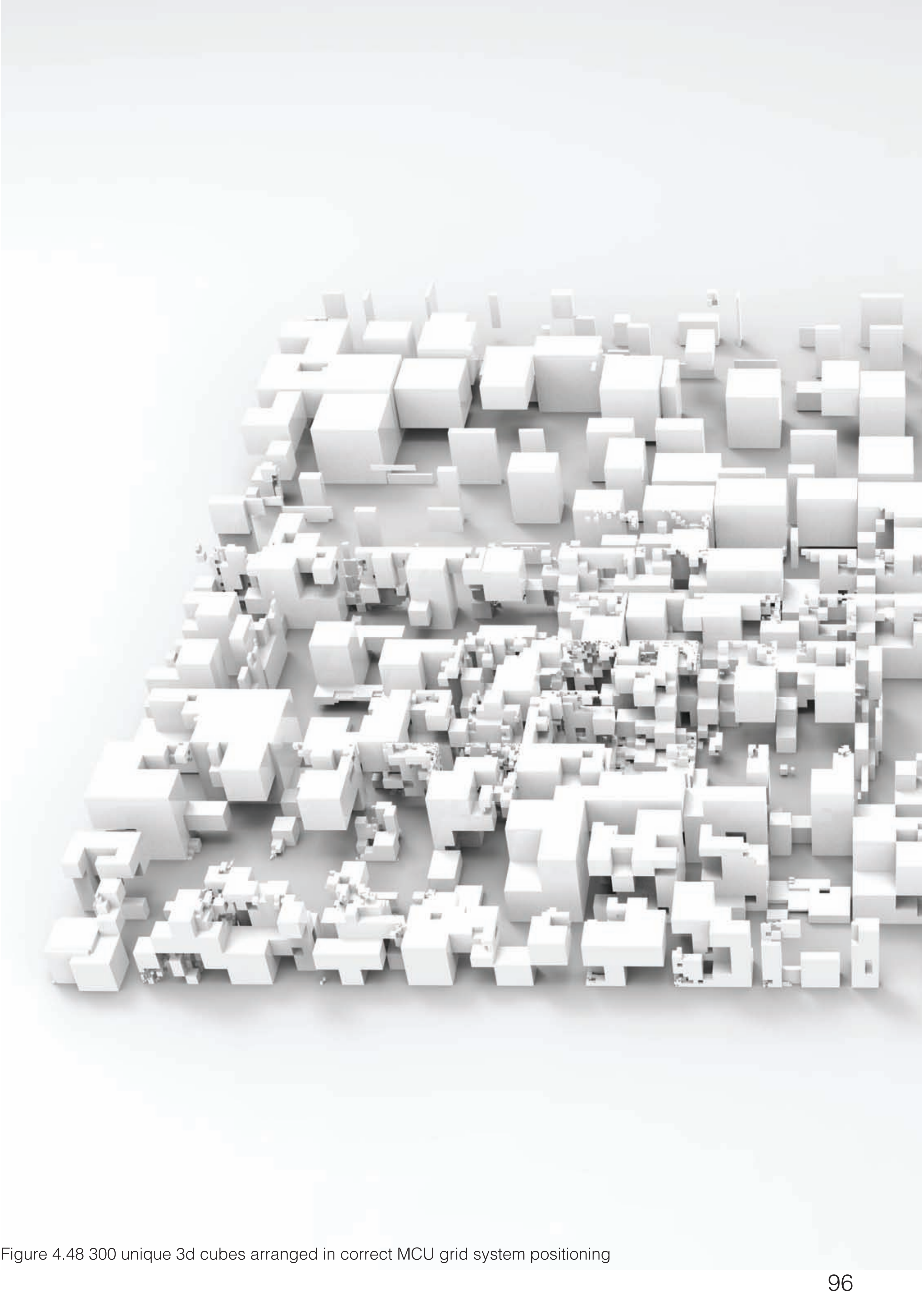


Figure 4.48 300 unique 3d cubes arranged in correct MCU grid system positioning

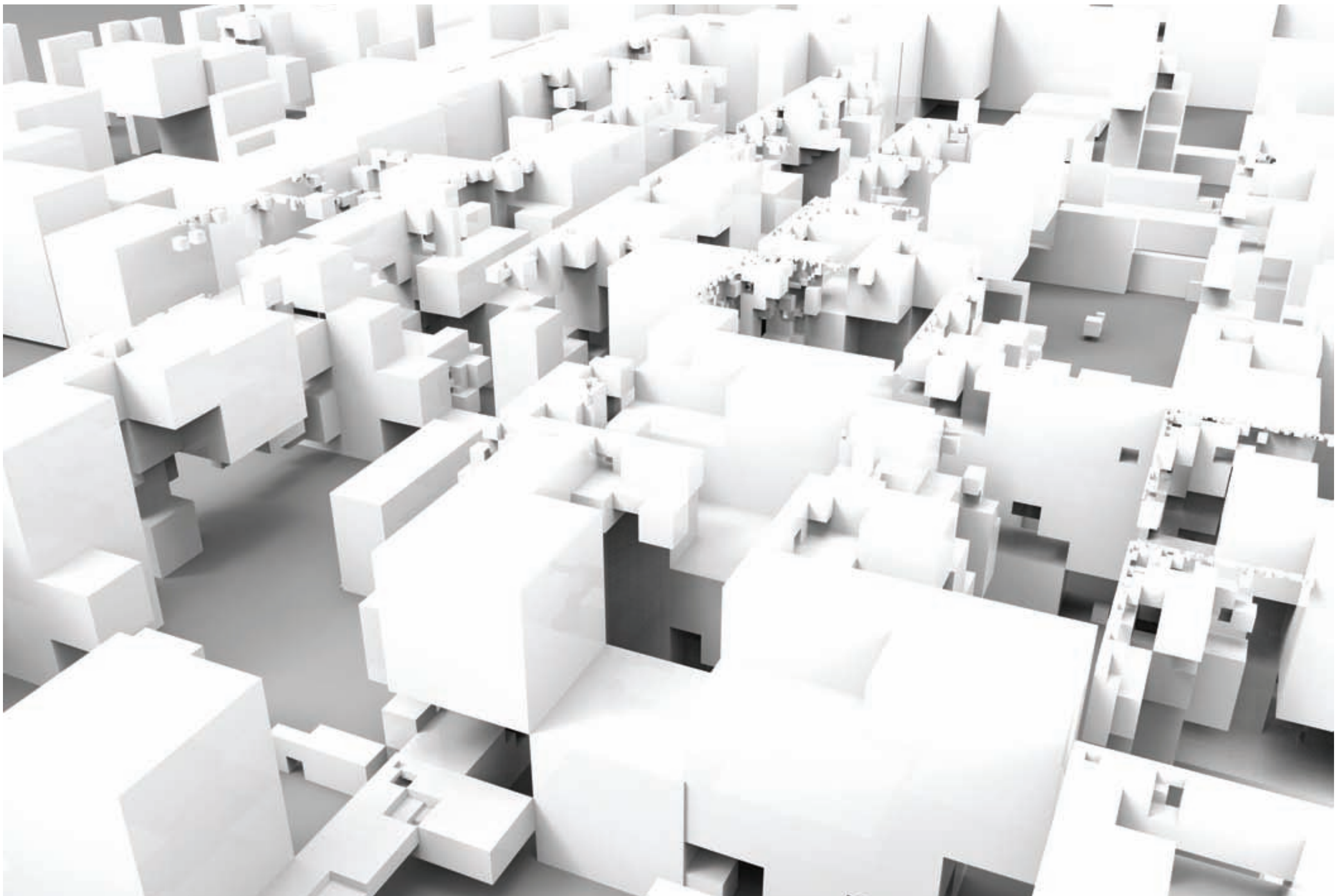
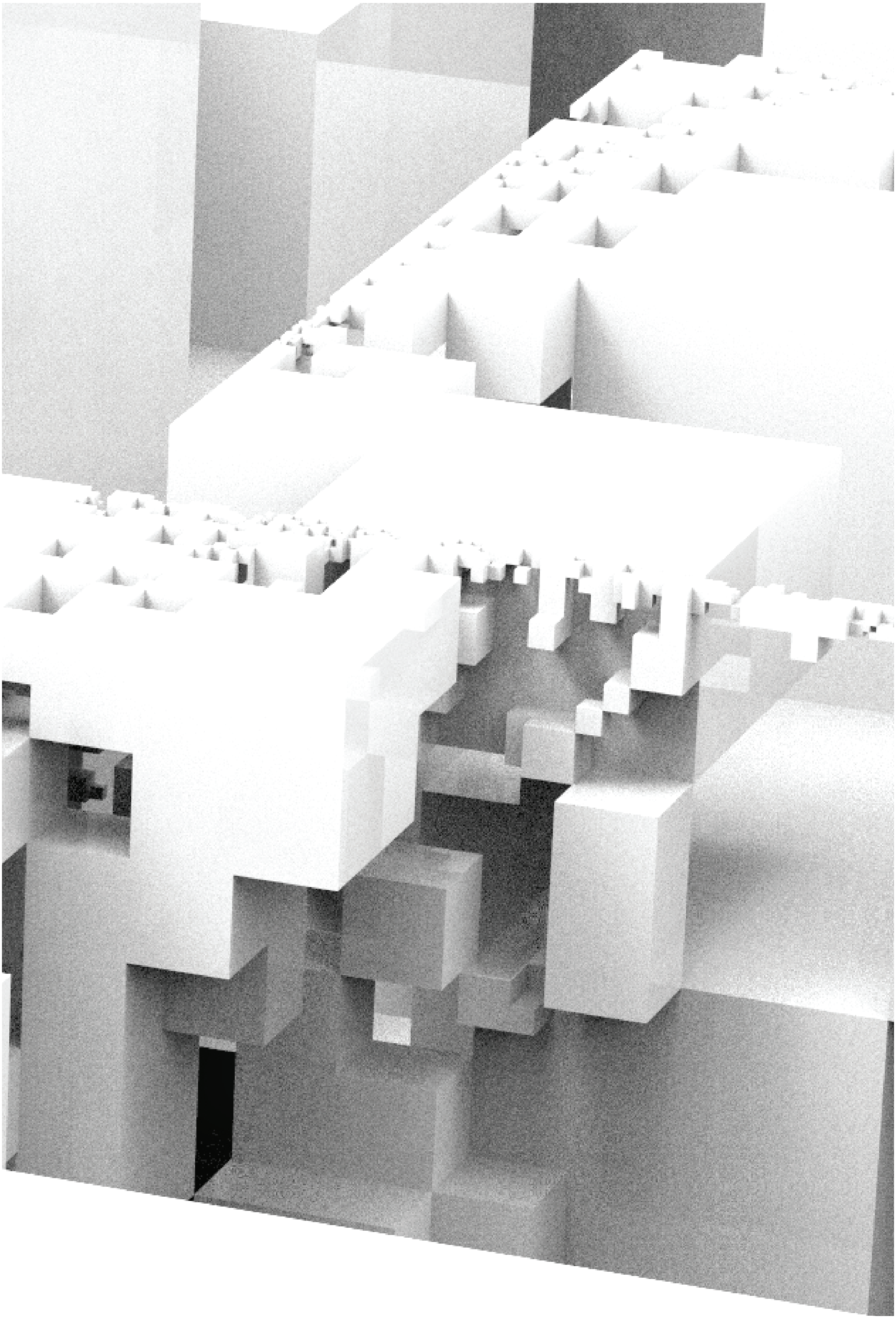
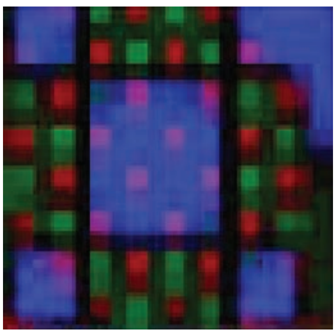


Figure 4.49 3d output creating unique and unimaginable digital spaces both in form and in void due to their arrangement within the MCU gridding system



PART TO WHOLE

Alignment is found between the initial design outcome and Schumacher's 'part to whole' theory. Patrik Schumacher (2012, p1) is an advocate for formal order. Schumacher's 'parametricism,' "enforces homogeneity that priorities topological deformation rather than privileging the design of specific objects." (Austin, 2015) Schumacher presented a lecture, 'Composition, Decomposition and Re-composition' during the Parallelism in Architecture, Environment & Computing Techniques Conference 2016 where in which this research was alongside presented. Schumacher talked about parametricisms 'part to whole' relationships saying, "there is a mutual interdependent determination... Parts are individualized within the complex of the whole but also the whole is often the constant of those elements. Part properties and processes are determined by then nature of the overall processes which is as their differentiation if you like. So the parts are only individual at first and defined in reference in relation to each other and the whole. They do not behave relevantly or possess their important characteristic independent from each other… Sometimes we cannot even point to a part unless in the context to a certain whole." (Schumacher, 2016) An excellent demonstrative precedent is Retsin's 'Sucheon Art Platofrm' consisting of 278 elements, initially structurally weak but gain strength through redundant combination, assembling together into a highly differentiated spatial assembly 'whole.' (Retsin, 2016) The 300 unique cube forms determined by digital decayed data can stand alone but are parts that make up a whole. Each separate cube is interesting alone however the spatial moments the cubes collectively create are further compelling.



GLITCH AS SYSTEM

Without variation in the specific inputs in each code, the unit would be a mundane cube. The mundane cube can be representational of a system that does not allow for unexpected interventions. When we apply our code from the glitched image, the cube starts to reveal opportunities that glitch this system. The methodology has an appreciation of an opportunity that the glitch brings about. Where there is a claim for perfection and mechanisation without 'unexpectedness' (which is most of the time) this methodology can be introduced. OReilly writes, "in every case with design, it has to be intentional. Even if there are chaotic elements, it still has to be intentional or controlled in some way—otherwise you're just showing off the tools and probably not communicating an idea." (OReilly in interview with Rourke, 2013) While the system creates 300 unexpected chaotic cube forms, there is controlled intent within the system resulting in an authentic interpretation of digitally decayed data.

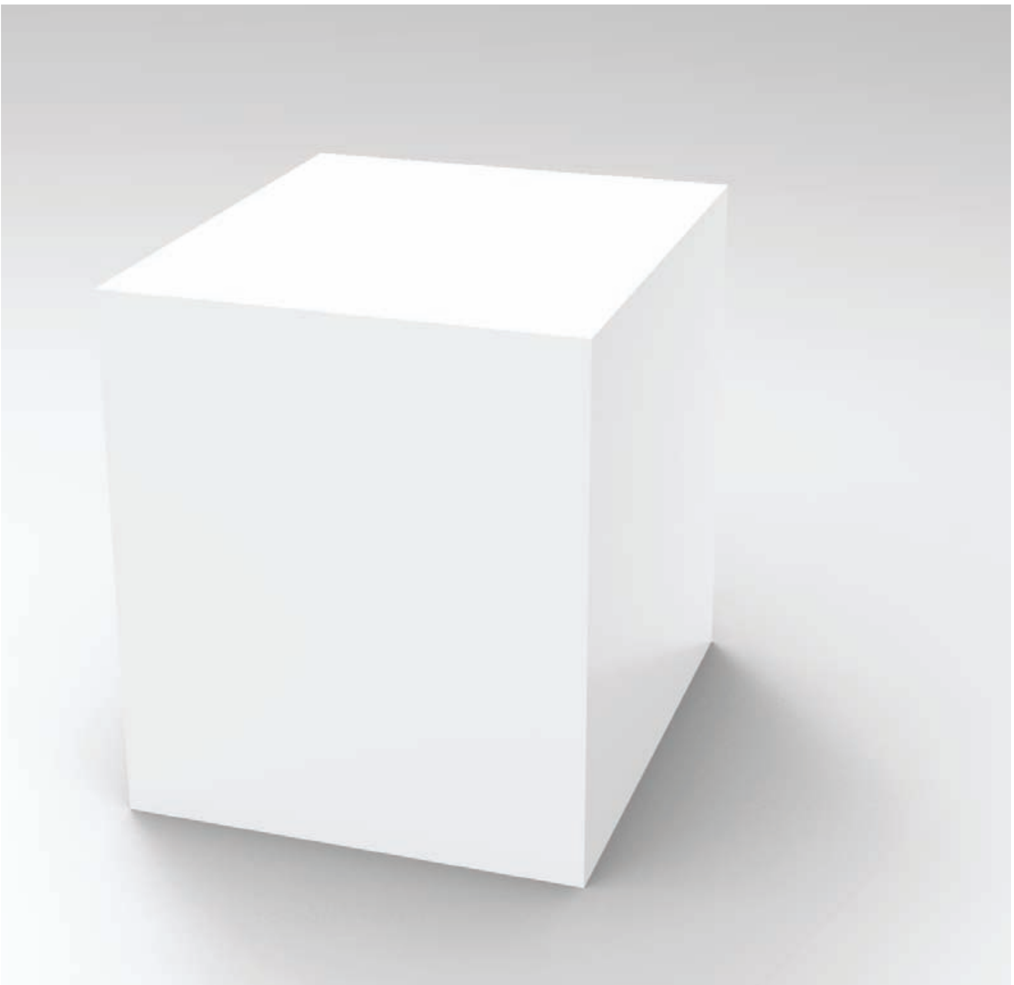
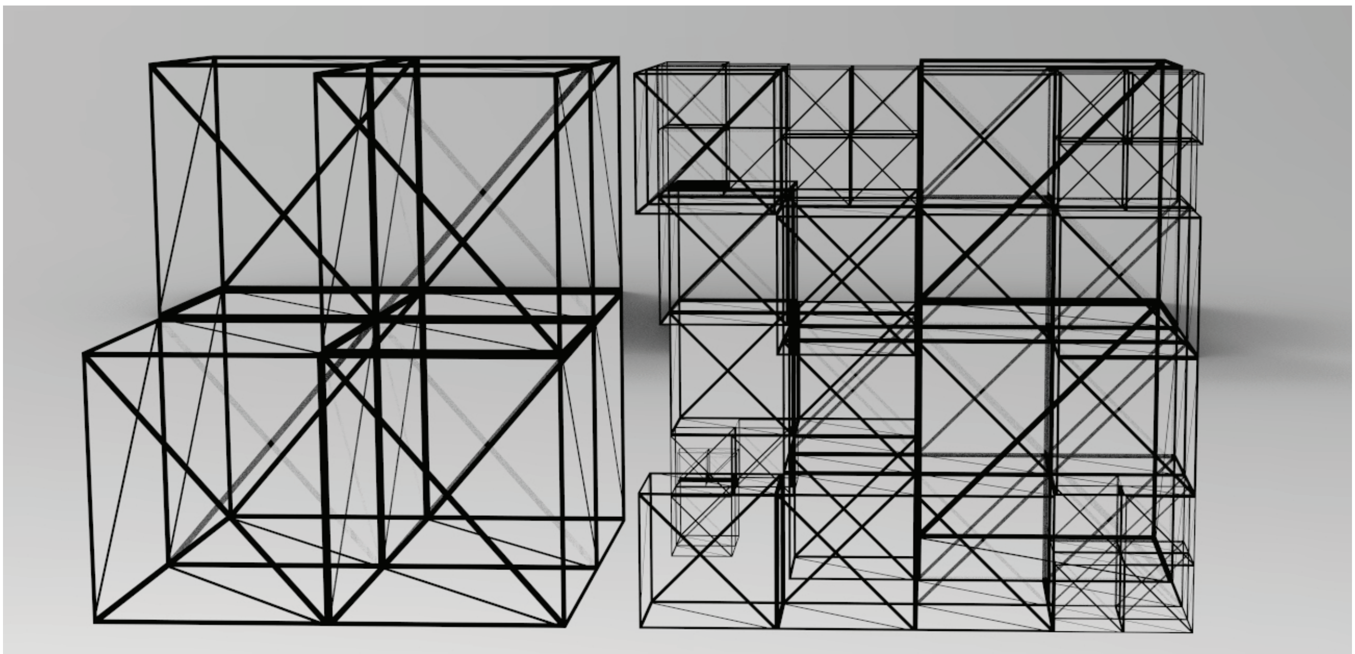


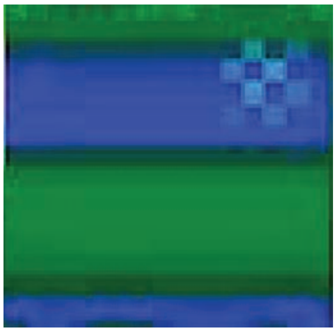
Figure 4.50 Mundane cube

REFLECTION

Bruno Latour's Actor-Network Theory (ANT) links all objects to relations in social networks (Latour, 2005). In this body of research, glitches are treated as objects in relationship to a network of 3D spatial elements offering multidimensional possibilities. Although an ontological difference could be regarded as unpassable, questioning what the fourth dimension might look like would help understand the multidimensional characteristics of architectural space. In association to higher level systems, a glitch can have a bittersweet quality by articulating the whole complexity with disturbance. A criticism of Latour's ANT is that the reduction of objects into relations casts off the potentiality behind the investigation of objects (Harman, 2009). The result of the preliminary work indicates that only an independent object itself (e.g. an artificial intelligence (AI) generation of glitch) can give an exact answer whether its self-existence is possible. However, a clear methodology of transformational changes exploring decayed files enables us to generate 3D architectural interpretations of the numerical data behind the decayed image. As the visualisation of a glitch is the interpretation of meaningful data, one can argue that the underlying data remains authentic, while only its communication and interpretation has changed. This interpretation is its own independent parameter or dimension. In an email conversation with creator of JPEGsnoop Calvin Hass elaborated on these points writing, "in fact, this perspective is actually more accurate than most realize -- the corruption people observe in their digital images can often just be a "misplaced interpretation" of the original data. In many cases, the original data is still available [somewhere] on the media device in its entirety! What became damaged were the keys to the interpretation process… Following your analogy above, the "interpretation" of an original image is a combination of the JPEG decoder algorithm and the file allocation table. If the directory tables get corrupted, then the interpretations become "misplaced" -- I say misplaced because it leads to random merges of portions of unrelated files which can lead to interesting visual anomalies." (Hass, pers. Comm. 2016)

Here we reach a point where we possess a compelling collection of 300 individual 3d forms arranged linearly in a gridding system generating countless inconceivable spaces open to a variety of scale interpretations. We understand that in computer spatial generating programs we are able to orbit, pan and zoom through the 3d digital spaces exploring the unexpected, unimaginable formal outcomes. However we later conventionally designate a legible camera angle in which we render out as a moment in time to communicate the formal discoveries with our audience. This conventional 2d presentational method completely flattens our 3d form that was originally created with the intention to progress away from the planar and into 3d. This conventional presentational method within digital architectural production leads us to question and challenge why we develop a digital 3d form to then present it back in 2d? The 3d spatial model exists within the digital thus we are not able to walk around in it (without VR) however upon reflection we feel for this research to authentically push the field of glitch from 2d representation to 3d interpretation, at this point we must explore alternative mediums for both design discovery and communication.





FUBAR EXHIBITION

The visual design outcomes of this process were exhibited by /'fu:bar/ in Siva Galerija, Croatia on September 19th 2016. Fubar is a multimedia event focusing on discovering and displaying errors in the process of creating new media art. (Fubar, 2016) The work was exhibited at AKC Gallery in Croatia alongside many other new media artists.

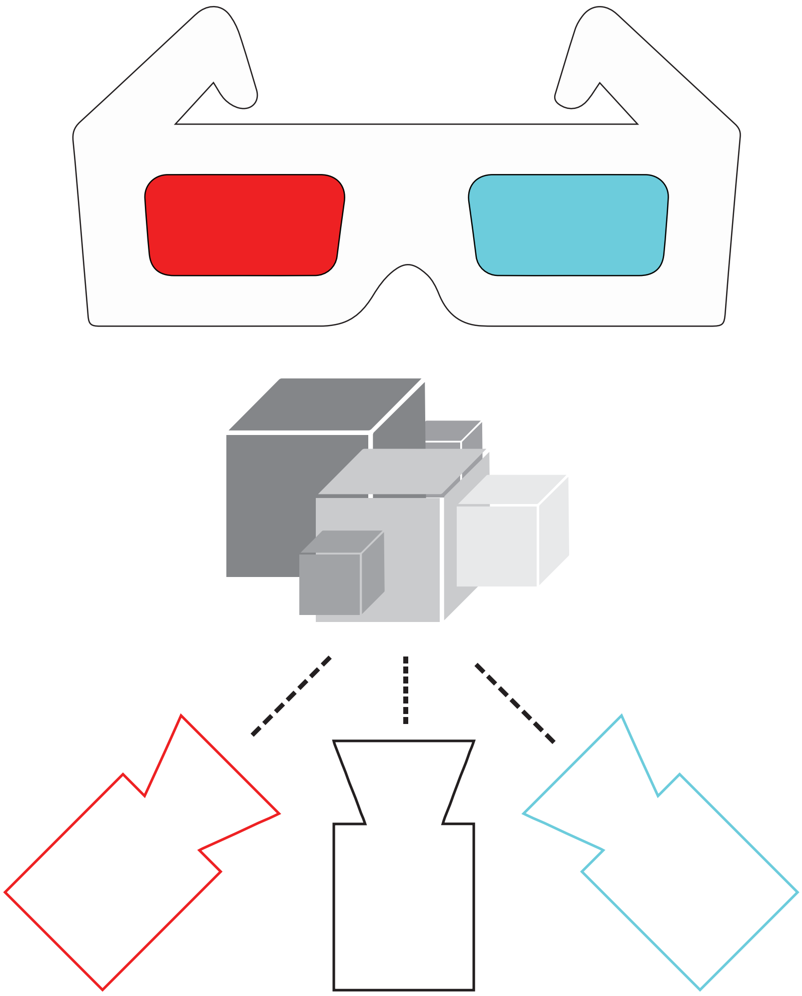
Figure 4.51 FUBAR exhibition (Fubar, 2016)

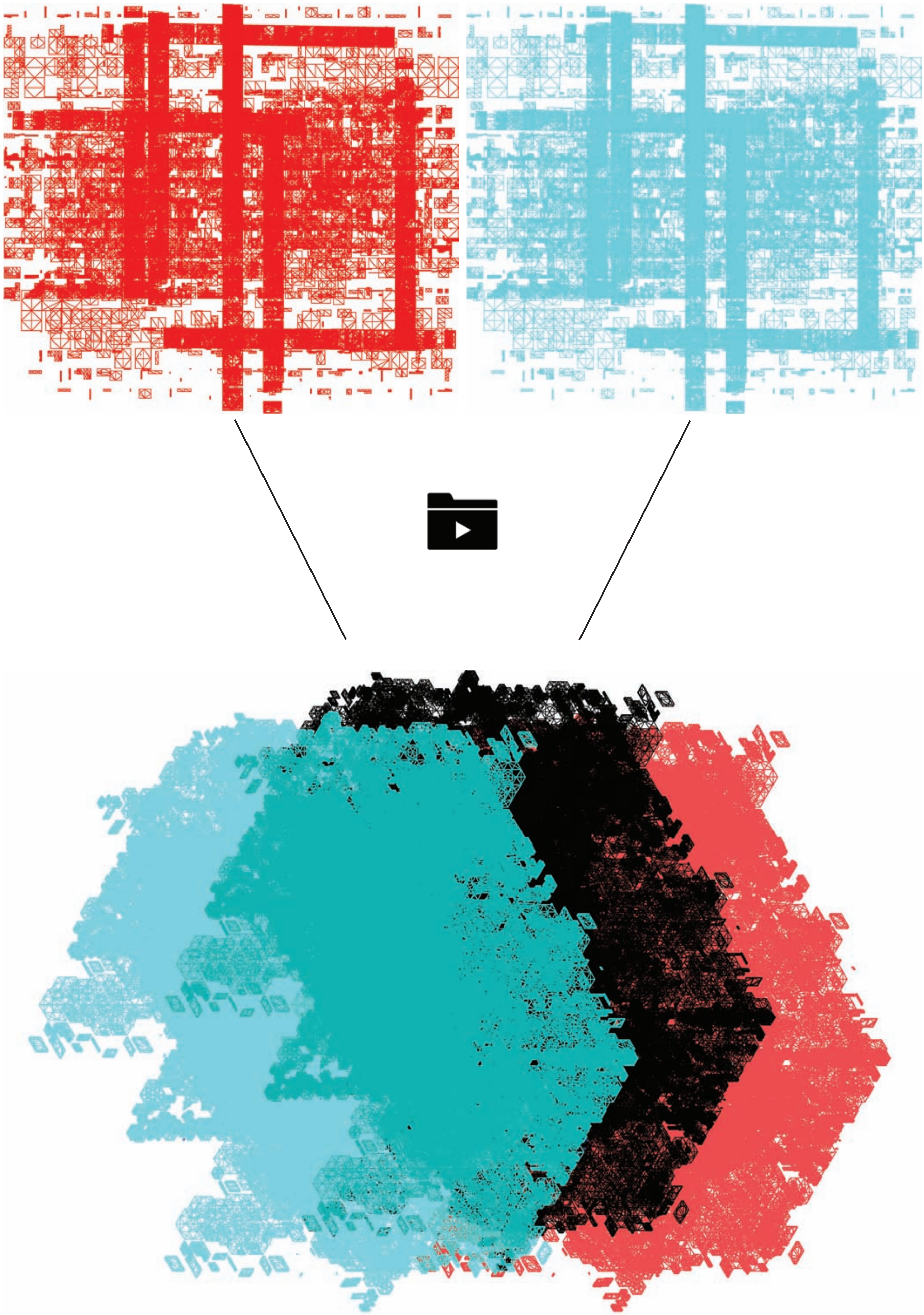
B9 93 6C 60 F1 1A 8F BF 2B 7D 7B 2D 6B 4B AB EC 7B 8F 9B E4 6F F5 6D D4 57 0D E2 06 33
24 37 59 CF 95 26 08 FA F4 A9 FE E8 A6 56 5C 57 1B B5 13 F6 AC C9 03 FD F0 3B 6E 18 27 B5
76 CB 1F EE 12 36 3B BC A5 0A 1B D7 67 7A E3 7C AD AB 14 A5 B6 9D 84 E3 1D 79 AE B2 D2
40 F6 70 B7 AA 9A 48 05 6B E9 6C 77 10 2B 3E 7E 24 3F 4A A0 9F EB 7E B5 76 7C 97 6A CF 27
63 E7 D0 D4 D2 57 A0 C1 F7 2B 86 B3 94 43 73 7A AC 70 65 F3 22 4F AE FF 00 F0 AB BA 37 09
72 3B 83 37 EB C5 51 D5 22 F2 2F E7 03 A3 37 98 3F E0 55 6B 4A 94 79 CE 9F C4 EA 3F 1E 6A
BF 7A E6 C3 ED B9 F2 DA A6 D4 E3 FD FC 51 28 E1 22 52 DF 88 A9 A3 1F E8 C7 D2 AF 5E C5
BC C8 DE AA 06 7D B1 50 A2 E2 35 4F 4F 6A 0D 68 34 3B 66 26 B9 99 46 1C D4 55 72 EB 1E
63 9E 9E 99 EB 55 01 14 DA E6 2E 46 1C 8A 9A 39 36 55 F4 BB 40 39 C9 AC 93 42 E6 92 B3 CA
D6 8C 93 24 AB B5 93 E8 7B 8A 89 08 42 AC 33 95 39 19 A8 F6 9A 69 A6 D2 E0 56 93 EA 37 0E
BB 1D A3 DB E9 E5 27 F3 AA CF 79 3B 2F 96 67 9B CB FF 00 9E 7B C8 4F FB E6 A9 E6 92 80
31 D2 86 6C D4 9E 61 A3 71 A7 43 04 B3 B6 C8 63 69 5B FD 91 FD 6B 5D 74 E4 B7 52 D7 47 74
9F F3 CD 7A 0F AD 29 20 53 79 AC 8C 9A 5C D5 89 9D 11 CF CA BB 70 38 FF 00 F5 55 7C A1
E4 10 29 E5 6A 3D F4 8F 92 B5 2C 48 5E 3D E0 7F AB 3B 5B FC 6A 1D FC E2 AF 59 37 FA DE
32 36 64 8F A5 02 9A D5 BF E1 8D 36 6D 43 55 B7 31 39 8A 3B 39 92 69 66 FE EE D3 95 51 FE
D3 62 BD E6 BC 7B C2 BA 65 D3 EA 36 DA 90 95 61 B7 CE F3 12 93 B9 C6 31 86 1D 2B D7 D8
E1 49 F4 04 D3 CF 4A 66 73 5E 77 E2 8B 90 F7 8A 80 FF 00 A9 42 3F 5A E0 E6 CB BE 3D 6B A8
D5 18 34 F3 C8 7B B1 AE 71 3E 79 4F B5 41 D5 AA F7 DC 8A B3 F4 93 FE 95 29 F4 90 FE 95
EA 3A 48 DD 00 35 E5 9A 37 DE 90 FF 00 B4 F5 EA FA 08 6F B3 E5 8F 6A BC 95 98 FD 6B 4D
B3 D3 15 9F 3C 67 15 B5 B0 9E E0 55 49 ED D4 64 E4 B1 A9 15 E9 95 E3 16 EF 2C C8 1E 56
F3 1F E9 C6 3B 55 F8 4A 80 C5 C8 55 5E C3 BD 63 FC AB C6 E2 31 EF 4B 84 90 6D 69 76 FF
00 C0 AB 35 86 6A 53 51 DC DC 7E F0 9E 0F 3C 0F 6E D9 AD DF 0F 6A 82 D6 49 FF 00 D1 E0
8C 49 09 5F 90 72 C7 DF DA B9 89 21 27 25 4E 6A CD 91 46 CA 12 CB 37 6E 38 C5 48 07 A5 2F
6A EC ED 7F B3 66 95 3E D8 EC 8F CF 11 01 B4 F3 F5 1C 53 75 E9 96 E0 8F DD 08 8D B8 F2
CC 8B FC 68 BD 0D 73 57 0C B0 C0 41 88 34 AA 37 07 DC 43 03 EA 3B 7E 94 D5 D7 2E 1A D5
ED 25 55 64 92 32 84 F7 C7 F9 F5 A8 B6 1A AB E4 36 73 54 1E 7F 9C FF 00 73 B5 76 FE 12 97
6C 77 8D B8 03 37 EE F9 E3 E5 1F FD 7A E0 A4 5F 93 35 72 C7 51 92 D4 61 40 C7 BD 4C 95
6B 19 15 E8 17 73 B2 3F 91 FD DE 78 F5 AC DB 90 D3 84 43 F7 77 02 7D F1 55 AD AF BE D5
96 95 A3 47 F4 F5 AB F6 88 D7 97 4D 12 B2 ED 48 5D 8F D0 0A 1D B2 68 DB B4 56 D1 D0 65
B8 B6 2D BF CB 9E 1B 71 22 A1 E5 5D 3F D9 C7 4E 94 FB 4F F8 F5 8F A7 19 1C 74 E2 A0 B8
BD 95 6C 26 D9 71 2C 53 5B 23 72 AD 86 F2 B1 CA 7D 2A 8F 87 AE 96 E6 CE 7D A7 3E 5C A3
F0 DD 4E 89 81 35 A1 A4 9F DF 55 C9 D7 AD 62 4C 7E 66 F6 AD C9 FB FB 57 3B 70 7E 66 A9
64 AF 43 80 FC 95 85 AC 26 EF 2A 5E FD 0F E0 2B 01 5D A2 75 91 7E F4 67 35 D0 5F 9D D1
E2 B9 F3 55 EB 9C D4 FF 00 D6 E4 57 74 D7 16 CF 60 2F 5A 44 8E DC 28 DE DF ED 0F E1 1E
F9 AE 5E E7 51 9A 6F 96 0C C3 1F A9 C6 F3 F4 C7 DD A8 F4 FF 00 2A 49 A2 B4 BA DC 6D 9E
4C AA EE C0 12 91 D6 B5 AF 34 E8 E1 24 28 34 C6 7C 71 51 5C 6A 12 CC 98 5A E6 F1 F5 FC
79 A3 15 66 48 F6 D4 34 66 B1 0D 48 91 34 9F 76 B5 A1 D3 58 2E E6 15 9F 67 71 F6 79 77 63
70 E9 8A D1 97 52 9E 4C A2 A0 41 4D 39 A0 6D EF 50 CE AA 95 9A C6 A7 70 ED C9 6C D3 36
01 D6 94 54 4C E2 A2 0A 4D 3D 36 2B 2E 70 DC F2 0F 4F A5 4B CE 3E 50 6A 9F 93 2F A1 A9
53 1D EA 12 D9 AE C2 1D 4B 10 08 E0 8E 18 B0 3F 81 71 F8 D6 4C F7 2F 96 0D C9 CD 65 AC
77 0B D1 4D 4B 89 48 E5 2A E8 16 CD D6 99 B9 C5 43 70 DB 85 54 15 7F C9 90 F5 18 A6 7D 94
D5 79 0A E7 8A 2A 05 AB 51 48 F1 6F D9 8C B0 DB F8 52 AD B1 5E 7A D0 A3 7C 88 83 BF 15
16 68 AF 63 F0 A2 62 0B 5F FA E4 B5 DB DD 36 DB 79 8F FB 06 BC BB 42 D7 3E C2 F0 C3 24
06 55 CA C5 F2 F0 46 78 CD 7A 5E A4 71 65 3F FB B4 E6 E6 9A A2 BC A2 FE 4E 1B DC 9A CC
B7 1F 24 8E 7B 2B 54 97 EF 96 DB 52 ED D9 69 29 FF 00 A6 2D FC AA 21 57 6E 9B 8C 56 2E
80 BB BF 12 F5 EC 7A 4C 28 96 CB DE BC 9F C3 76 EF 34 67 6A 96 FA 0C F5 AF 48 82 0B CB
74 5D BE 72 71 E9 FF 00 D6 AB 05 F1 C5 54 58 B7 F3 5D 3E 05 55 9C 0C 76 AC D5 97 51 3D
59 B1 EE A3 FF 00 89 A7 C9 24 DB 7E 72 0D 30 38 14 EF B3 35 78 47 91 71 FF 00 3C BF 5A 4F
26 7F EE 2F E7 5A C7 A5 32 A2 DE 68 C5 67 08 6E 33 D5 6A C2 5A 8F BD E6 EC 7A 9E 96 8D
C6 8C 55 63 06 EF BF 33 B5 3B EC 90 7A 1F CE A7 A7 75 A4 E6 97 15 5F EC F6 DD D5 8F E3
52 08 ED 87 FC B2 A7 53 68 A2 A7 57 B7 4E 96 E3 F3 A9 96 F4 C7 FE A9 1A 3C F7 57 C1 AA 39
14 64 51 4E AB 32 4E D2 A9 43 E6 6D 6E 0F EF 0F 23 DE BA 4F 0B 2A 22 5F 05 5C 67 CB 3D
73 EB 5C 96 F1 EB 5D 57 86 48 DF 7B FF 00 5C 94 FE B5 24 23 0D 57 6C 71 E6 D6 D5 CF 46
AE 5E E3 A7 15 D4 DC 61 B7 7D 2B 92 BA E0 7D 2A 79 AB BB 84 E2 2A C3 BC 6C D6 41 AD 1B
A3 CD 66 D5 63 5C C5 E3 65 E9 BC 8E 47 04 72 3E B5 DB C7 28 BF B1 8E 61 F7 D4 6D 93 EA
2B 88 AD 8D 1A EC 41 3F 93 27 FA AB 8E 39 EC D4 C7 19 15 45 4E 0D 3A E2 2E B5 98 C2 BA

CHAPTER FOUR

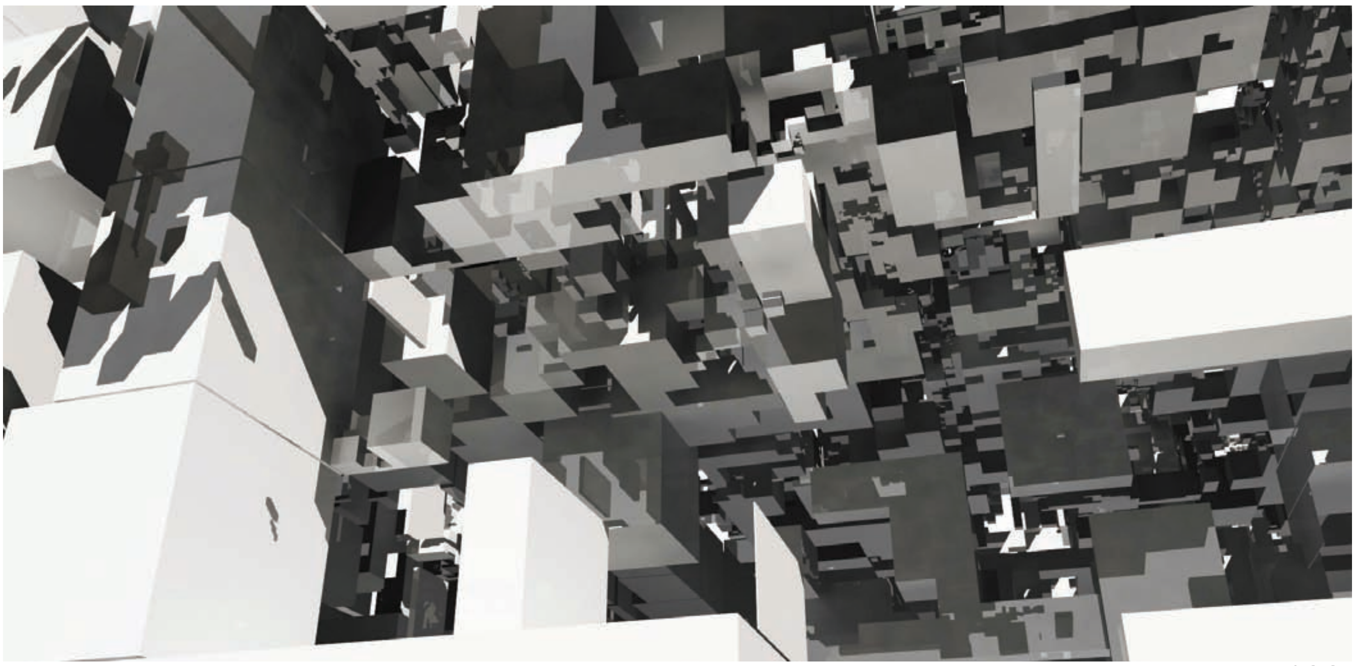
STEREOSCOPIC ANIMATION

Stereoscopic 3d animation deepens the audiences digital 3d experience from rendered captured moments to movement with depth. Stereoscopy works by presenting two offset images separately to the left and right eye of the viewer using red and cyan due to their chromatic difference (Johansson, 2009). The brain combines these offsets views to give a perception of 3d depths. Stereoscopy works as an illusion tricking the brain into perceiving depth. These ideas of illusion and tricked perception align with that of digital decay in the way glitch seemingly tricks the computers by shifting the visual perception of a digital files binary code. Stereoscopic 3D animation is most definitely not new technology however the medium aligns with the topic of digital decay in the antique nature of the technology tying with the glitch representing a digital antique.





The stereoscopic animation allows the audience to move through the forms. Movement is a key technique enhancing the unforeseen nature of glitch. New media artist Briz believes a glitch artist could be compared to an explorer of sorts writing, “exploration is the act of searching or traveling a terrain (including space) for the purpose of the discovery of resources or information… The term may also be used metaphorically, for example persons may speak of exploring the internet, sexuality, etc… Exploration is the attempt to develop an initial, rough understanding of some phenomenon. In all these ways the glitch artist is like an explorer.” (Briz, 2011) Stereoscopic animation allowed the viewer to explore the space by movement and a perception of depth illusion. OReilly writes, “there’s a kind of back and forth between software and idea that goes on when I work in 3D, because to me it’s weird not to acknowledge that everything is fake and animation is basically an optical illusion - but it’s still ultimately a medium to get ideas across. I don’t want style or design to be center stage—it’s just something that happens in the translation process from brain to screen.” (OReilly in interview with Rourke, 2013) This is exactly how stereoscopic animation is employed within the design discovery process of this research. The animation techniques and quality are not the focal point, stereoscopy is purely a tool expressing an idea, deepening the understanding of glitches happening in digital time and allowing the audience to experience digital 3d architecture.



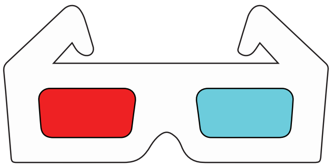
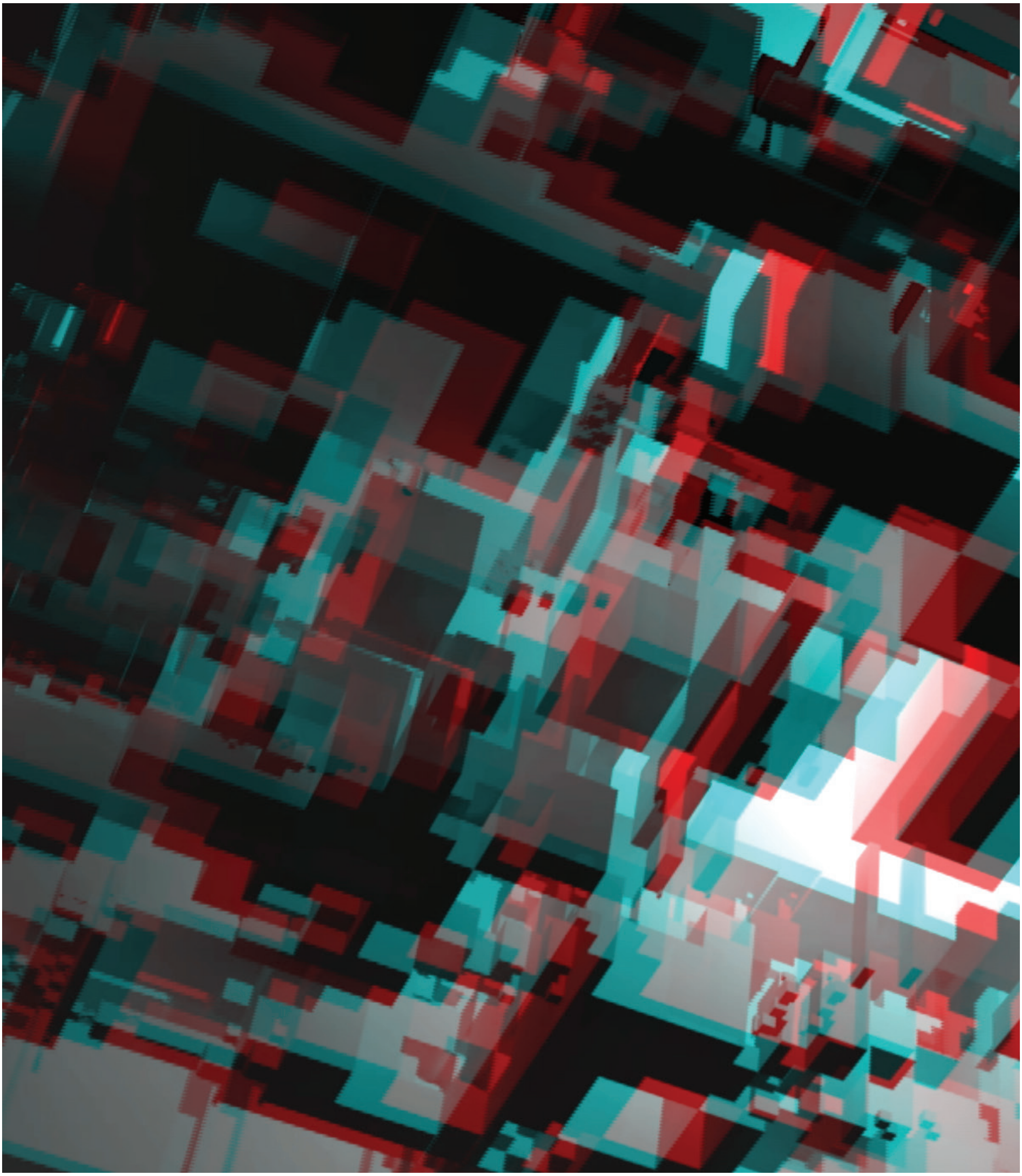
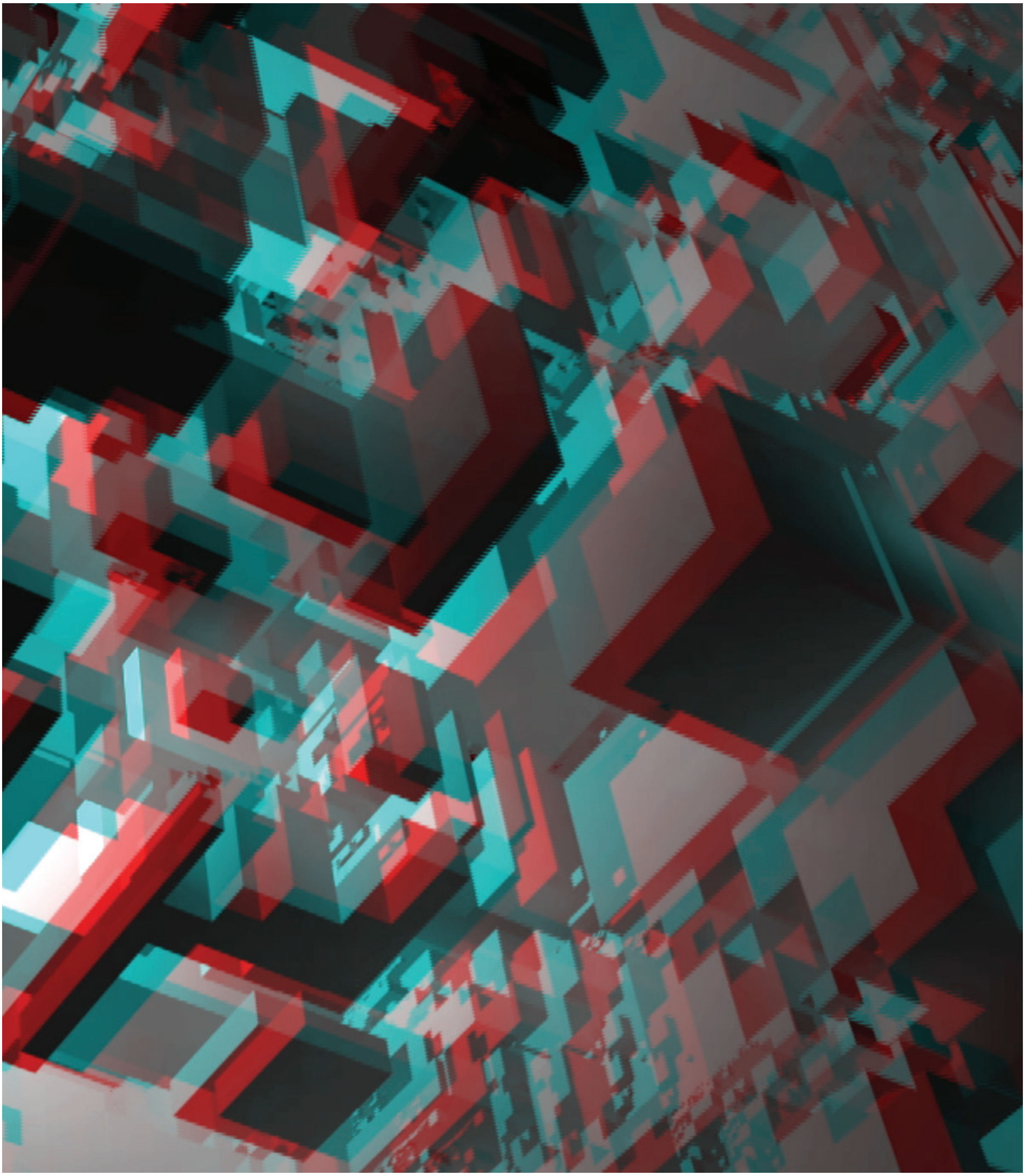


Figure 5.52 Stereoscopic animation developed using 3DSMAX program (view wearing anaglyph glasses)





DATAMOSHING

The stereoscopic animation is further glitched through a process called Datamoshing, to advance unforeseen opportunities in the form through movement in 3d. Datamoshing is the act of removing the I-frames from a compressed video DataStream causing the playback image and motion-vector data to not understand where the first clip ends and next clip starts. This results in the player merging the clips together in a distorted, pixelated, unpredictable glitch like fashion. Though the deletion of key frames in a video can be done intentionally e.g. in Avidemux program, it is a natural result of digital decay as seen in the earlier example of video footage glitched through physically dropping a storage device. Briz writes, glitch art is “anytime an artist intentionally leverages that moment (being an unexpected moment in a system calling attention to the system itself) by either re-contextualizing or provoking glitches.” (Briz for Kernel, Klee, 2015) Provoked datamoshing calls attention to the stereoscopic system of illusion of depth and disassembles human’s perception of 3d depths within the digital realm similarly to the way a glitch disassembles a visual interpretation of an images code.

Figure 5.53 Naturally datamoshed footage (Beverly, 2016)

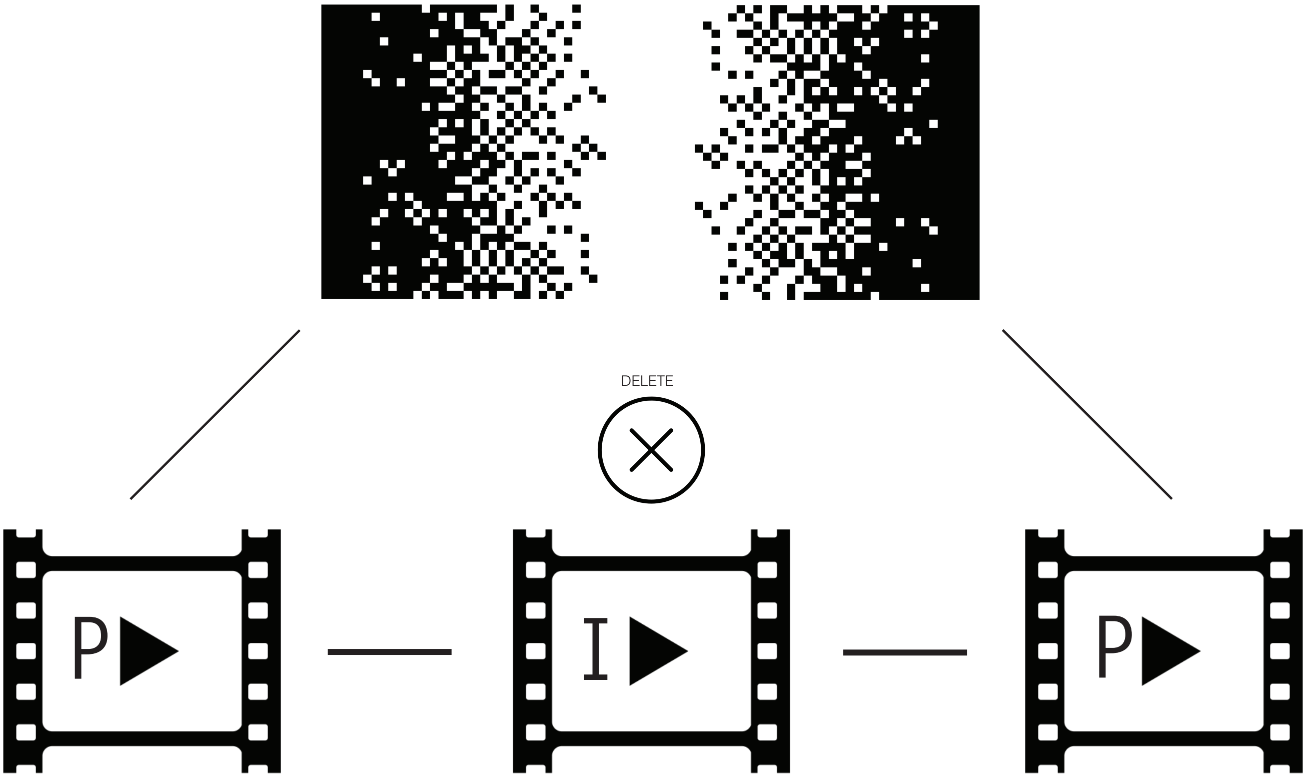
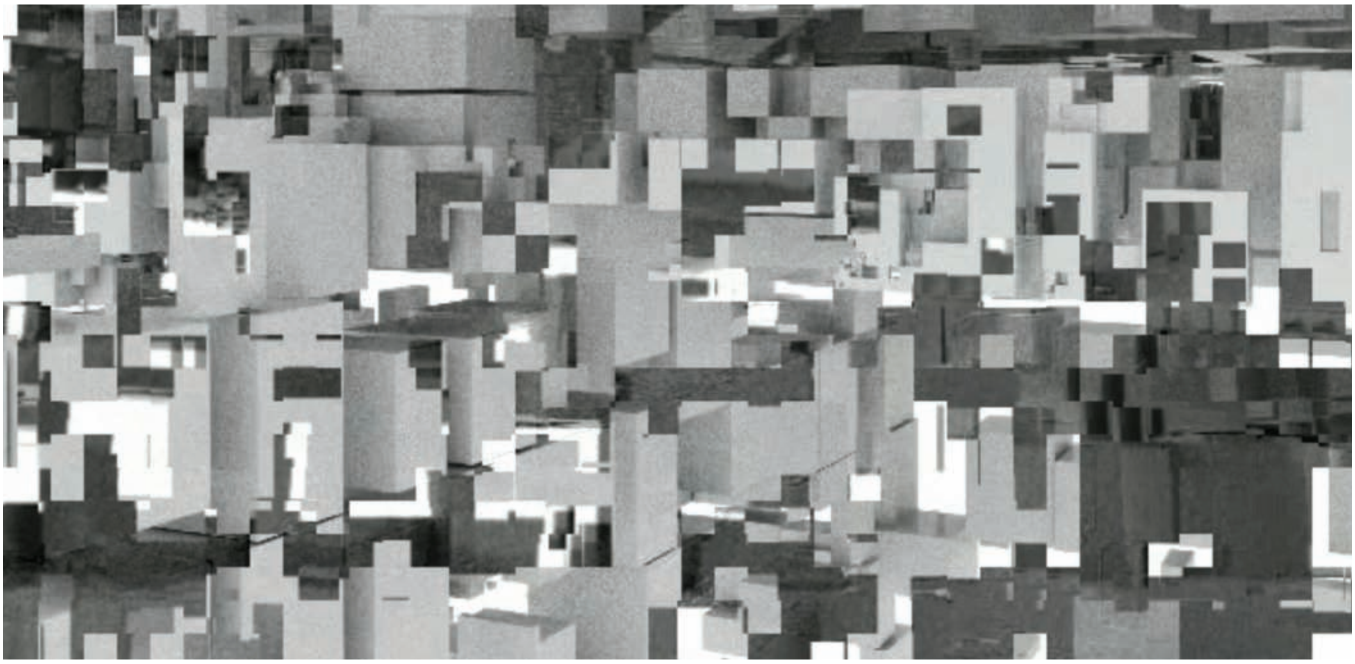
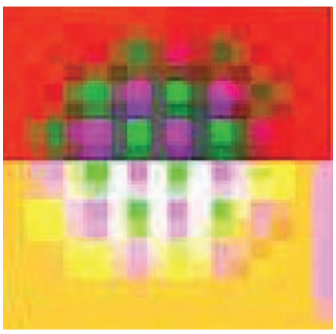


Figure 5.54 Datamoshing animation test study



Digital decay processes are often viewed with negative connotations, however intriguingly datamoshing as a glitch technique is rapidly being embraced. Datamoshing was employed in Kanye West's music video 'Welcome to Heartbreak' 7 years ago, (West, 2009) last year by ASAP Mob in their music video 'Yamborghini High' (ASAPMob, 2016) and again by Calvin Harris in 'My Way' (Harris, 2016). Datamoshing as a glitch technique is arguably used in these music videos to express a narrative around the agitation for the digital age we live in, but also purely as a contemporary aesthetic. Datamoshing was earlier employed as narrative in 2013 by David OReilly for a television series 'Adventure Time' in the episode 'A Glitch is a glitch' (Rourke, 2013) Creator of this particular episode explains, "in general I try to find ideas which justify being in 3D animation. On this project, I wanted to focus on glitch as a narrative device." (OReilly in interview with Rourke for Rhizome, 2013) OReilly employed glitch as a visual technique to communicate the narrative of the story while alluding to the animated nature of the television series usually being in 2d storeyboard style and for this unique one off episode progressing into 3d datamoshed animation. Datamoshing methods embrace the unexpected outcome of glitch and advance interpretations further than 3d opening up a sort of optical illusion of the 4th dimension. Employing datamoshing into stereoscopic 3d animation within this research developes an understanding for how glitch can be performed in 3d space and how it effects the digital dimensional space. Although numerous datamoshing video can be found on YouTube, this research is the first to Datamosh stereoscopic animation specifically.



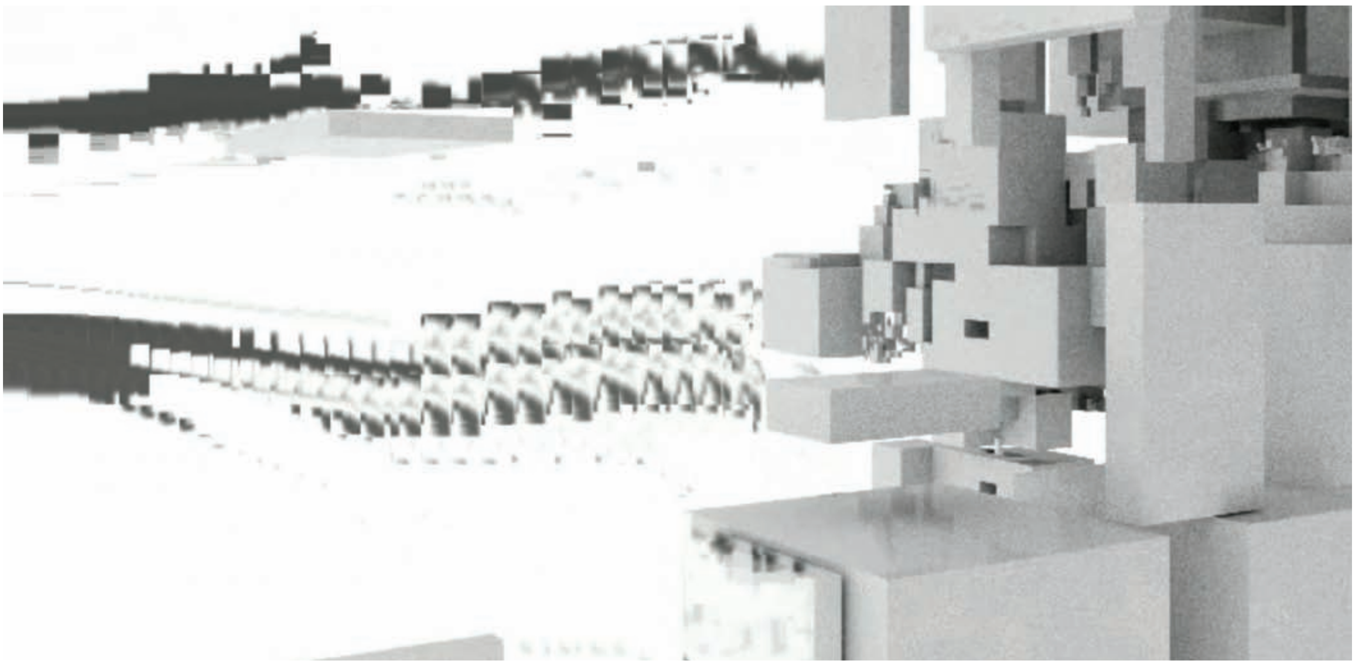
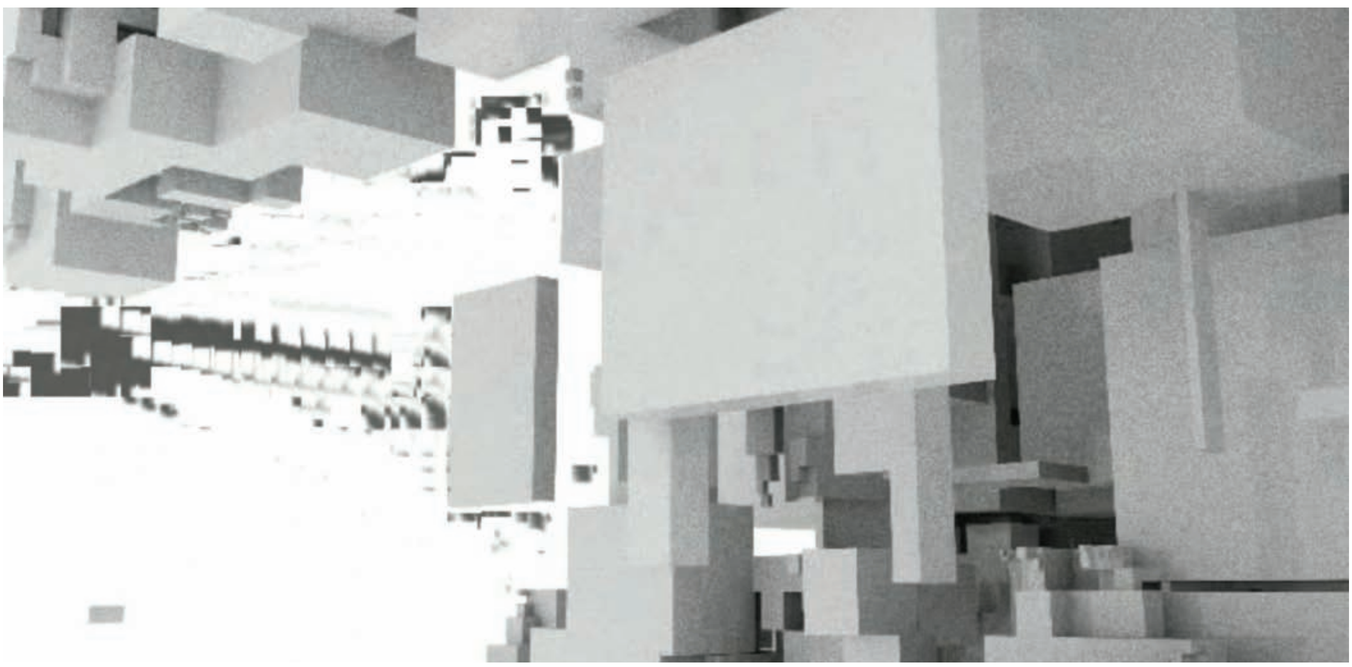




Figure 5.55 “Welcome to the Heartbreak” music video (West, 2009)

Figure 5.56 “Yamborghini Hight” music video (ASAPmob, 2016)

https://www.youtube.com/watch?v=46m22tzIgS8&t=6s

Figure 5.57 Stereoscopic datamosh animation can be watched via the Youtube link

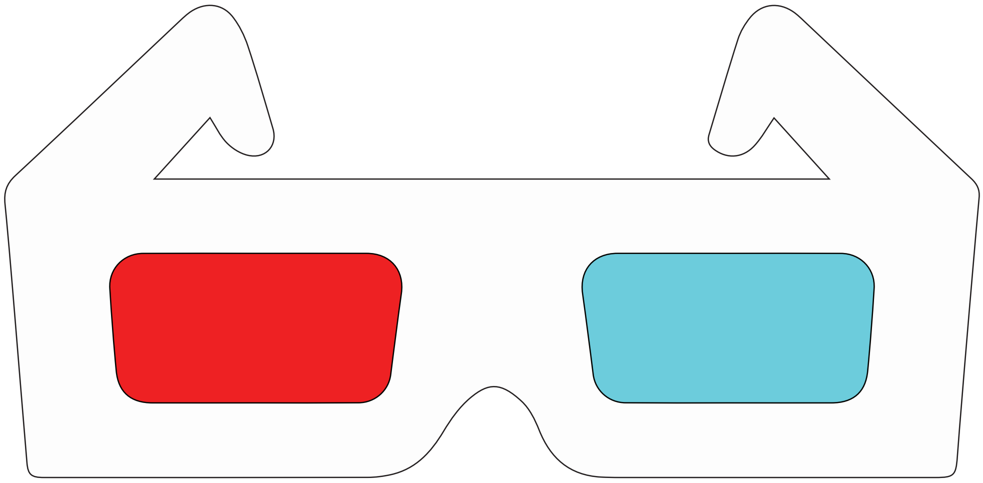
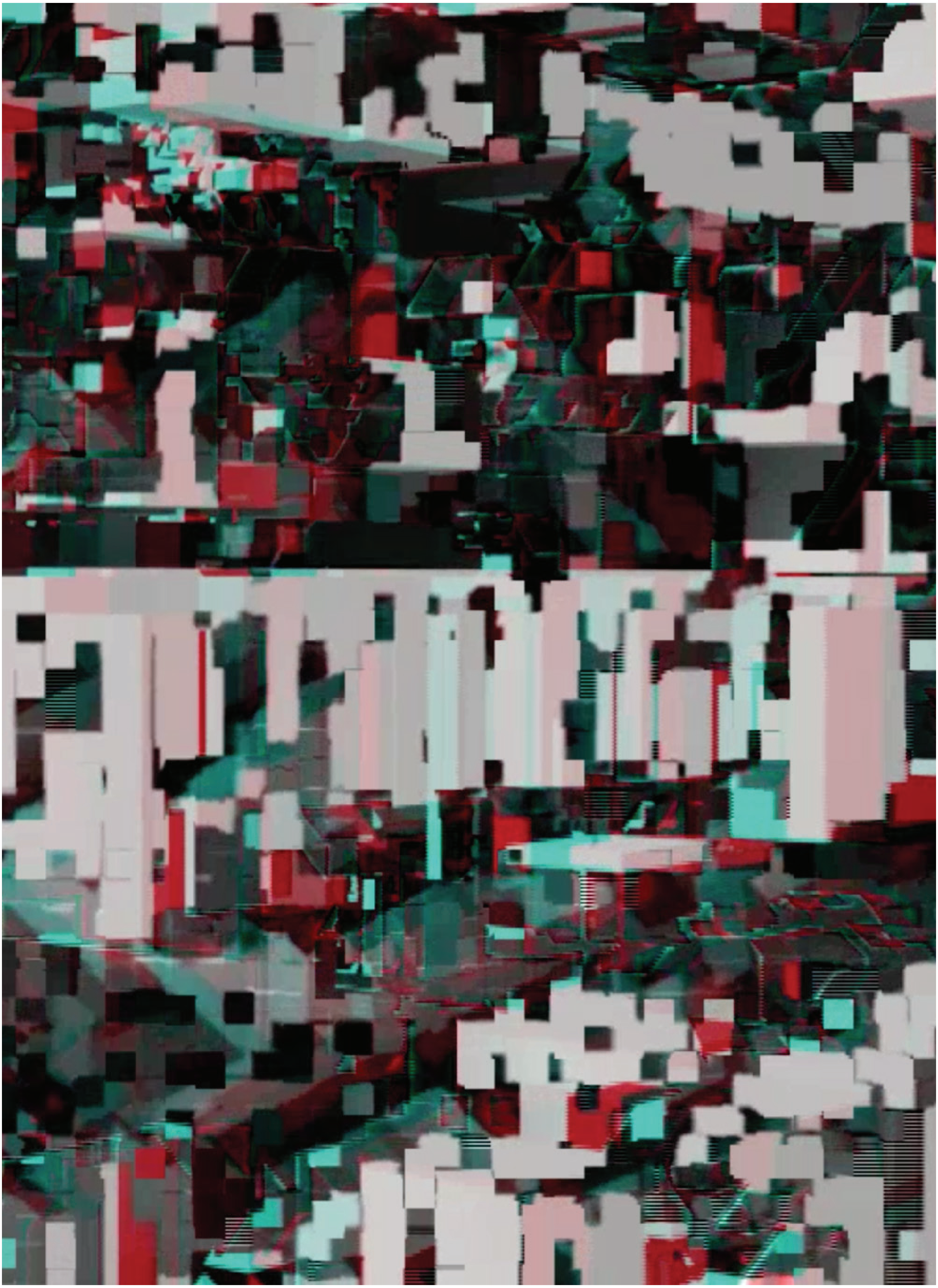
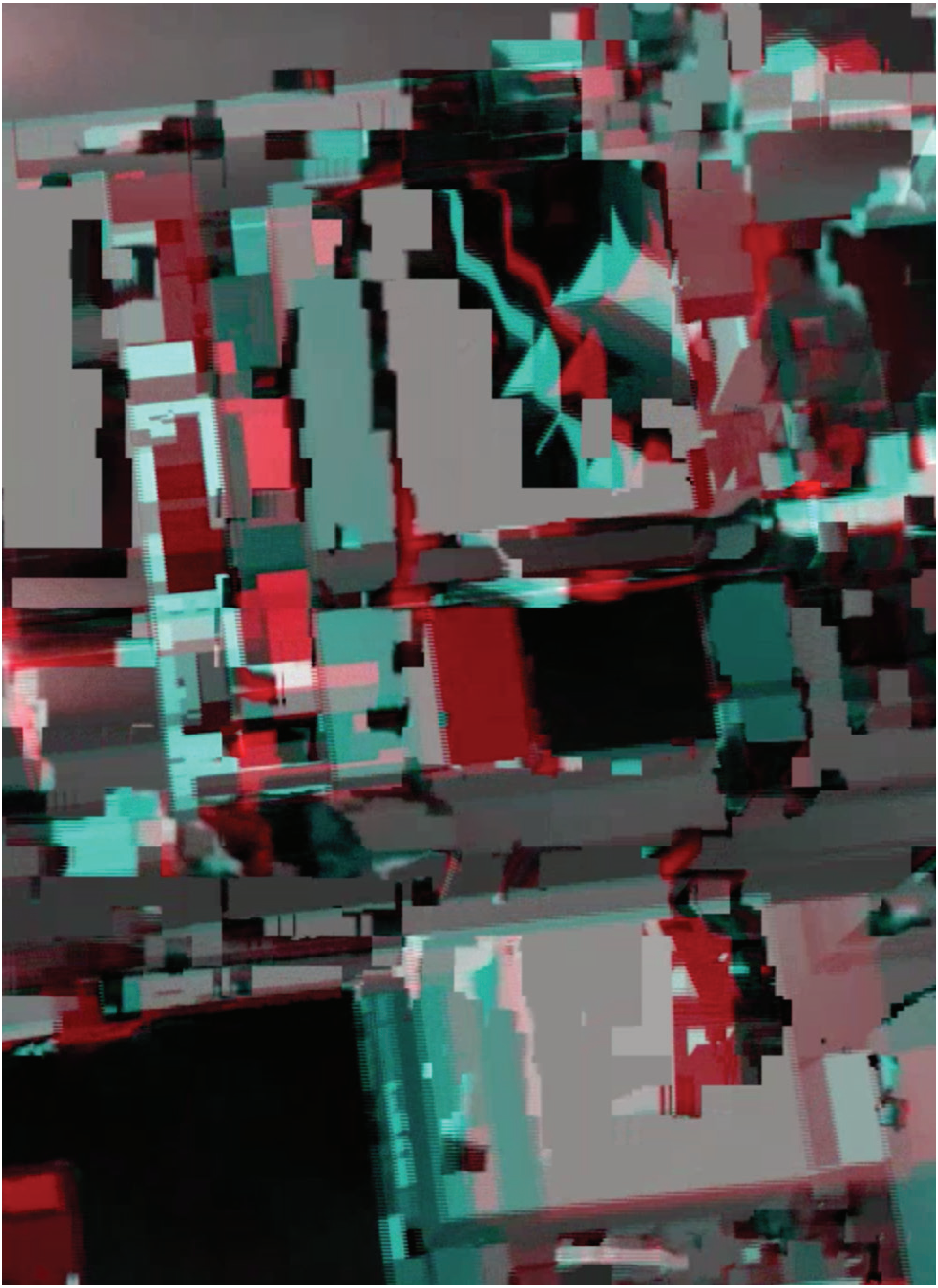
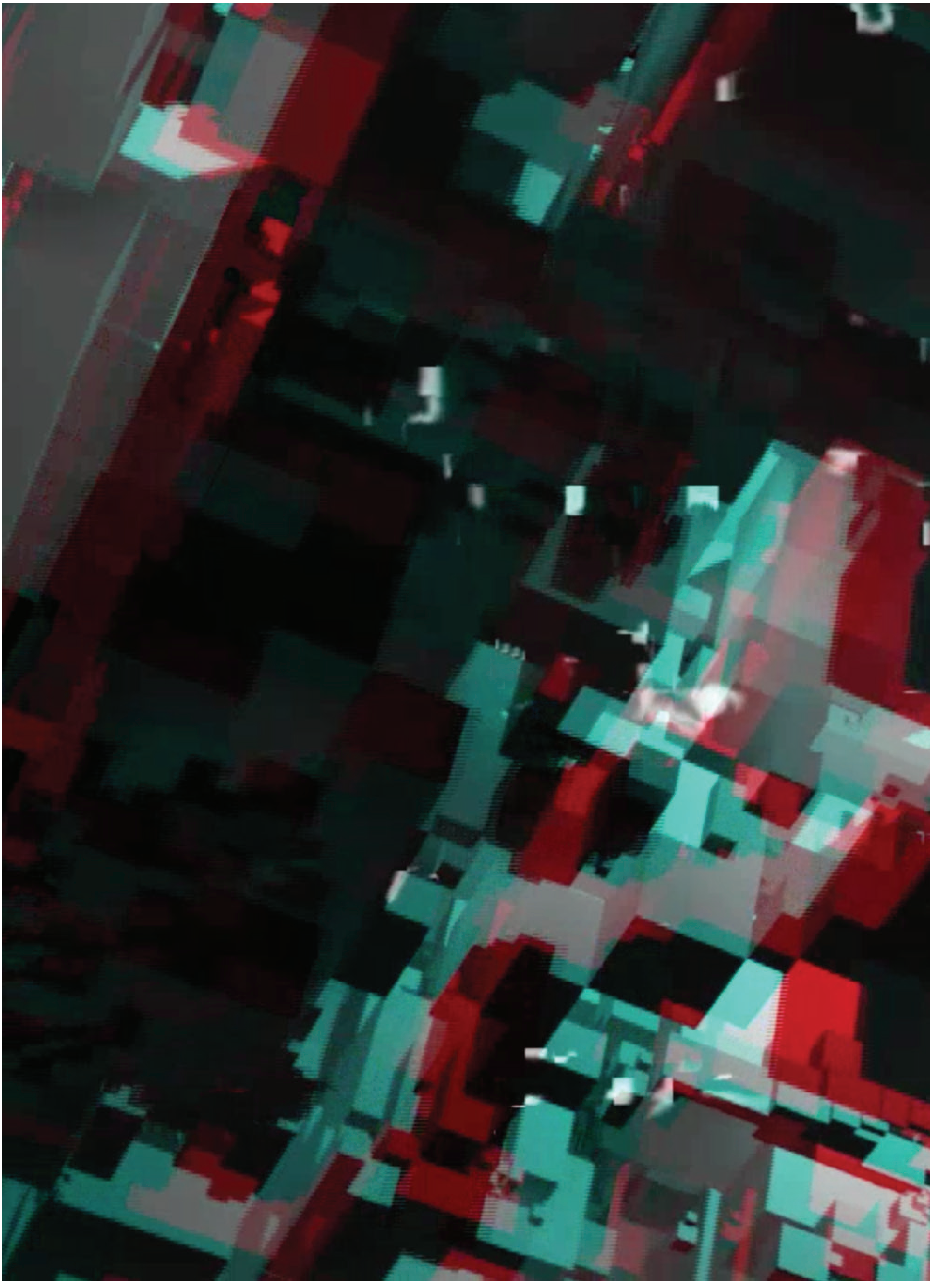
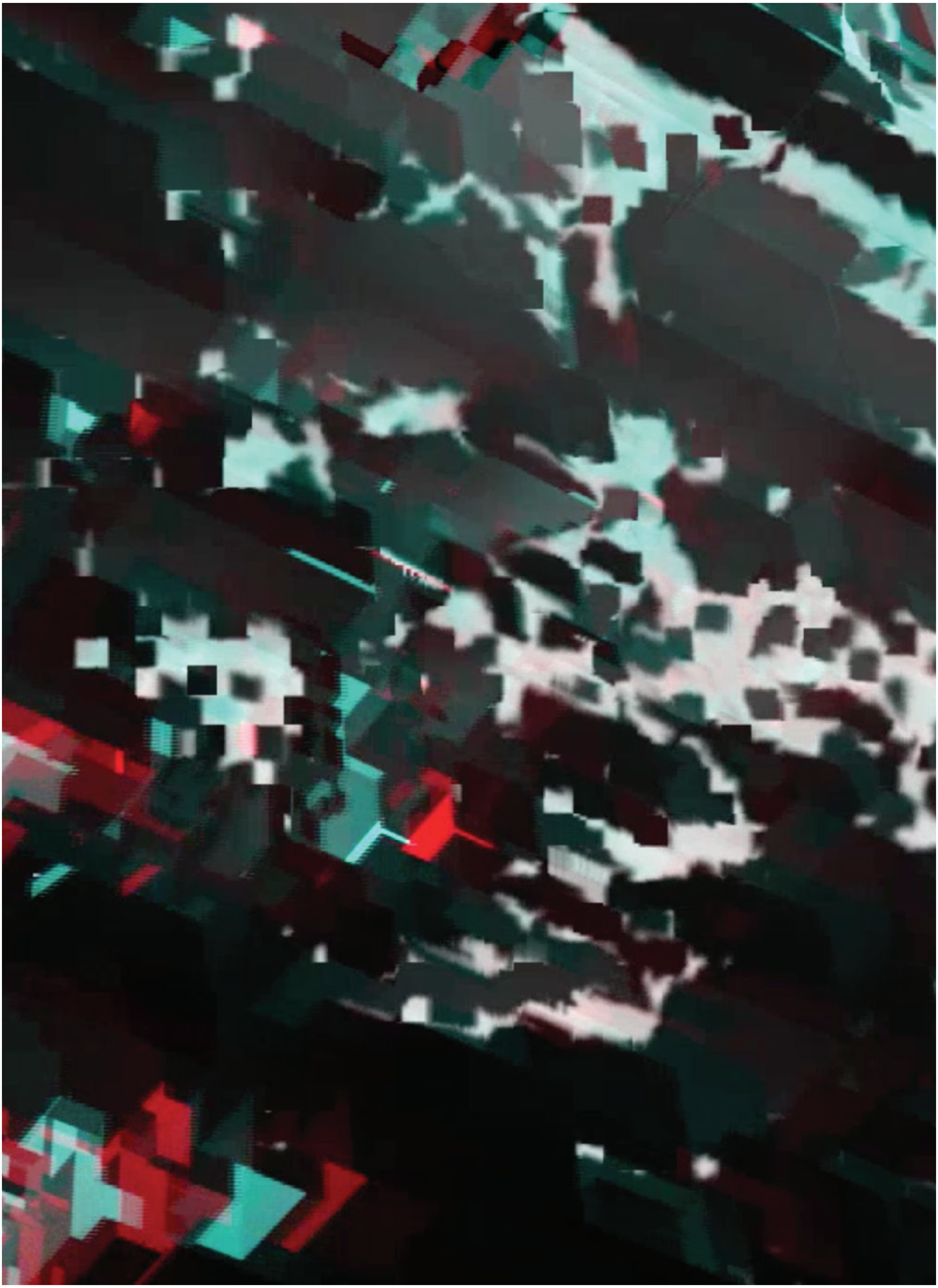


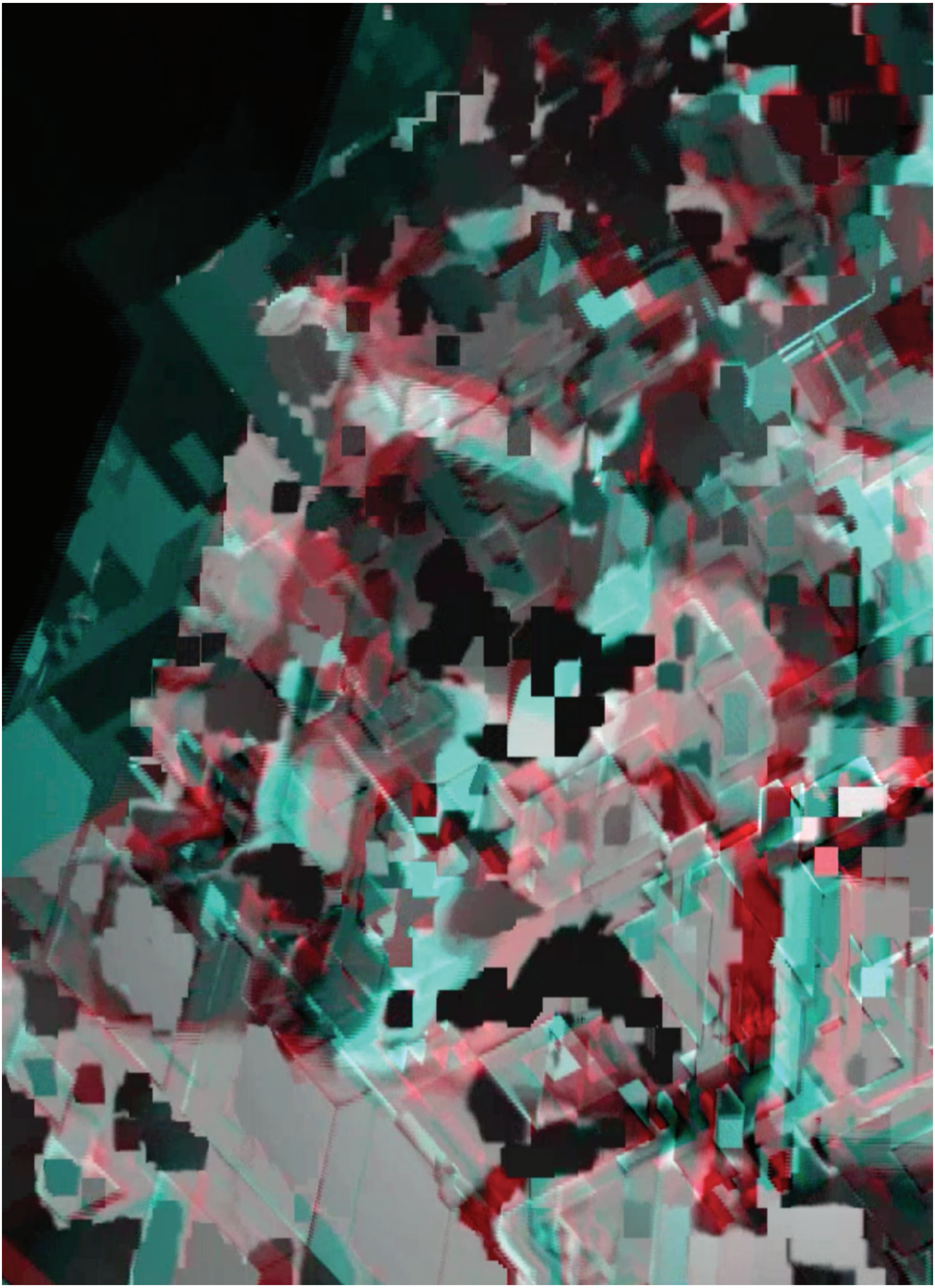
Figure 5.58 The following images are captured moments from the moving datamoshed stereoscopic animation. These images are still intended to be viewed wearing anaglyph glasses.

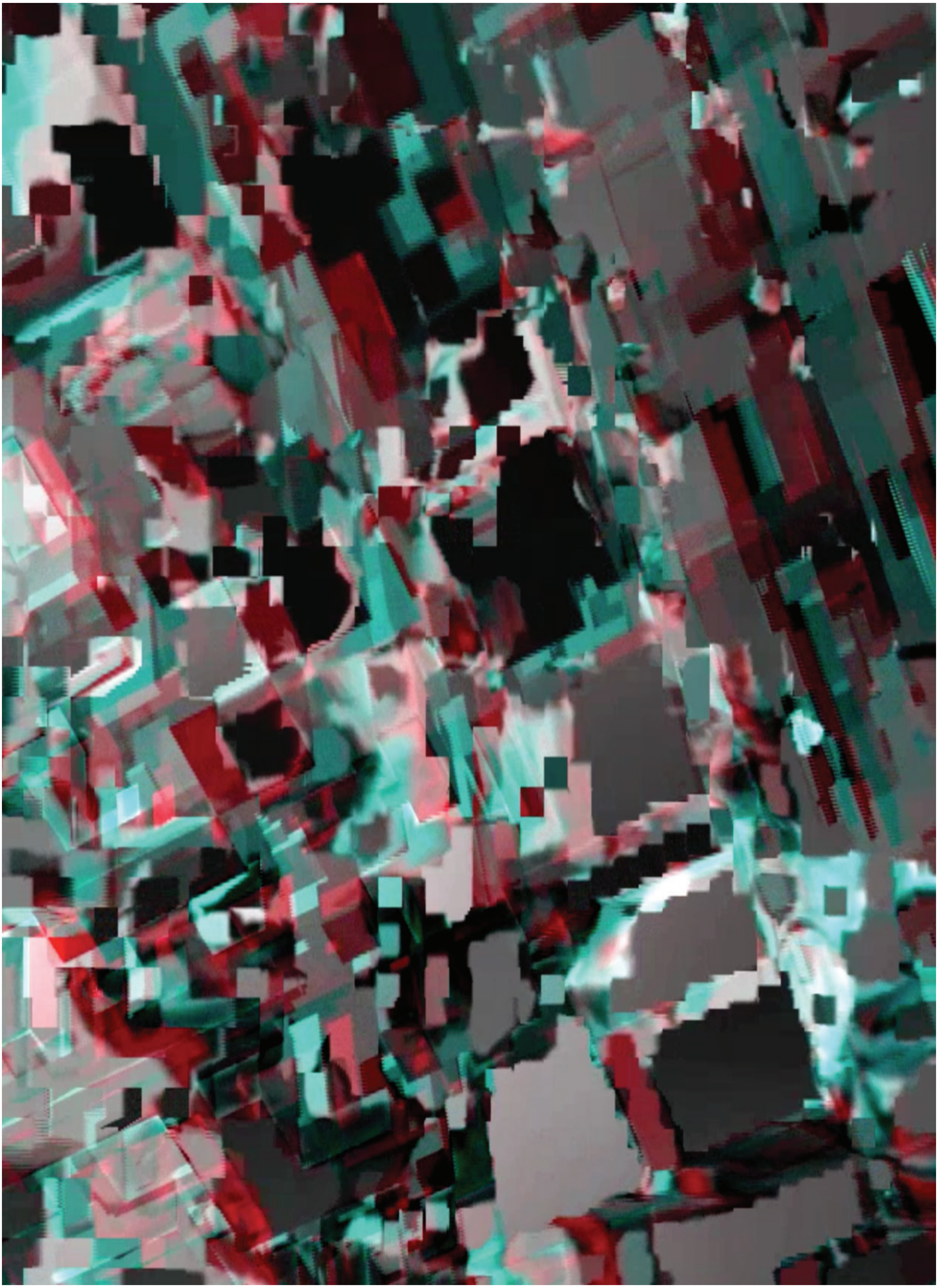


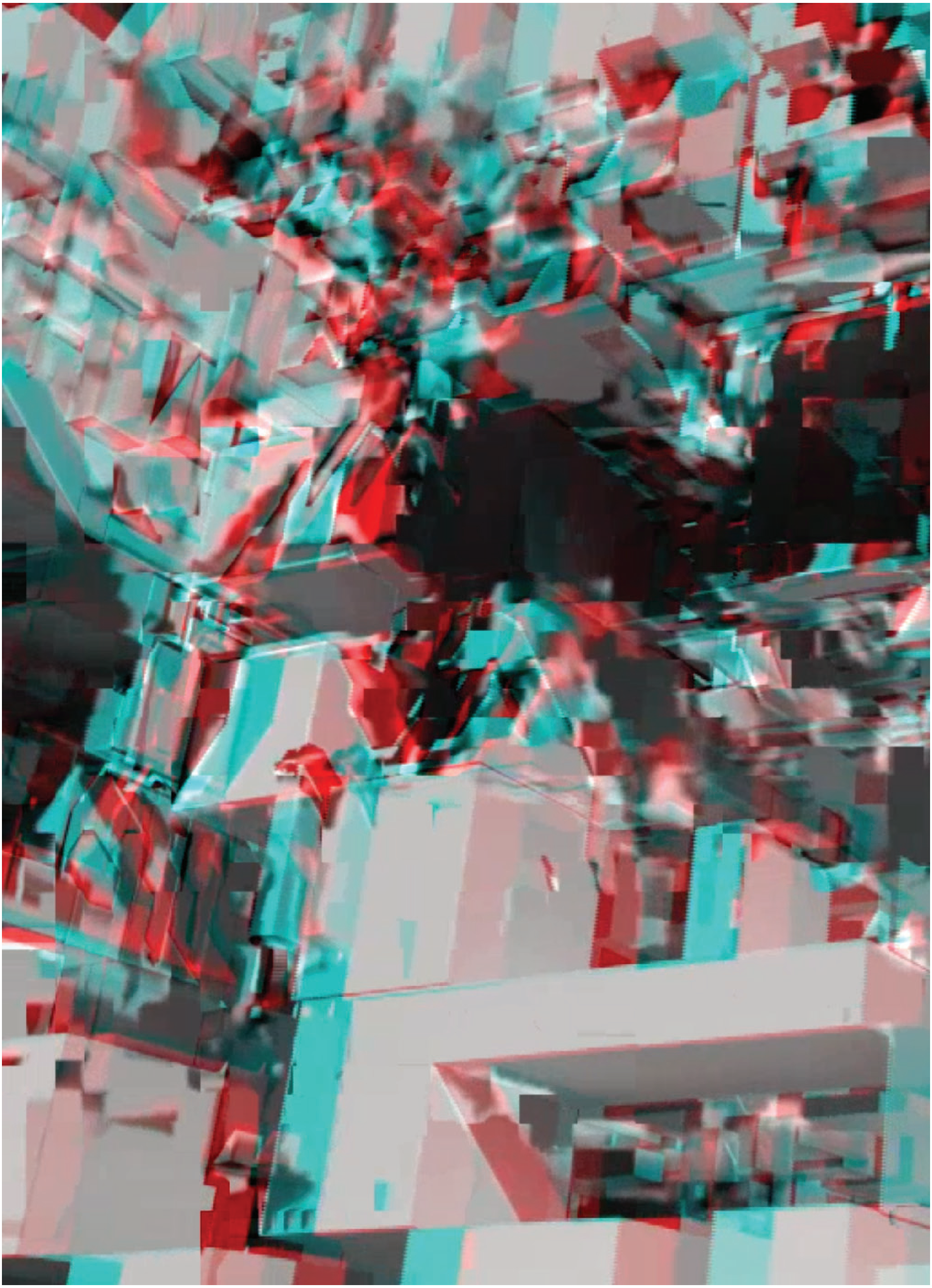


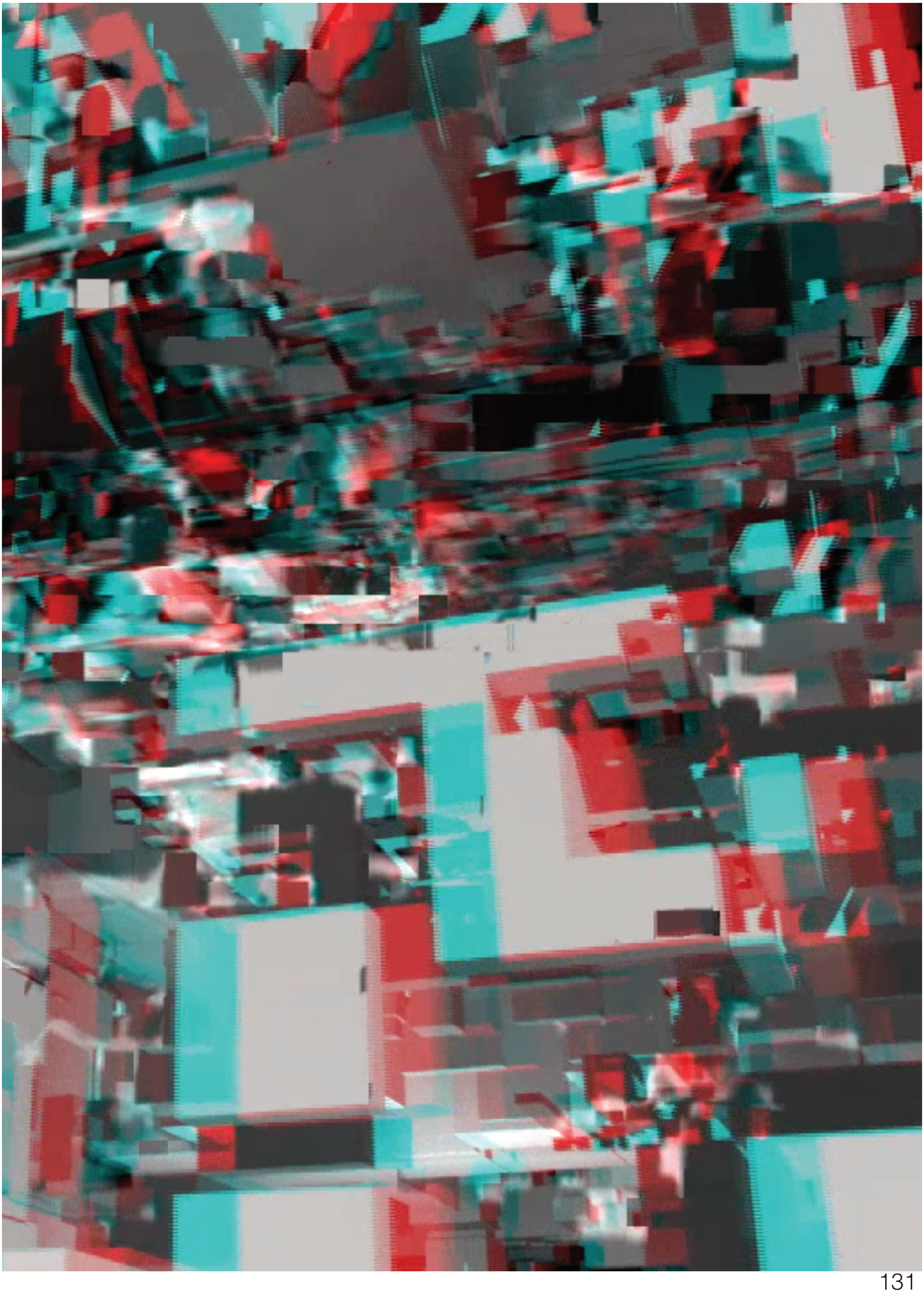


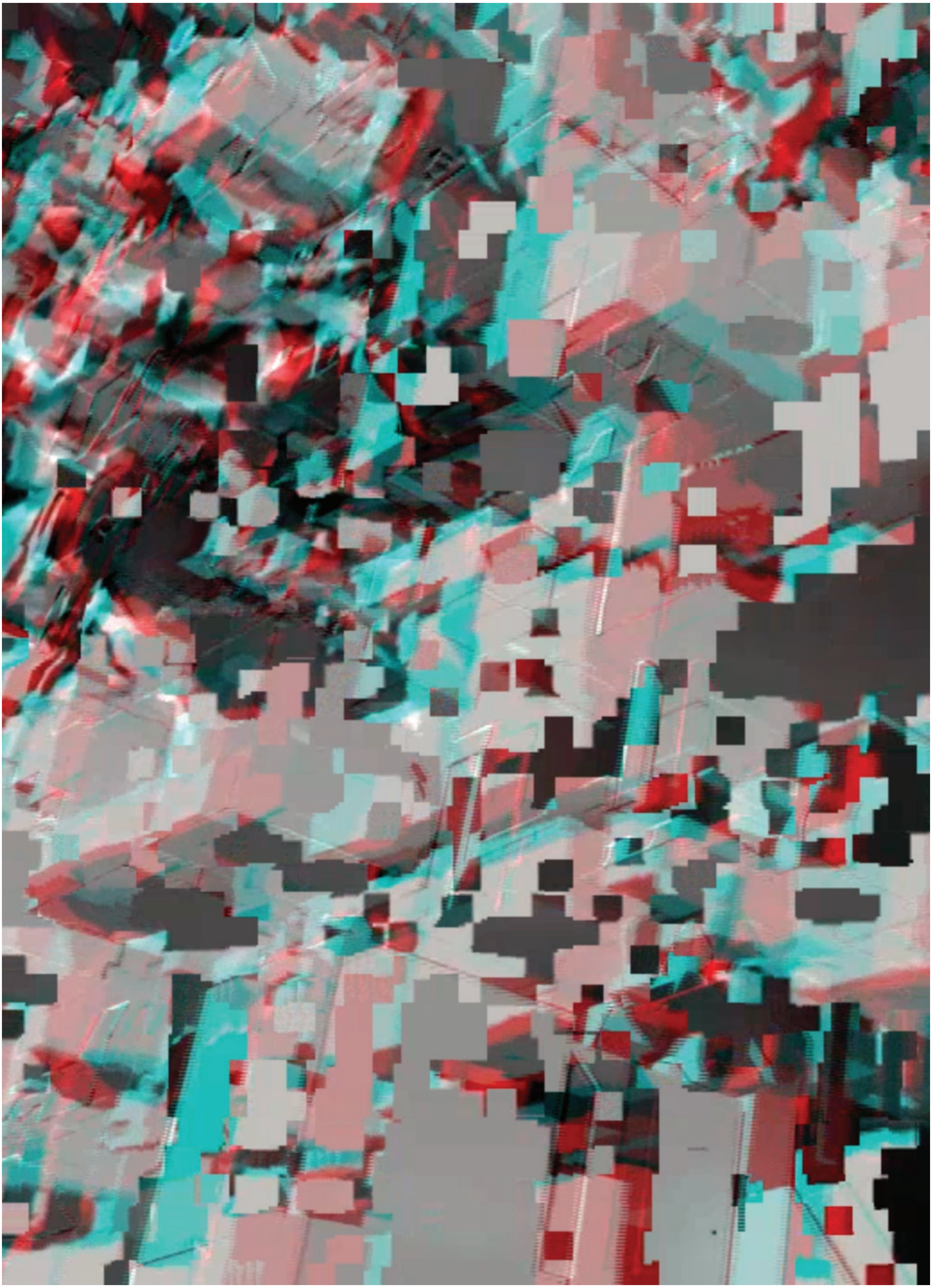


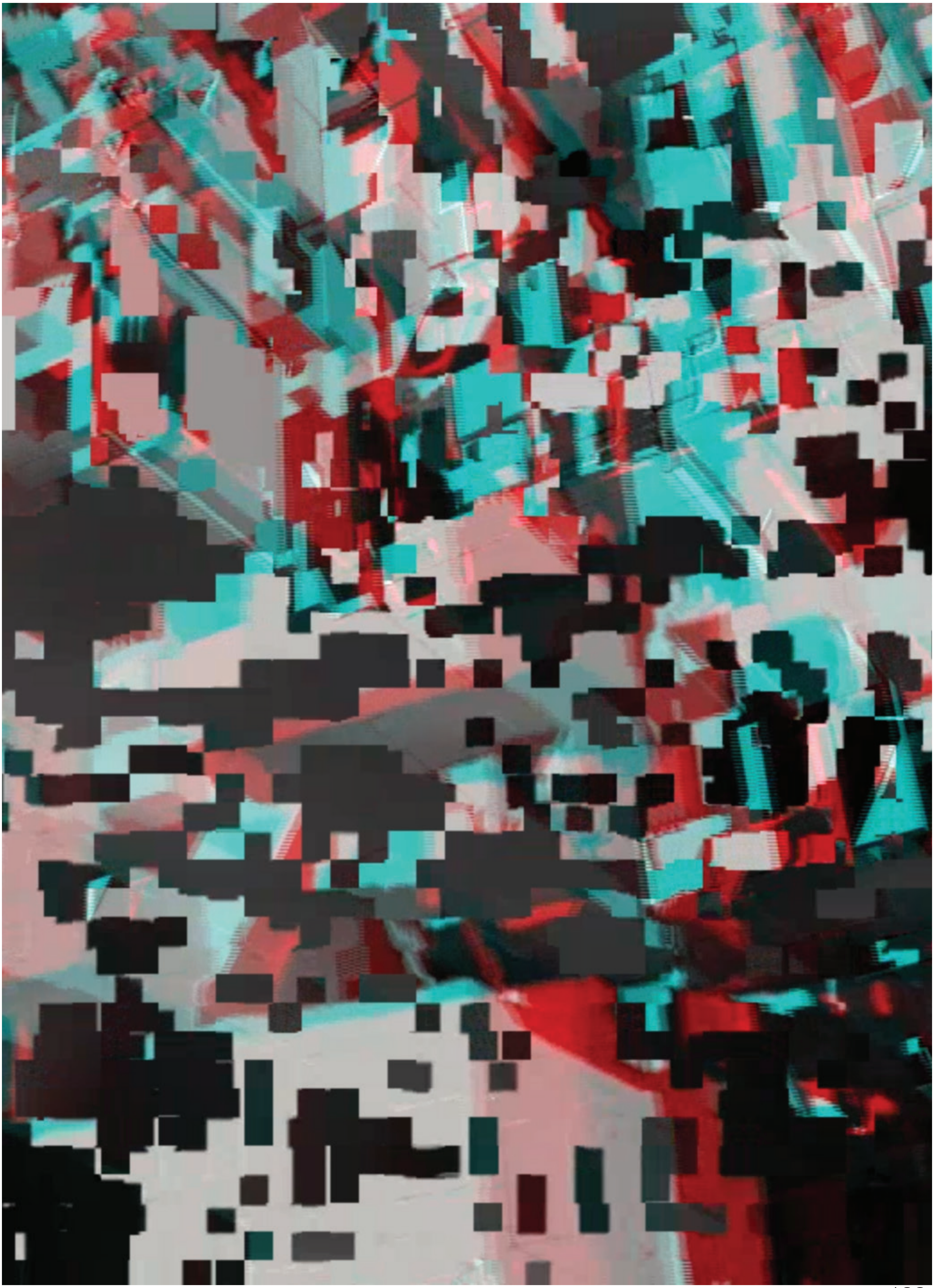






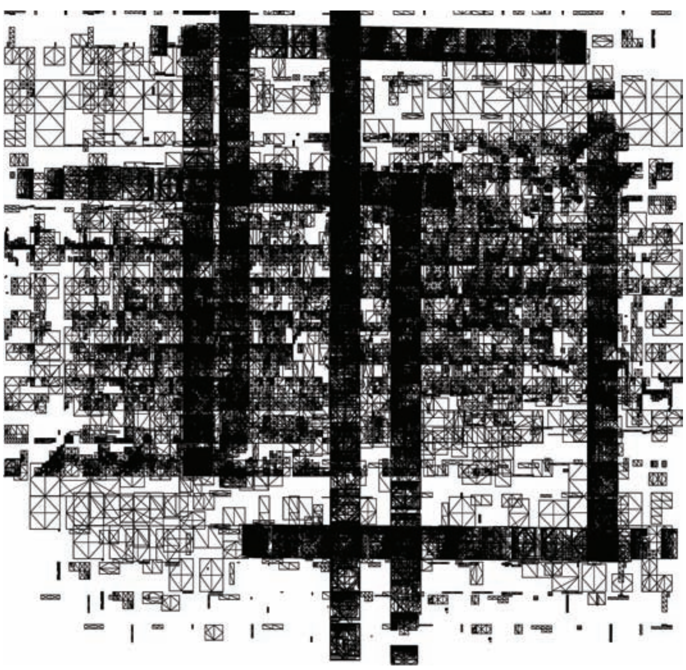


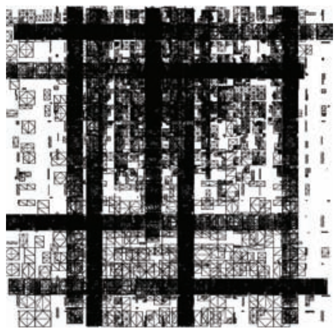




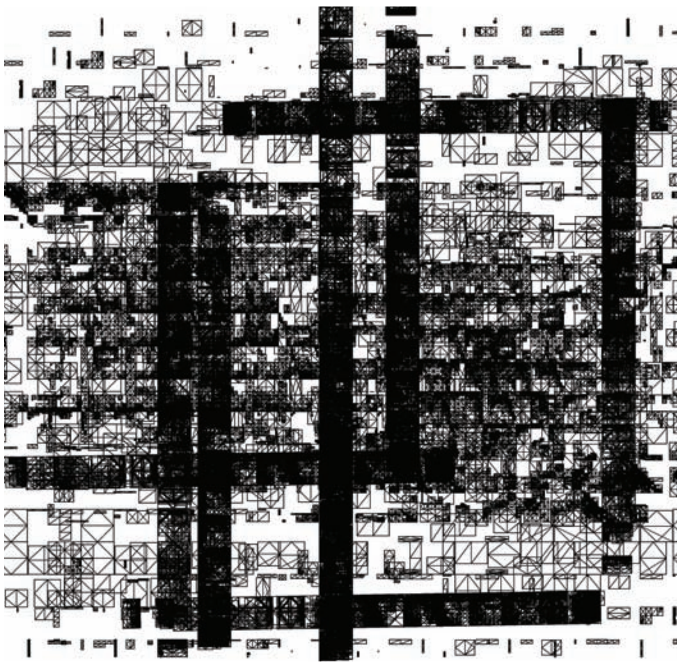
CONVENTIONAL ARCHITECTURAL PLANS IN TIME

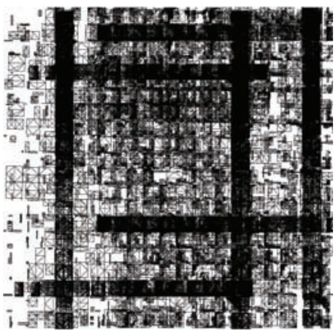
When modeling in any computational spatial generation and design program, you are drawing in plan, elevation and perspective simultaneously. Therefore, when manipulating our form for stereoscopic animation in 3DSMAX we found ourselves drawing in 2d concurrently. Due to the complexity of the design form, when the conventional architectural drawings were exported into PDF to be read with vector line work, the files drew themselves out in an unpredictable and uninformed GIF like manner. The architectural drawings slowly compose themselves layer upon layer of information over the duration of a few minute. As the drawings continue to digitally compose themselves there is a sense of the unexpected, we are unsure of the end result. Within this return to 2d, we start to have a more direct relationship with architecture through an interpretation of conventional architectural drawing. The drawings become diagrammatic spaces and we see potential in the way in which they compose themselves out over a continuation of time becoming an architectural expression, similar to that of Cedric Price's 'Fun Palace' (Price, 1961). We appreciate visual relationships between the mechanical structure of Prices 'Fun House' that is intended to move and react to the inhibitors of the space and the way in which the linear plans of our design draw themselves out layer upon layer (Mathews, 2006). The linear plans seem to move as the structure is erected before our eyes on the digital screen, reminding us to 'delight in the unknown.' (Price, 1984)



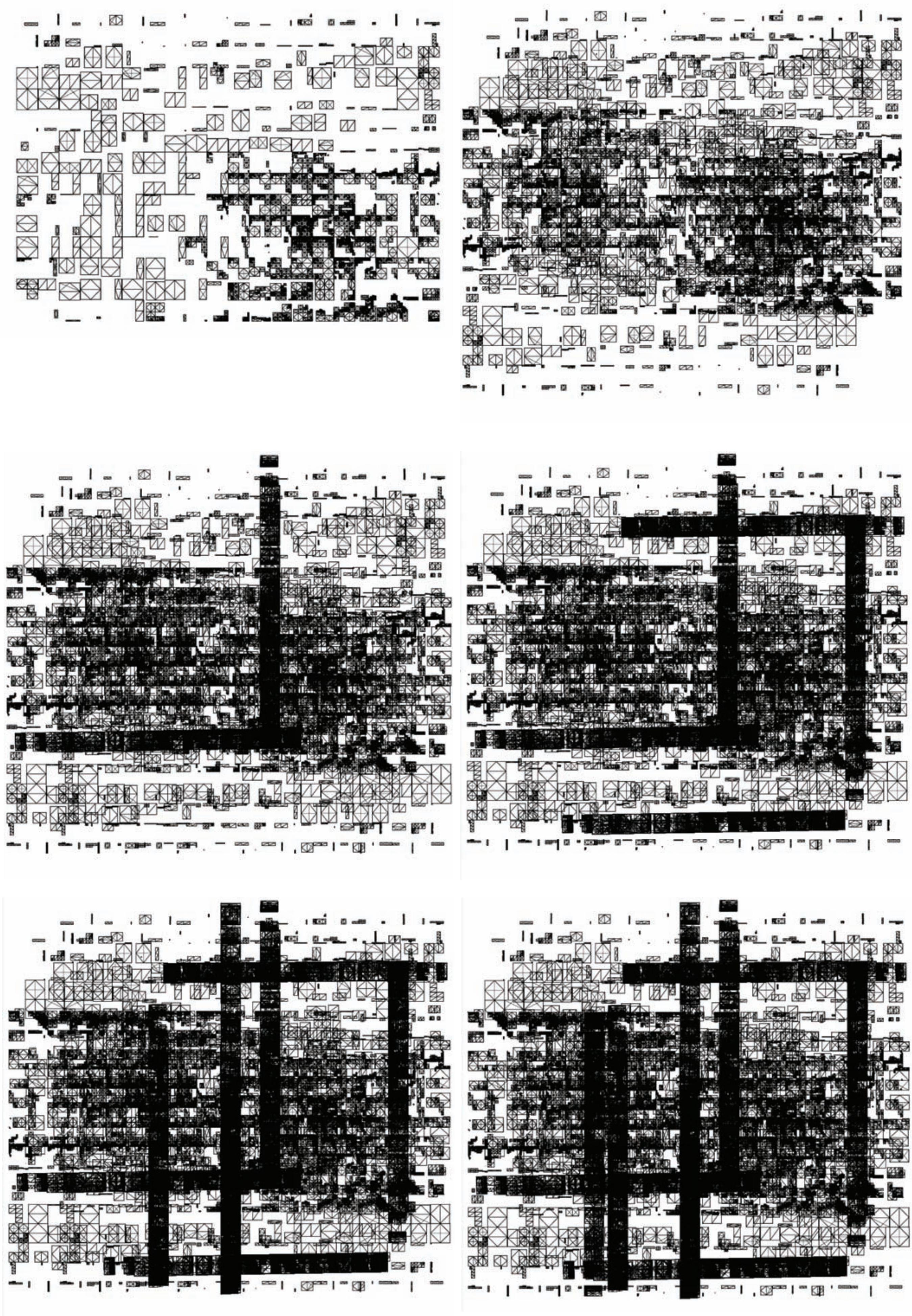


Returning to conventional means of architectural presentation is interesting when discussing glitch architecture by virtue of glitch methodologies possessing the ability to test conventional ways of drawing architecture and reinterpreting what we think we know. For instance, these drawings do not have any scale or ground plan; it is completely up to the perception of the viewer and their previous spatial experiences. The plan could be a city and the elevation could be a chair, the section could be an apartment building while the elevation could be the plan. The way the drawings utilize time to compose themselves digitally speaks about glitch's inherent nature to work along a ribbon of time itself.

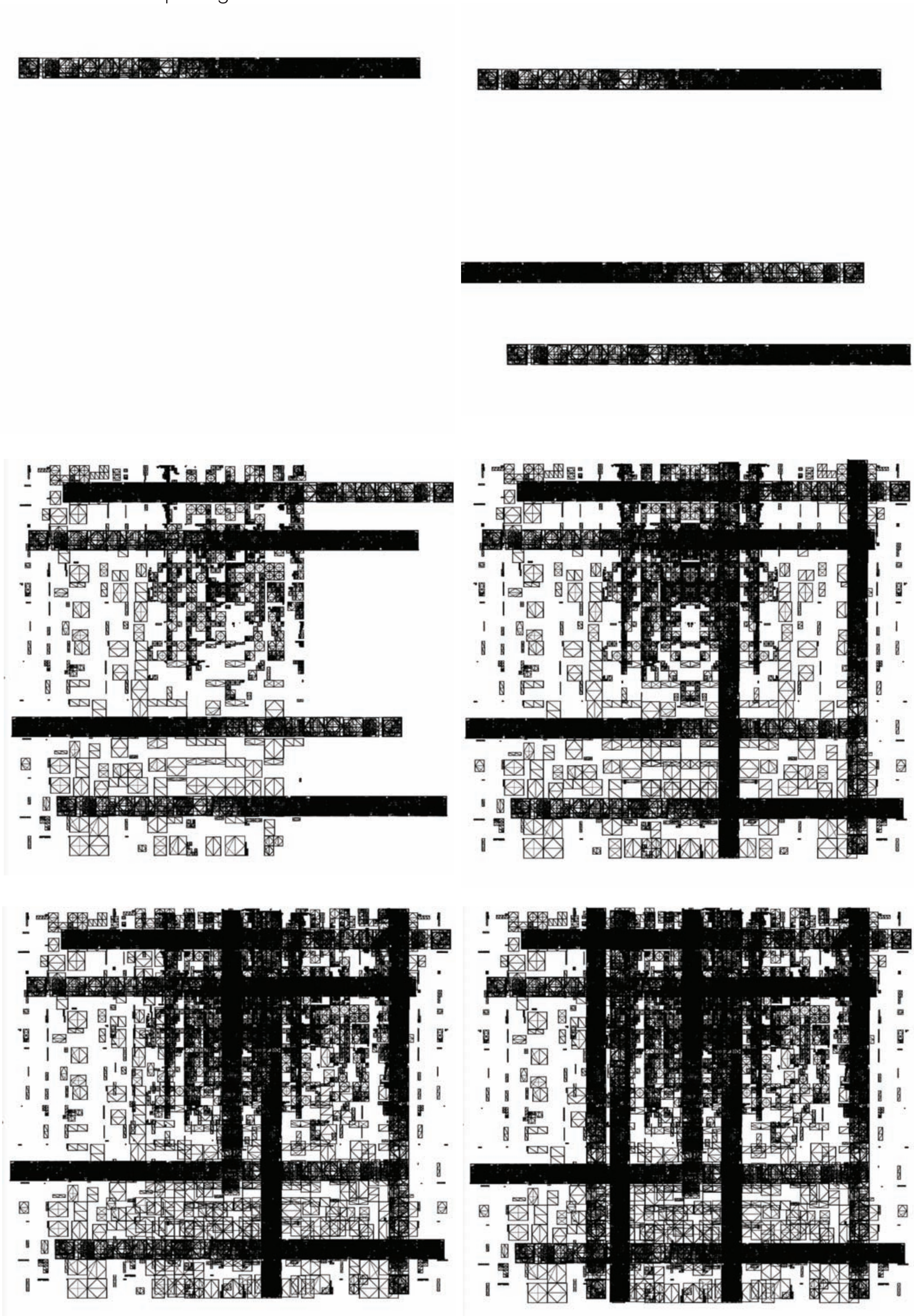




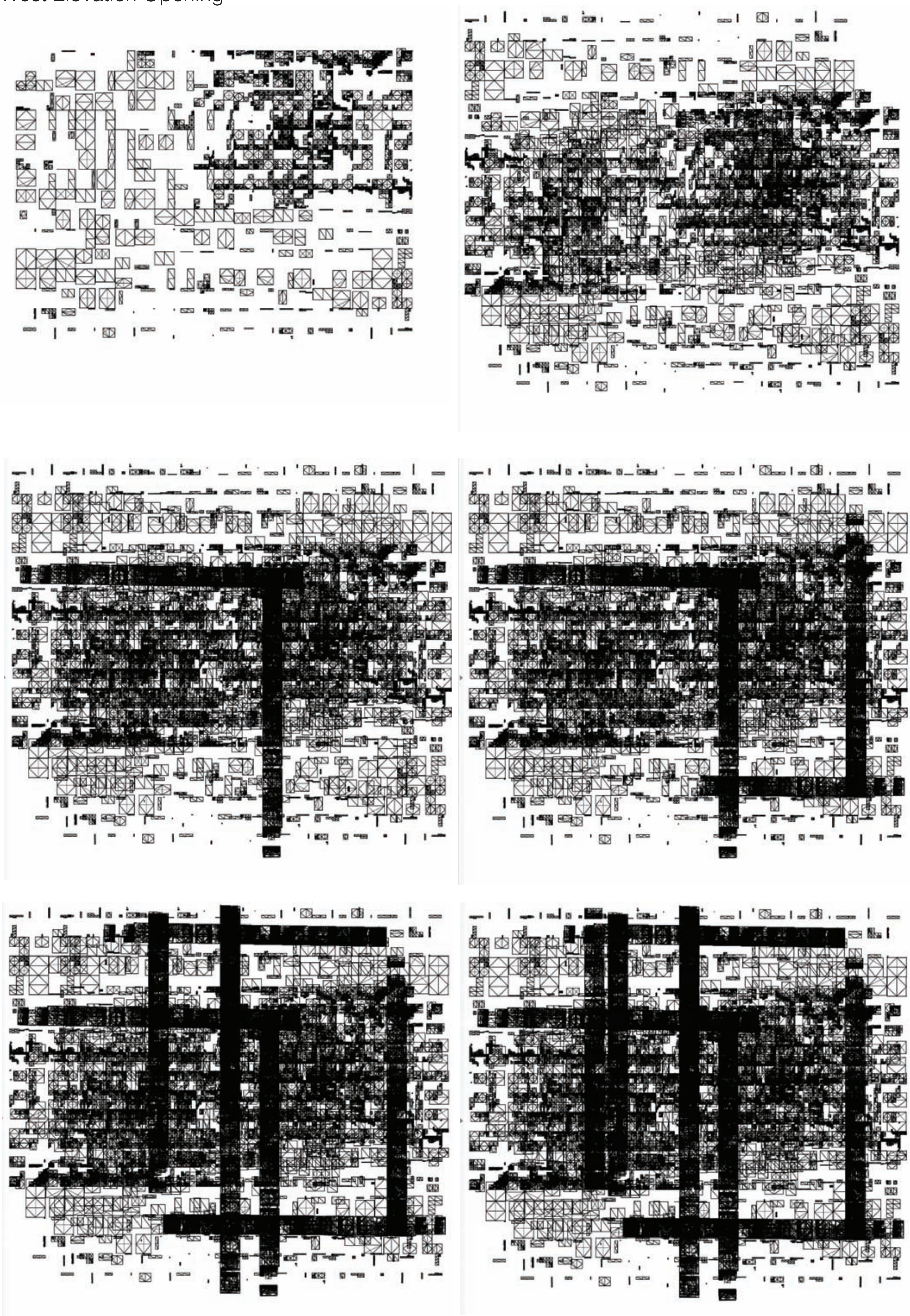
East Elevation Opening



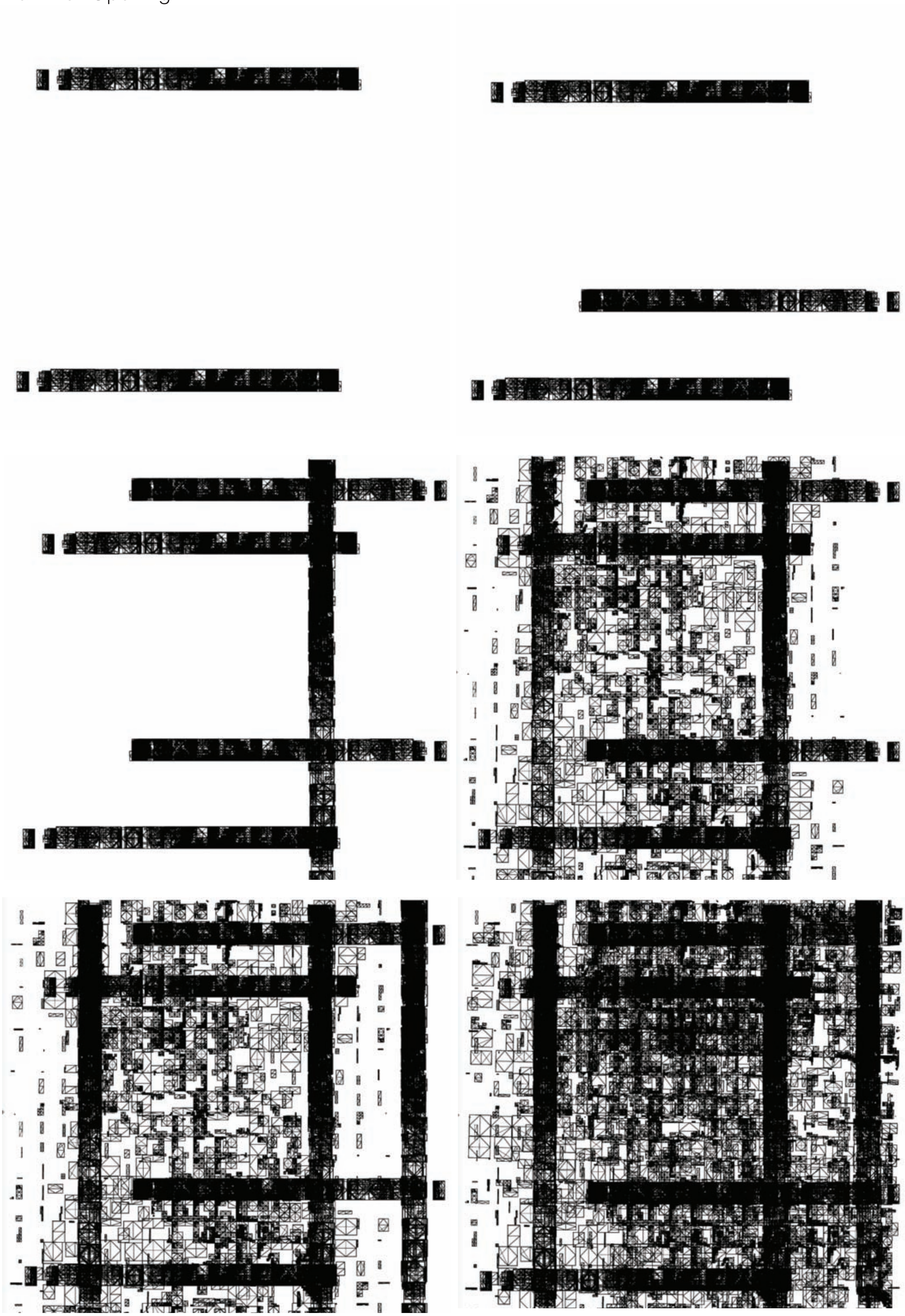
North Elevation Opening



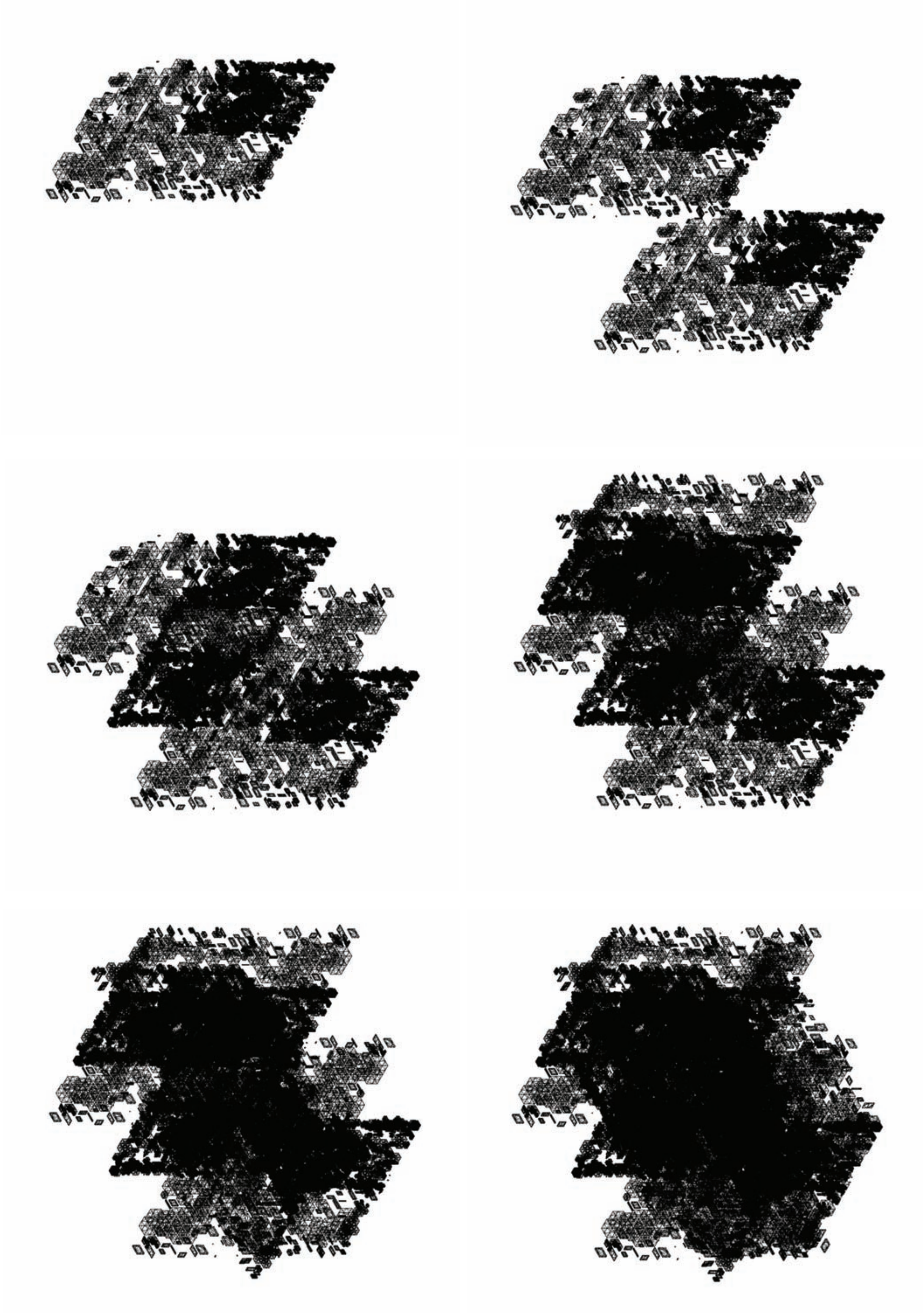
West Elevation Opening



Plan ViewOpening



Axonometric Opening



PACT CONFERENCE

This research was presented at Parallelism in Architecture, Environment and Computing Techniques (PACT) Conference 2016 held at the University of East London alongside key notes Patrik Schumacher, Mario Carpo, Jose Sanchez and Benjamin Dillenburger. The research was well received gaining some excellent feedback. Following the presentation, the paper was discussed by Gilles Retsin and Manuel Jimenez Garcia who provided some excellent precedents that contributed to inform the next steps of the research. Maria Alessandra Segantini (Director & Principal of C+S Architects and visiting professor at MIT) wrote to the author saying, "you were able to represent the power of parametric thinking far beyond its more formal interpretations… I wish you all the best for a very promising work." (Segantini, pers. Comm. 2016) The paper 'Digital Decay' (Haslop, 2016) is published in Taylor & Francis International Journal of Parallel, Emergent, and Distributed Systems (IJPEDS.)

Figure 5.59 Blaire Haslop (left) Patrik Schumacher (middle) Claudia Van Velthooven (right) attending PACT Conference, London, 2016.

Figure 5.60 Proceedings at PACT Conference, London 2016

REFLECTION

Following the PACT Conference presentation of the paper 'Digital Decay' (Haslop, 2016) large debate took place both during the discussion session and back in studio concerning the researches further progression. Many practical minded designers felt the research could lend itself to built environment situations where the methodology could be employed to solve or provide an alternative solution to real issues such as urban planning. The more theoritically minded designers strongly felt that the methodology needed to continue to be pushed in an experimental manner resulting in further digital design outcomes. Combining the two reflective perspectives the research intends to progress forward with the experimental design methodology of transformational change, however strongly focussing on digital architectural formal output. Animation is seen as a visualisation tool at the end of a design process, however for this research animation was employed as a tool contributing to the design process, just as Moleta argues in his CAADRIA paper 'Flowing through Space', game engines can be used for design ideation (Moleta, 2015). We take the learning from our moving digital experimentations and we solidy this into fixed digital architectural form through further design experimentation. The animation lacks authenticity due to there being no real formal outcome, we have moments that we capture and imagine to be inhibitabel space but the research now requires an architectural progression towards form while remaining in the digital realm.

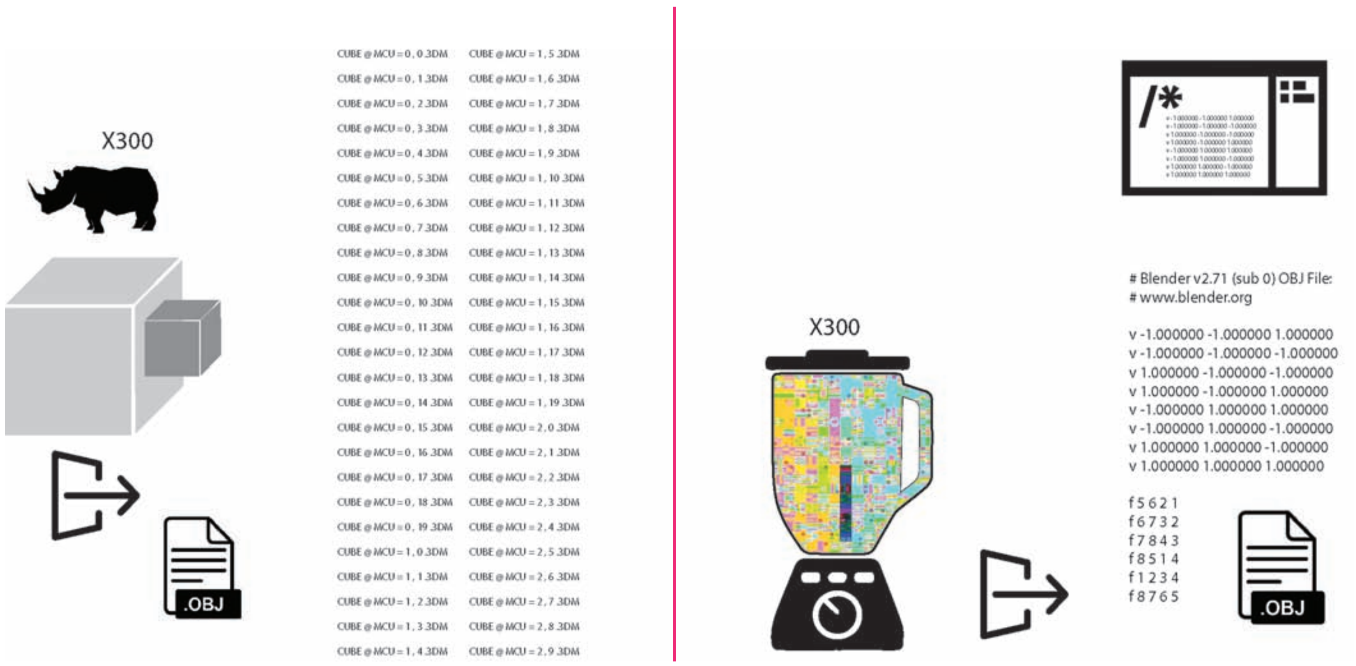
5A 29 29 28 A4 A4 A2 92 9B 4B 49 45 2D 34 D6 49 2C 56 7F 7F 3B F4 52 45 6C 60 9E 95 56 EE
DB CA 24 E3 11 C9 20 FF 00 C7 E1 3F FB 35 32 4E 3A D5 BB 78 CB 2B 30 AC AD 22 C8 B4 50
4D 28 C0 D8 1B 1E B8 FC EB 71 BA D4 36 6F FE 8B FE EE 10 7E 1C 54 ED FC EA 78 47 CB 5D
DE 9B 17 97 10 AC AB E9 06 F8 6D 81 FB C7 CD 97 FE B9 AF F8 D6 4E A3 21 82 D8 37 DD 69
DF 03 D9 7A D5 8D FE 7E A9 A8 67 A4 11 C5 0A FF 00 5A C9 D7 24 DD 71 0D BF FC F3 51 F9
91 41 A4 BA 93 E4 2F 4D 9C 04 D4 04 47 EE CB 04 7F F8 FA 7F 9E D5 8E C0 AB 10 7B 12 2B
5B 55 FD DE A1 17 FB 30 41 FA 25 53 BD 4C 4B BB B3 A8 6F F1 A4 AE 7A ED 7A D5 51 D4 57
57 6E CC A0 02 DE 62 60 15 6F E9 8A E4 AB 6F 4E 97 20 C6 DD BE E9 FE 86 9A 6B 22 51 DE
BA 10 D5 28 6A A1 9C 54 A1 E9 B5 52 AF 86 A9 05 51 12 8A 94 4C 29 69 B5 72 9F 9A A8 1E 9B
33 29 46 0D 20 4E 39 F7 14 D6 6D A2 80 B9 AD EB 7F BB 5A 31 8A E5 F4 AB B2 D9 84 E0 AC
63 E5 6F 6F 43 5D 2C 2F 53 21 C8 CD 31 C6 0D 6C 45 5A 29 58 8B 30 15 AD 6E FB 86 6A 4A 65
68 AA 8E 0F 19 1E DC D5 3D 5B 4C 4D 5F 4F B8 B0 95 CC 62 60 31 22 F5 46 07 20 D5 C5 35
38 A6 53 EB 9C F0 F7 87 FF 00 B0 C5 C0 33 89 CC C2 21 90 BB 7E E0 3D B2 7F 9D 74 D4 94
EA 4E B4 E1 5C D7 8A BF E4 14 47 F7 AE 22 1F CE B8 04 19 35 DE 78 B0 FF 00 C4 B6 2F 7B
C8 BF F4 17 AE 1D 78 19 A6 BF 4A 9A 05 DC F5 A3 6C D9 E2 B5 12 3A E7 AC 67 FD F6 3D EB
AC 5E 95 6A 1F BB 51 5C 8C 3D 44 47 15 97 3B 63 35 B2 DD 2B 2E E2 2D C0 9A 9E AB D6 2F
9C 45 49 E6 E6 B0 2E 6F 96 0F BD 9E 7A 01 D6 AA C7 AC 26 EC 32 B2 8F 5E B5 99 8A B1 5D
56 FA 5D D5 96 97 4A 7A 1A 9C 4D 9A 6D 2E 2A EE 6B AC B3 8D 60 B4 DA 2D 7E DD 34 D1 F9
97 11 E5 54 47 0F A1 27 3F 37 FB 3D 6B 8C 8D F9 CF 1F 2F 3C D7 49 61 7C 22 76 BA 9A 76 12
3F FC B2 0A 79 1B 70 B8 A7 AB 01 D6 93 DA B2 25 55 59 1B 66 42 1E 55 5B A8 1E 9F 85 57 DD
4C BB BC 96 49 A5 9A 78 FC BC 9F 95 07 61 E9 56 2C 2D AE EF 32 52 D9 64 8F AE E3 90 00
FA D3 23 91 65 3F 2D 39 90 A7 5A AD 2C 8B 10 05 98 2E 7D E9 20 92 29 4E 3C C5 03 D7 22 B4
DB 43 86 49 0C C5 E6 9B E5 DB B2 21 FB B5 FF 00 81 B6 6A D4 1A 2D 8C 59 D9 A5 C1 3B B0
F9 BC D9 DB 3B 7D DB 95 E3 D9 6A 6D 94 CC D5 08 59 55 3E FE E0 58 E2 B9 99 2F A7 B8 D4
6E 63 CE D1 E5 80 AB 9E 9B 7F AD 6D DD 43 15 A5 CD C4 10 49 BE DE 31 98 9B B8 27 92 BF
F0 1C F5 AA F2 E9 7E 4B E9 F3 AF 3B F7 89 CF 27 FD 68 CA 7D 39 A8 8E 64 3B 6B 6F 4B 83
CD EF 51 D8 8C 59 47 19 1F 31 9F F4 EB 57 CE 3C D5 4F 42 28 DB 82 83 FB A0 D4 3D 67 27
D1 6A C8 1B 46 2B B9 89 02 AE 05 72 DA 3B 79 B7 FA 8E 79 DD 39 3F F8 F9 FA D6 64 59 BD
D5 64 73 FF 00 3D FF 00 F1 D0 70 2A C6 8C F8 BE BE 3D BC A9 98 FE 04 E3 D6 9B A0 20 69
CB 9F F9 EC 7F F1 D2 4D 47 58 8C 77 81 1F BD 43 AA B6 FD 4A 63 D9 02 27 E5 4E BA 5C DB
43 27 A6 47 E1 8A 8E ED 7E 76 94 F5 95 D8 FE B5 7B 6E EB 2A 4A AA 53 74 8E 0D 73 F5 6E
D1 F6 CC BC E3 77 15 59 A9 B4 95 87 20 ED 5D 5E FA 5D F5 97 6C DB 94 12 6A DF 3D B1 4C
AA 26 A6 F3 87 F7 A9 7E D2 AB B7 9C EE 6D A2 B3 4D DC 49 21 47 46 18 F6 A9 8B 47 2B DB
05 EF 3A F3 52 28 DC 71 48 41 AD 2F B5 10 59 7C 8B 93 B0 FC D8 85 F8 A9 E4 BC 8A E7 2A
A8 72 91 60 E4 57 AB DA EA BA 22 59 23 47 3D AC 11 F0 3C A9 0A 24 9B CF F7 95 B0 49 CF 7A
87 50 97 46 DA 25 78 62 BF 91 7E 51 1D B8 56 5C B7 F7 8E 7C BE 00 FE 23 4A D1 AB 0C 52 64
AB 57 99 69 AF E5 C4 ED D9 DB F9 57 45 69 70 1B 35 CD EA BA 82 C9 3C AB 6F 05 8D 9C 48
7E 41 16 FD E4 7B FF 00 0F E9 D6 B3 A0 D5 A5 B7 FE 15 93 F3 14 83 0B D2 91 A3 66 E6 BB
B9 A4 F9 4D 69 58 6A 10 5B 41 BA EA E2 28 97 1D 5D 80 FC AB CC 26 D6 6F 26 1B 4C 82 35
F4 8F FC 6B 3C C9 B8 E5 BE 63 EA DC D1 E6 50 21 F5 AF 59 BA F1 B6 99 6E 08 B6 49 AF 5F
FD 91 B2 3F FB EC FF 00 85 3B 41 F1 9C 7A 9D E7 D8 AE AD 85 9C 92 FF 00 C7 BB 07 DC AC
7F B8 73 DF D2 BC 88 C9 42 C9 86 52 AC 55 D4 E5 59 78 60 47 A1 A4 DF 52 79 62 BE 99 A7 57
93 F8 7F C6 1A A3 DE 59 58 5E 08 AE E2 B8 99 20 12 63 64 EB BF 80 7F BA D8 FA 74 AF 58 A7
54 58 C5 72 7E 2D FF 00 8F 3B 55 FE F5 E2 FE 88 F5 C2 CC FB 12 BB 4F 16 BF 16 31 FF 00
B7 24 87 F2 00 57 9C DE CB DA A3 7F 4A BB 6C 36 A9 6A 92 C2 6F F4 BA F4 68 B0 63 43 FE
CD 79 56 9A F9 BD 5F 41 D6 BD 3A C9 B7 C4 BE D5 76 1E 95 46 73 96 AB 1B 77 75 AA 37 23
D2 B4 F9 C5 66 5C F7 A9 C5 57 AF 28 10 49 7B 72 E0 1F 95 7F 8C F4 02 AE 7F 66 44 38 CB B7
AB 13 8F C8 54 7F 68 F2 83 0B 75 C1 CF CE CC 3A D5 D4 9C CE 9F C5 BF D7 B0 AC EC D4
F5 01 88 5B C7 C4 87 0B EB E9 45 B5 D2 CB 2A 44 8E 0B 3B 00 3F 1A AD 78 5F CA 28 4E 78
AA 5A 54 72 CD 33 34 28 D2 34 48 CE 76 02 48 00 72 78 F4 14 9B 73 4E DD 5E 89 0E 89 73 73
34 B6 C2 48 B3 00 CB 31 2C 13 A7 1C E3 DE A2 B7 5B 98 D9 ED E5 78 EE 3C AC 6D 78 BE 61
8F 4D C6 A9 59 EA 57 96 D6 CF 0D B4 FB 5E 7F A3 6E DD C7 CC 5B DB BD 67 79 9A 96 9D 24
A4 5D 28 69 00 39 1F 32 91 DB 1C 70 2A 3F 95 87 35 5C 4F 86 E2 B6 AF 58 4A EB 6E 3A E3 96
FE EF FB 26 BA ED 36 EB C9 FB 15 AC 58 F2 C1 11 E0 7F 16 4F CC C6 BC C7 FB 45 FE 55 1F
78 92 F3 C8 DD 65 63 E9 FD D1 ED 5D 5F 85 66 F3 EF C0 CF FA 35 A4 6F 3F CD FC 27 A0 E7
F1 A7 41 0C 71 1F 96 AC 49 2B 49 D6 BD 1A EC 01 1F 00 F1 9F 95 7D FD 6B 90 BC BE 36 90

CHAPTER FIVE

MOVEMENT TO FORM

Stereoscopy works by having a left and right offset of the original form, left being red and right being cyan. Red and cyan are employed because they are chromatic opposites allowing the brain to merge the two offsets of opposing colours into one neutral form. When we datamoshed stereoscopic animation, we confused the brains spatial perception of depth by reconstructing the red and cyan offsets in an unexpected manner. This bring us to question how stereoscopic colours and methods can be again shifted to confuse the brains perception in the same way a glitch confuses the computers perception. We ask, how can the red and cyan stereoscopic offset methods be employed into solid digital architectural form to further shift perception?

Figure 6.61 Diagram explaining the design progress shifting from Rhino to .obj export format imported into Blender for vertices's shifts, again exported as .obj



With personal assistance from digital media artist Mark Klink, Blender was discovered as an open source 3d modeling program with the ability to export a specific output format resulting in a modestly unsophisticated codec using just vertices's and faces. (Klink, 2014) During this research we have found digital 3d files are commonly incredibly inflexible in terms of code manipulation due to exceptionally constricting codec systems. Exploiting this discovery, we employ a code simplification process by separating each unique 3d MCU cube created in GH into separate Rhinoceros files and then importing / exporting through Blender, resulting in 300 unique digital 3d files with the ability to be reinterpreted through code manipulation rather than through 3d modeling programs. An appreciation for unexpected outcome returns when manipulating the bones of the form through code variations as shifting numerical data is a blind process until the digital file is reopened revealing the form. The method stays true to the way in which glitch exists naturally within the digital realm in a fairly behind the scenes manner. Reiser & Umemoto write, "the architect is, in effect, neither a passive observer of determined systems nor a determined manipulator of passive material, but rather, the manager of an unfolding process." (Reiser + Umemoto, 2006) Each of the 300 unique cube .obj files go through the fabricated Blender import / export code simplification process to then be individually manipulated in a program called Hexfiend. Hexfiend allows specific numerals in the code to be swapped based on the co-ordinate location of the cube within the MCU grid plan system. Y co-ordinates are replaced with X co-ordinates for the red anaglyph and X co-ordinates are replaced with Y co-ordinates for the cyan. This creates a unique left and right offset per cube in the same way stereoscopic offset works, though the offsets are being determined by the cubes position in the original MCU grid plan instead of the conventional inter-axial separation of 6.5 (Autodesk, 2016.) E.g. if the cube is located in MCU grid (2,3) then two new forms are created; for the red form every 3 is replaced with a 2, and for the cyan every 2 is replaced with a 3.

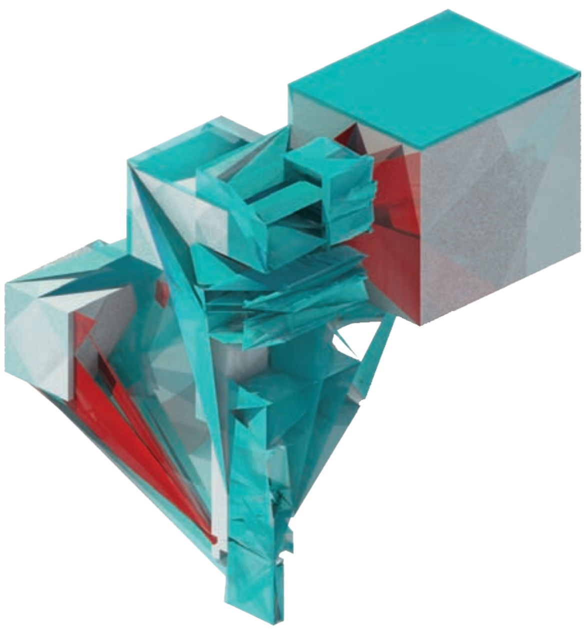
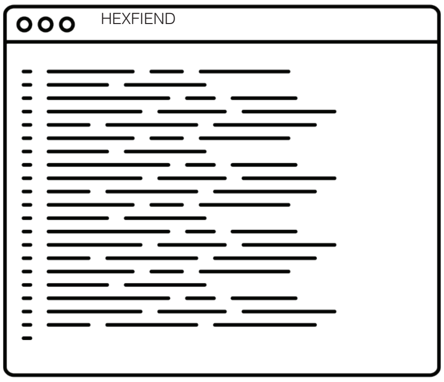
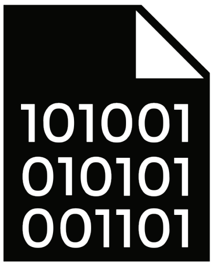
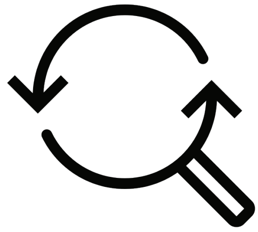


Figure 6.62 The following red and cyan forms are intended to be viewed with anaglyph glasses





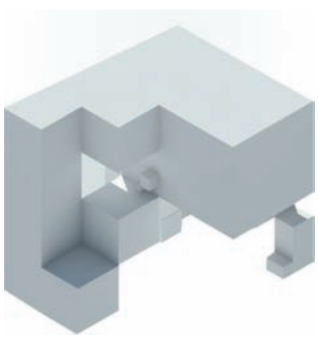


FIND: **Y** REPLACE: **X**

FIND: **X** REPLACE: **Y**

ORIGINAL HEX CODE OF FORM CO-ORDINATES 14,7

v	-20.777617	-3.921570	5.882353	v	5.457679	-3.921571	14.509803	v	-3.287419	-11.960786	14.509802	v	-2.740851	-6.936275	-0.588236
v	-20.777617	-3.921568	-2.745099	v	5.457679	-11.960786	14.509802	v	5.457679	-15.980394	14.509801	v	-2.740851	-5.931373	-0.588236
v	-12.032517	-3.921568	-2.745099	v	5.457679	-20.000002	10.196076	v	5.457679	-11.960786	14.509802	v	-3.287419	-5.931373	-0.588236
v	-12.032517	-3.921571	14.509803	v	5.457679	-20.000002	5.882350	v	5.457679	-20.000002	14.509801	v	-2.194282	-6.433824	-0.588236
v	-20.777617	-3.921571	14.509803	v	9.830228	-20.000002	5.882350	v	-3.287419	-5.931373	0.490195	v	-2.194282	-5.931373	-0.588236
v	-3.287419	-3.921570	5.882353	v	9.830228	-20.000002	14.509801	v	-3.287419	-5.931373	-0.588236	v	-2.194282	-6.936275	-0.588236
v	-3.287419	-3.921571	14.509803	v	5.457679	-20.000002	14.509801	v	-2.194282	-5.931373	-0.588236	v	-2.194282	-6.936275	-1.127452
v	-3.287419	-3.921568	-2.745099	v	14.202777	-20.000002	10.196076	v	-2.194282	-5.931373	1.568627	v	-2.194282	-6.936274	-1.666668
v	-3.287419	-3.921570	5.882353	v	14.202777	-20.000002	14.509801	v	-3.287419	-5.931373	1.568627	v	-1.647713	-6.936274	-1.666668
v	-3.287419	-3.921568	-2.745099	v	14.202777	-20.000002	5.882350	v	-1.101145	-5.931373	0.490195	v	-1.647713	-6.936275	-0.588236
v	-3.287419	4.117648	-2.745097	v	14.202777	-20.000002	10.196076	v	-1.101145	-5.931373	1.568627	v	-2.194282	-6.936275	-0.588236
v	-3.287419	4.117645	14.509805	v	14.202777	-20.000002	5.882350	v	-1.101145	-5.931373	-0.588236	v	-1.101145	-6.936275	-1.127452
v	-3.287419	-3.921571	14.509803	v	14.202777	-15.980393	5.882351	v	-1.101145	-5.931373	0.490195	v	-1.101145	-6.936275	-0.588236
v	-3.287419	12.156862	5.882355	v	14.202777	-15.980394	14.509801	v	-1.101145	-5.931373	-0.588236	v	-1.101145	-6.936274	-1.666668
v	-3.287419	12.156861	14.509806	v	14.202777	-20.000002	14.509801	v	-1.101145	-4.926471	-0.588236	v	-1.101145	-6.936275	-1.127452
v	-3.287419	12.156863	-2.745096	v	14.202777	-11.960786	10.196077	v	-1.101145	-4.926471	1.568627	v	-1.101145	-6.936274	-1.666668
v	-3.287419	12.156862	5.882355	v	14.202777	-11.960785	5.882351	v	-1.101145	-5.931373	1.568627	v	-1.101145	-6.433823	-1.666668
v	-3.287419	12.156863	-2.745096	v	14.202777	-11.960786	14.509802	v	-1.101145	-3.921569	0.490195	v	-1.101145	-6.433824	-0.588236
v	-12.032517	12.156863	-2.745096	v	14.202777	-11.960786	10.196077	v	-1.101145	-3.921569	-0.588236	v	-1.101145	-6.936275	-0.588236
v	-12.032517	12.156861	14.509806	v	14.202777	-11.960785	5.882351	v	-1.101145	-3.921569	1.568627	v	-1.101145	-5.931373	-1.127452
v	-3.287419	12.156861	14.509806	v	9.830228	-11.960785	5.882351	v	-1.101145	-3.921569	0.490195	v	-1.101145	-5.931373	-0.588236
v	-20.777617	12.156862	5.882355	v	9.830228	-11.960786	14.509802	v	-1.101145	-3.921569	-0.588236	v	-1.101145	-5.931372	-1.666668
v	-20.777617	12.156861	14.509806	v	14.202777	-11.960786	14.509802	v	-2.194282	-3.921569	-0.588236	v	-1.101145	-5.931373	-1.127452
v	-20.777617	12.156863	-2.745096	v	5.457679	-11.960786	10.196077	v	-2.194282	-3.921569	1.568627	v	-1.101145	-5.931372	-1.666668
v	-20.777617	12.156862	5.882355	v	5.457679	-11.960786	14.509802	v	-1.101145	-3.921569	1.568627	v	-1.647713	-5.931372	-1.666668
v	-20.777617	12.156863	-2.745096	v	5.457679	-11.960785	5.882351	v	-3.287419	-3.921569	0.490195	v	-1.647713	-5.931373	-0.588236
v	-20.777617	4.117648	-2.745097	v	5.457679	-11.960786	10.196077	v	-3.287419	-3.921569	1.568627	v	-1.101145	-5.931373	-0.588236
v	-20.777617	4.117645	14.509805	v	5.457679	-11.960785	5.882351	v	-3.287419	-3.921569	-0.588236	v	-2.194282	-5.931373	-1.127452
v	-20.777617	12.156861	14.509806	v	5.457679	-15.980393	5.882351	v	-3.287419	-3.921569	0.490195	v	-2.194282	-5.931373	-0.588236
v	-20.777617	-3.921570	5.882353	v	5.457679	-15.980394	14.509801	v	-3.287419	-3.921569	-0.588236	v	-2.194282	-5.931372	-1.666668
v	-20.777617	-3.921571	14.509803	v	5.457679	-11.960786	14.509802	v	-3.287419	-4.926471	-0.588236	v	-2.194282	-5.931373	-1.127452
v	-20.777617	-3.921568	-2.745099	v	5.457679	-20.000002	10.196076	v	-3.287419	-4.926471	1.568627	v	-2.194282	-5.931372	-1.666668
v	-12.032517	-3.921568	-2.745099	v	5.457679	-20.000002	5.882350	v	-3.287419	-3.921569	1.568627	v	-2.194282	-6.433823	-1.666668
v	-20.777617	-3.921568	-2.745099	v	5.457679	-20.000002	14.509801	v	-3.287419	-5.931373	0.490195	v	-2.194282	-6.433824	-0.588236
v	-20.777617	4.117648	-2.745097	v	9.830228	-20.000002	5.882350	v	-3.287419	-5.931373	-0.588236	v	-2.194282	-5.931373	-0.588236
v	-3.287419	4.117648	-2.745097	v	5.457679	-20.000002	5.882350	v	-3.287419	-5.931373	1.568627	v	-2.194282	-6.936275	-1.127452
v	-3.287419	-3.921568	-2.745099	v	5.457679	-15.980393	5.882351	v	-2.194282	-5.931373	-0.588236	v	-2.194282	-6.936275	-0.588236
v	-12.032517	12.156863	-2.745096	v	14.202777	-15.980393	5.882351	v	-3.287419	-5.931373	-0.588236	v	-2.194282	-6.936274	-1.666668
v	-3.287419	12.156863	-2.745096	v	14.202777	-20.000002	5.882350	v	-3.287419	-4.926471	-0.588236	v	-1.647713	-6.936274	-1.666668
v	-20.777617	12.156863	-2.745096	v	9.830228	-11.960785	5.882351	v	-1.101145	-4.926471	-0.588236	v	-2.194282	-6.936274	-1.666668
v	-20.777617	4.117645	14.509805	v	5.457679	-11.960785	5.882351	v	-1.101145	-5.931373	-0.588236	v	-2.194282	-6.433823	-1.666668
v	-20.777617	-3.921571	14.509803	v	14.202777	-11.960785	5.882351	v	-2.194282	-3.921569	-0.588236	v	-1.101145	-6.433823	-1.666668
v	-12.032517	-3.921571	14.509803	v	5.457679	-15.980394	14.509801	v	-3.287419	-3.921569	-0.588236	v	-1.101145	-6.936274	-1.666668
v	-12.032517	12.156861	14.509806	v	5.457679	-20.000002	14.509801	v	-1.101145	-3.921569	-0.588236	v	-1.647713	-5.931372	-1.666668
v	-20.777617	12.156861	14.509806	v	9.830228	-20.000002	14.509801	v	-3.287419	-4.926471	1.568627	v	-1.101145	-5.931372	-1.666668
v	-3.287419	4.117645	14.509805	v	9.830228	-11.960786	14.509802	v	-3.287419	-5.931373	1.568627	v	-2.194282	-5.931372	-1.666668
v	-3.287419	12.156861	14.509806	v	5.457679	-11.960786	14.509802	v	-2.194282	-5.931373	1.568627	v	-2.194282	-6.433824	-0.588236
v	-3.287419	-3.921571	14.509803	v	14.202777	-15.980394	14.509801	v	-2.194282	-3.921569	1.568627	v	-2.194282	-6.936275	-0.588236
v	-3.287419	-11.960786	10.196077	v	14.202777	-11.960786	14.509802	v	-3.287419	-3.921569	1.568627	v	-1.647713	-6.936275	-0.588236
v	-3.287419	-11.960785	5.882351	v	14.202777	-20.000002	14.509801	v	-1.101145	-4.926471	1.568627	v	-1.647713	-5.931373	-0.588236
v	1.085130	-11.960785	5.882351	v	-3.287419	-20.000002	10.196076	v	-1.101145	-3.921569	1.568627	v	-2.194282	-5.931373	-0.588236
v	1.085130	-11.960786	14.509802	v	-3.287419	-20.000002	5.882350	v	-1.101145	-5.931373	1.568627	v	-1.101145	-6.433824	-0.588236
v	-3.287419	-11.960786	14.509802	v	1.085130	-20.000002	5.882350	v	-3.287419	-6.936275	-1.127452	v	-1.101145	-5.931373	-0.588236
v	5.457679	-11.960786	10.196077	v	1.085130	-20.000002	14.509801	v	-3.287419	-6.936274	-1.666668	v	-1.101145	-6.936275	-0.588236
v	5.457679	-11.960786	14.509802	v	-3.287419	-20.000002	14.509801	v	-2.740851	-6.936274	-1.666668	v	-3.287419	-7.941176	-2.205884
v	5.457679	-11.960785	5.882351	v	5.457679	-20.000002	10.196076	v	-2.740851	-6.936275	-0.588236	v	-3.287419	-7.941176	-2.745099
v	5.457679	-11.960786	10.196077	v	5.457679	-20.000002	14.509801	v	-3.287419	-6.936275	-0.588236	v	-2.740851	-7.941176	-2.745099
v	5.457679	-11.960785	5.882351	v	5.457679	-20.000002	5.882350	v	-2.194282	-6.936275	-1.127452	v	-2.740851	-7.941176	-1.666668
v	5.457679	-7.941177	5.882352	v	5.457679	-20.000002	10.196076	v	-2.194282	-6.936275	-0.588236	v	-3.287419	-7.941176	-1.666668
v	5.457679	-7.941179	14.509803	v	5.457679	-20.000002	5.882350	v	-2.194282	-6.936274	-1.666668	v	-2.194282	-7.941176	-2.205884
v	5.457679	-11.960786	14.509802	v	5.457679	-15.980393	5.882351	v	-2.194282	-6.936275	-1.127452	v	-2.194282	-7.941176	-1.666668
v	5.457679	-3.921570	10.196078	v	5.457679	-15.980394	14.509801	v	-2.194282	-6.936274	-1.666668	v	-2.194282	-7.941176	-2.745099
v	5.457679	-3.921571	14.509803	v	5.457679	-20.000002	14.509801	v	-2.194282	-6.433823	-1.666668	v	-2.194282	-7.941176	-2.205884
v	5.457679	-3.921570	5.882353	v	5.457679	-11.960786	10.196077	v	-2.194282	-6.433824	-0.588236	v	-2.194282	-7.941176	-2.745099
v	5.457679	-3.921570	10.196078	v	5.457679	-11.960785	5.882351	v	-2.194282	-6.936275	-0.588236	v	-2.194282	-7.438725	-2.745099
v	5.457679	-3.921570	5.882353	v	5.457679	-11.960786	14.509802	v	-2.194282	-5.931373	-1.127452	v	-2.194282	-7.438725	-1.666668
v	1.085130	-3.921570	5.882353	v	5.457679	-11.960786	10.196077	v	-2.194282	-5.931373	-0.588236	v	-2.194282	-7.941176	-1.666668
v	1.085130	-3.921571	14.509803	v	5.457679	-11.960785	5.882351	v	-2.194282	-5.931372	-1.666668	v	-2.194282	-6.936274	-2.205884
v	5.457679	-3.921571	14.509803	v	1.085130	-11.960785	5.882351	v	-2.194282	-5.931373	-1.127452	v	-2.194282	-6.936274	-1.666668
v	-3.287419	-3.921570	10.196078	v	1.085130	-11.960786	14.509802	v	-2.194282	-5.931372	-1.666668	v	-2.194282	-6.936274	-2.745099
v	-3.287419	-3.921571	14.509803	v	5.457679	-11.960786	14.509802	v	-2.740851	-5.931372	-1.666668	v	-2.194282	-6.936274	-2.205884
v	-3.287419	-3.921570	5.882353	v	-3.287419	-11.960786	10.196077	v	-2.740851	-5.931373	-0.588236	v	-2.194282	-6.936274	-2.745099
v	-3.287419	-3.921570	10.196078	v	-3.287419	-11.960786	14.509802	v	-2.194282	-5.931373	-0.588236	v	-2.740851	-6.936274	-2.745099
v	-3.287419	-3.921570	5.882353	v	-3.287419	-11.960785	5.882351	v	-3.287419	-5.931373	-1.127452	v	-2.740851	-6.936274	-1.666668
v	-3.287419	-7.941177	5.882352	v	-3.287419	-11.960786	10.196077	v	-3.287419	-5.931373	-0.588236	v	-2.194282	-6.936274	-1.666668
v	-3.287419	-7.941179	14.509803	v	-3.287419	-11.960785	5.882351	v	-3.287419	-5.931372	-1.666668	v	-3.287419	-6.936274	-2.205884
v	-3.287419	-3.921571	14.509803	v	-3.287419	-15.980393	5.882351	v	-3.287419	-5.931373	-1.127452	v	-3.287419	-6.936274	-1.666668
v	-3.287419	-11.960786	10.196077	v	-3.287419	-15.980394	14.509801	v	-3.287419	-5.931372	-1.666668	v	-3.287419	-6.936274	-2.745099
v	-3.287419	-11.960786	14.509802	v	-3.287419	-11.960786	14.509802	v	-3.287419	-6.433823	-1.666668	v	-3.287419	-6.936274	-2.205884
v	-3.287419	-11.960785	5.882351	v	-3.287419	-20.000002	10.196076	v	-3.287419	-6.433824	-0.588236	v	-3.287419	-6.936274	-2.745099
v	1.085130	-11.960785	5.882351	v	-3.287419	-20.000002	5.882350	v	-3.287419	-5.931373	-0.588236	v	-3.287419	-7.438725	-2.745099
v	-3.287419	-11.960785	5.882351	v	-3.287419	-20.000002	14.509801	v	-3.287419	-6.936275	-1.127452	v	-3.287419	-7.438725	-1.666668
v	-3.287419	-7.941177	5.882352	v	1.085130	-20.000002	5.882350	v	-3.287419	-6.936275	-0.588236	v	-3.287419	-6.936274	-1.666668
v	5.457679	-7.941177	5.882352	v	-3.287419	-20.000002	5.882350	v	-3.287419	-6.936274	-1.666668	v	-3.287419	-7.941176	-2.205884
v	5.457679	-11.960785	5.882351	v	-3.287419	-15.980393	5.882351	v	-2.740851	-6.936274	-1.666668	v	-3.287419	-7.941176	-1.666668
v	1.085130	-3.921570	5.882353	v	5.457679	-15.980393	5.882351	v	-3.287419	-6.936274	-1.666668	v	-3.287419	-7.941176	-2.745099
v	5.457679	-3.921570	5.882353	v	5.457679	-20.000002	5.882350	v	-3.287419	-6.433823	-1.666668	v	-2.740851	-7.941176	-2.745099
v	-3.287419	-3.921570	5.882353	v	1.085130	-11.960785	5.882351	v	-2.194282	-6.433823	-1.666668	v	-3.287419	-7.941176	-2.745099
v	-3.287419	-7.941179	14.509803	v	-3.287419	-11.960785	5.882351	v	-2.194282	-6.936274	-1.666668	v	-3.287419	-7.438725	-2.745099
v	-3.287419	-11.960786	14.509802	v	5.457679	-11.960785	5.882351	v	-2.740851	-5.931372	-1.666668	v	-2.194282	-7.438725	-2.745099
v	1.085130	-11.960786	14.509802	v	-3.287419	-15.980394	14.509801	v	-2.194282	-5.931372	-1.666668	v	-2.194282	-7.941176	-2.745099
v	1.085130	-3.921571	14.509803	v	-3.287419	-20.000002	14.509801	v	-3.287419	-5.931372	-1.666668	v	-2.740851	-6.936274	-2.745099
v	-3.287419	-3.921571	14.509803	v	1.085130	-20.000002	14.509801	v	-3.287419	-6.433824	-0.588236	v	-2.194282	-6.936274	-2.745099
v	5.457679	-7.941179	14.509803	v	1.085130	-11.960786	14.509802	v	-3.287419	-6.936275	-0.588236	v	-3.287419	-6.936274	-2.745099



REPLACE EVERY 14 REPLACED WITH 7

v	-20.777617	-3.921570	5.882353	v	5.457679	-7.941179	7.509803	v	1.085130	-20.000002	7.509801	v	-3.287419	-5.931372	-1.666668
v	-20.777617	-3.921568	-2.745099	v	5.457679	-3.921571	7.509803	v	1.085130	-11.960786	7.509802	v	-3.287419	-6.433824	-0.588236
v	-12.032517	-3.921568	-2.745099	v	5.457679	-11.960786	7.509802	v	-3.287419	-11.960786	7.509802	v	-3.287419	-6.936275	-0.588236
v	-12.032517	-3.921571	7.509803	v	5.457679	-20.000002	10.196076	v	5.457679	-15.980394	7.509801	v	-2.740851	-6.936275	-0.588236
v	-20.777617	-3.921571	7.509803	v	5.457679	-20.000002	5.882350	v	5.457679	-11.960786	7.509802	v	-2.740851	-5.931373	-0.588236
v	-3.287419	-3.921570	5.882353	v	9.830228	-20.000002	5.882350	v	5.457679	-20.000002	7.509801	v	-3.287419	-5.931373	-0.588236
v	-3.287419	-3.921571	7.509803	v	9.830228	-20.000002	7.509801	v	-3.287419	-5.931373	0.490195	v	-2.194282	-6.433824	-0.588236
v	-3.287419	-3.921568	-2.745099	v	5.457679	-20.000002	7.509801	v	-3.287419	-5.931373	-0.588236	v	-2.194282	-5.931373	-0.588236
v	-3.287419	-3.921570	5.882353	v	7.202777	-20.000002	10.196076	v	-2.194282	-5.931373	-0.588236	v	-2.194282	-6.936275	-0.588236
v	-3.287419	-3.921568	-2.745099	v	7.202777	-20.000002	7.509801	v	-2.194282	-5.931373	1.568627	v	-2.194282	-6.936275	-1.127452
v	-3.287419	4.117648	-2.745097	v	7.202777	-20.000002	5.882350	v	-3.287419	-5.931373	1.568627	v	-2.194282	-6.936274	-1.666668
v	-3.287419	4.117645	7.509805	v	7.202777	-20.000002	10.196076	v	-1.10175	-5.931373	0.490195	v	-1.647713	-6.936274	-1.666668
v	-3.287419	-3.921571	7.509803	v	7.202777	-20.000002	5.882350	v	-1.10175	-5.931373	1.568627	v	-1.647713	-6.936275	-0.588236
v	-3.287419	12.156862	5.882355	v	7.202777	-15.980393	5.882351	v	-1.10175	-5.931373	-0.588236	v	-2.194282	-6.936275	-0.588236
v	-3.287419	12.156861	7.509806	v	7.202777	-15.980394	7.509801	v	-1.10175	-5.931373	0.490195	v	-1.10175	-6.936275	-1.127452
v	-3.287419	12.156863	-2.745096	v	7.202777	-20.000002	7.509801	v	-1.10175	-5.931373	-0.588236	v	-1.10175	-6.936275	-0.588236
v	-3.287419	12.156862	5.882355	v	7.202777	-11.960786	10.196077	v	-1.10175	-4.926471	-0.588236	v	-1.10175	-6.936274	-1.666668
v	-3.287419	12.156863	-2.745096	v	7.202777	-11.960785	5.882351	v	-1.10175	-4.926471	1.568627	v	-1.10175	-6.936275	-1.127452
v	-12.032517	12.156863	-2.745096	v	7.202777	-11.960786	7.509802	v	-1.10175	-5.931373	1.568627	v	-1.10175	-6.936274	-1.666668
v	-12.032517	12.156861	7.509806	v	7.202777	-11.960786	10.196077	v	-1.10175	-3.921569	0.490195	v	-1.10175	-6.433823	-1.666668
v	-3.287419	12.156861	7.509806	v	7.202777	-11.960785	5.882351	v	-1.10175	-3.921569	-0.588236	v	-1.10175	-6.433824	-0.588236
v	-20.777617	12.156862	5.882355	v	9.830228	-11.960785	5.882351	v	-1.10175	-3.921569	1.568627	v	-1.10175	-6.936275	-0.588236
v	-20.777617	12.156861	7.509806	v	9.830228	-11.960786	7.509802	v	-1.10175	-3.921569	0.490195	v	-1.10175	-5.931373	-1.127452
v	-20.777617	12.156863	-2.745096	v	7.202777	-11.960786	7.509802	v	-1.10175	-3.921569	-0.588236	v	-1.10175	-5.931373	-0.588236
v	-20.777617	12.156862	5.882355	v	5.457679	-11.960786	10.196077	v	-2.194282	-3.921569	-0.588236	v	-1.10175	-5.931372	-1.666668
v	-20.777617	12.156863	-2.745096	v	5.457679	-11.960786	7.509802	v	-2.194282	-3.921569	1.568627	v	-1.10175	-5.931373	-1.127452
v	-20.777617	4.117648	-2.745097	v	5.457679	-11.960785	5.882351	v	-1.10175	-3.921569	1.568627	v	-1.10175	-5.931372	-1.666668
v	-20.777617	4.117645	7.509805	v	5.457679	-11.960786	10.196077	v	-3.287419	-3.921569	0.490195	v	-1.647713	-5.931372	-1.666668
v	-20.777617	12.156861	7.509806	v	5.457679	-11.960785	5.882351	v	-3.287419	-3.921569	1.568627	v	-1.647713	-5.931373	-0.588236
v	-20.777617	-3.921570	5.882353	v	5.457679	-15.980393	5.882351	v	-3.287419	-3.921569	-0.588236	v	-1.10175	-5.931373	-0.588236
v	-20.777617	-3.921571	7.509803	v	5.457679	-15.980394	7.509801	v	-3.287419	-3.921569	0.490195	v	-2.194282	-5.931373	-1.127452
v	-20.777617	-3.921568	-2.745099	v	5.457679	-11.960786	7.509802	v	-3.287419	-3.921569	-0.588236	v	-2.194282	-5.931373	-0.588236
v	-12.032517	-3.921568	-2.745099	v	5.457679	-20.000002	10.196076	v	-3.287419	-4.926471	-0.588236	v	-2.194282	-5.931372	-1.666668
v	-20.777617	-3.921568	-2.745099	v	5.457679	-20.000002	5.882350	v	-3.287419	-4.926471	1.568627	v	-2.194282	-5.931373	-1.127452
v	-20.777617	4.117648	-2.745097	v	5.457679	-20.000002	7.509801	v	-3.287419	-3.921569	1.568627	v	-2.194282	-5.931372	-1.666668
v	-3.287419	4.117648	-2.745097	v	9.830228	-20.000002	5.882350	v	-3.287419	-5.931373	0.490195	v	-2.194282	-6.433823	-1.666668
v	-3.287419	-3.921568	-2.745099	v	5.457679	-20.000002	5.882350	v	-3.287419	-5.931373	-0.588236	v	-2.194282	-6.433824	-0.588236
v	-12.032517	12.156863	-2.745096	v	5.457679	-15.980393	5.882351	v	-3.287419	-5.931373	1.568627	v	-2.194282	-5.931373	-0.588236
v	-3.287419	12.156863	-2.745096	v	7.202777	-15.980393	5.882351	v	-2.194282	-5.931373	-0.588236	v	-2.194282	-6.936275	-1.127452
v	-20.777617	12.156863	-2.745096	v	7.202777	-20.000002	5.882350	v	-3.287419	-5.931373	-0.588236	v	-2.194282	-6.936275	-0.588236
v	-20.777617	4.117645	7.509805	v	9.830228	-11.960785	5.882351	v	-3.287419	-4.926471	-0.588236	v	-2.194282	-6.936274	-1.666668
v	-20.777617	-3.921571	7.509803	v	5.457679	-11.960785	5.882351	v	-1.10175	-4.926471	-0.588236	v	-1.647713	-6.936274	-1.666668
v	-12.032517	-3.921571	7.509803	v	7.202777	-11.960785	5.882351	v	-1.10175	-5.931373	-0.588236	v	-2.194282	-6.936274	-1.666668
v	-12.032517	12.156861	7.509806	v	5.457679	-15.980394	7.509801	v	-2.194282	-3.921569	-0.588236	v	-2.194282	-6.433823	-1.666668
v	-20.777617	12.156861	7.509806	v	5.457679	-20.000002	7.509801	v	-3.287419	-3.921569	-0.588236	v	-1.10175	-6.433823	-1.666668
v	-3.287419	4.117645	7.509805	v	9.830228	-20.000002	7.509801	v	-1.10175	-3.921569	-0.588236	v	-1.10175	-6.936274	-1.666668
v	-3.287419	12.156861	7.509806	v	9.830228	-11.960786	7.509802	v	-3.287419	-4.926471	1.568627	v	-1.647713	-5.931372	-1.666668
v	-3.287419	-3.921571	7.509803	v	5.457679	-11.960786	7.509802	v	-3.287419	-5.931373	1.568627	v	-1.10175	-5.931372	-1.666668
v	-3.287419	-11.960786	10.196077	v	7.202777	-15.980394	7.509801	v	-2.194282	-5.931373	1.568627	v	-2.194282	-5.931372	-1.666668
v	-3.287419	-11.960785	5.882351	v	7.202777	-11.960786	7.509802	v	-2.194282	-3.921569	1.568627	v	-2.194282	-6.433824	-0.588236
v	1.085130	-11.960785	5.882351	v	7.202777	-20.000002	7.509801	v	-3.287419	-3.921569	1.568627	v	-2.194282	-6.936275	-0.588236
v	1.085130	-11.960786	7.509802	v	-3.287419	-20.000002	10.196076	v	-1.10175	-4.926471	1.568627	v	-1.647713	-6.936275	-0.588236
v	-3.287419	-11.960786	7.509802	v	-3.287419	-20.000002	5.882350	v	-1.10175	-3.921569	1.568627	v	-1.647713	-5.931373	-0.588236
v	5.457679	-11.960786	10.196077	v	1.085130	-20.000002	5.882350	v	-1.10175	-5.931373	1.568627	v	-2.194282	-5.931373	-0.588236
v	5.457679	-11.960786	7.509802	v	1.085130	-20.000002	7.509801	v	-3.287419	-6.936275	-1.127452	v	-1.10175	-6.433824	-0.588236
v	5.457679	-11.960785	5.882351	v	-3.287419	-20.000002	7.509801	v	-3.287419	-6.936274	-1.666668	v	-1.10175	-5.931373	-0.588236
v	5.457679	-11.960786	10.196077	v	5.457679	-20.000002	10.196076	v	-2.740851	-6.936274	-1.666668	v	-1.10175	-6.936275	-0.588236
v	5.457679	-11.960785	5.882351	v	5.457679	-20.000002	7.509801	v	-2.740851	-6.936275	-0.588236	v	-3.287419	-7.941176	-2.205884
v	5.457679	-7.941177	5.882352	v	5.457679	-20.000002	5.882350	v	-3.287419	-6.936275	-0.588236	v	-3.287419	-7.941176	-2.745099
v	5.457679	-7.941179	7.509803	v	5.457679	-20.000002	10.196076	v	-2.194282	-6.936275	-1.127452	v	-2.740851	-7.941176	-2.745099
v	5.457679	-11.960786	7.509802	v	5.457679	-20.000002	5.882350	v	-2.194282	-6.936275	-0.588236	v	-2.740851	-7.941176	-1.666668
v	5.457679	-3.921570	10.196078	v	5.457679	-15.980393	5.882351	v	-2.194282	-6.936274	-1.666668	v	-3.287419	-7.941176	-1.666668
v	5.457679	-3.921571	7.509803	v	5.457679	-15.980394	7.509801	v	-2.194282	-6.936275	-1.127452	v	-2.194282	-7.941176	-2.205884
v	5.457679	-3.921570	5.882353	v	5.457679	-20.000002	7.509801	v	-2.194282	-6.936274	-1.666668	v	-2.194282	-7.941176	-1.666668
v	5.457679	-3.921570	10.196078	v	5.457679	-11.960786	10.196077	v	-2.194282	-6.433823	-1.666668	v	-2.194282	-7.941176	-2.745099
v	5.457679	-3.921570	5.882353	v	5.457679	-11.960785	5.882351	v	-2.194282	-6.433824	-0.588236	v	-2.194282	-7.941176	-2.205884
v	1.085130	-3.921570	5.882353	v	5.457679	-11.960786	7.509802	v	-2.194282	-6.936275	-0.588236	v	-2.194282	-7.941176	-2.745099
v	1.085130	-3.921571	7.509803	v	5.457679	-11.960786	10.196077	v	-2.194282	-5.931373	-1.127452	v	-2.194282	-7.438725	-2.745099
v	5.457679	-3.921571	7.509803	v	5.457679	-11.960785	5.882351	v	-2.194282	-5.931373	-0.588236	v	-2.194282	-7.438725	-1.666668
v	-3.287419	-3.921570	10.196078	v	1.085130	-11.960785	5.882351	v	-2.194282	-5.931372	-1.666668	v	-2.194282	-7.941176	-1.666668
v	-3.287419	-3.921571	7.509803	v	1.085130	-11.960786	7.509802	v	-2.194282	-5.931373	-1.127452	v	-2.194282	-6.936274	-2.205884
v	-3.287419	-3.921570	5.882353	v	5.457679	-11.960786	7.509802	v	-2.194282	-5.931372	-1.666668	v	-2.194282	-6.936274	-1.666668
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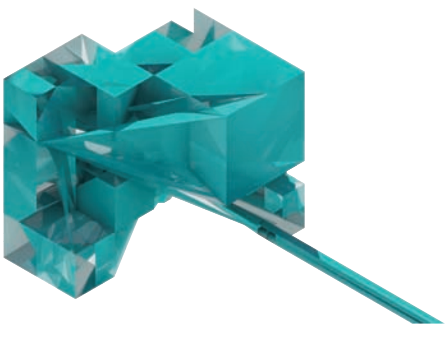
v	-3.287419	-3.921570	5.882353	v	-3.287419	-11.960786	7.509802	v	-2.740851	-5.931373	-0.588236	v	-2.194282	-6.936274	-2.205884
v	-3.287419	-7.941177	5.882352	v	-3.287419	-11.960785	5.882351	v	-2.194282	-5.931373	-0.588236	v	-2.194282	-6.936274	-2.745099
v	-3.287419	-7.941179	7.509803	v	-3.287419	-11.960786	10.196077	v	-3.287419	-5.931373	-1.127452	v	-2.740851	-6.936274	-2.745099
v	-3.287419	-3.921571	7.509803	v	-3.287419	-11.960785	5.882351	v	-3.287419	-5.931373	-0.588236	v	-2.740851	-6.936274	-1.666668
v	-3.287419	-11.960786	10.196077	v	-3.287419	-15.980393	5.882351	v	-3.287419	-5.931372	-1.666668	v	-2.194282	-6.936274	-1.666668
v	-3.287419	-11.960786	7.509802	v	-3.287419	-15.980394	7.509801	v	-3.287419	-5.931373	-1.127452	v	-3.287419	-6.936274	-2.205884
v	-3.287419	-11.960785	5.882351	v	-3.287419	-11.960786	7.509802	v	-3.287419	-5.931372	-1.666668	v	-3.287419	-6.936274	-1.666668
v	1.085130	-11.960785	5.882351	v	-3.287419	-20.000002	10.196076	v	-3.287419	-6.433823	-1.666668	v	-3.287419	-6.936274	-2.745099
v	-3.287419	-11.960785	5.882351	v	-3.287419	-20.000002	5.882350	v	-3.287419	-6.433824	-0.588236	v	-3.287419	-6.936274	-2.205884
v	-3.287419	-7.941177	5.882352	v	-3.287419	-20.000002	7.509801	v	-3.287419	-5.931373	-0.588236	v	-3.287419	-6.936274	-2.745099
v	5.457679	-7.941177	5.882352	v	1.085130	-20.000002	5.882350	v	-3.287419	-6.936275	-1.127452	v	-3.287419	-7.438725	-2.745099
v	5.457679	-11.960785	5.882351	v	-3.287419	-20.000002	5.882350	v	-3.287419	-6.936275	-0.588236	v	-3.287419	-7.438725	-1.666668
v	1.085130	-3.921570	5.882353	v	-3.287419	-15.980393	5.882351	v	-3.287419	-6.936274	-1.666668	v	-3.287419	-6.936274	-1.666668
v	5.457679	-3.921570	5.882353	v	5.457679	-15.980393	5.882351	v	-2.740851	-6.936274	-1.666668	v	-3.287419	-7.941176	-2.205884
v	-3.287419	-3.921570	5.882353	v	5.457679	-20.000002	5.882350	v	-3.287419	-6.936274	-1.666668	v	-3.287419	-7.941176	-1.666668
v	-3.287419	-7.941179	7.509803	v	1.085130	-11.960785	5.882351	v	-3.287419	-6.433823	-1.666668	v	-3.287419	-7.941176	-2.745099
v	-3.287419	-11.960786	7.509802	v	-3.287419	-11.960785	5.882351	v	-2.194282	-6.433823	-1.666668	v	-2.740851	-7.941176	-2.745099
v	1.085130	-11.960786	7.509802	v	5.457679	-11.960785	5.882351	v	-2.194282	-6.936274	-1.666668	v	-3.287419	-7.941176	-2.745099
v	1.085130	-3.921571	7.509803	v	-3.287419	-15.980394	7.509801	v	-2.740851	-5.931372	-1.666668	v	-3.287419	-7.438725	-2.745099
v	-3.287419	-3.921571	7.509803	v	-3.287419	-20.000002	7.509801	v	-2.194282	-5.931372	-1.666668	v	-2.194282	-7.438725	-2.745099



REPLACE EVERY 7 REPLACED WITH

v	-20.1414146114	-3.9215140	5.882353	v	5.45146149	-14.9411149	14.509803	v	1.085130	-20.000002	14.509801	v	-3.2814419	-5.9313142	-1.666668
v	-20.1414146114	-3.921568	-2.1445099	v	5.45146149	-3.9215141	14.509803	v	1.085130	-11.9601486	14.509802	v	-3.2814419	-6.433824	-0.588236
v	-12.0325114	-3.921568	-2.1445099	v	5.45146149	-11.9601486	14.509802	v	-3.2814419	-11.9601486	14.509802	v	-3.2814419	-6.9362145	-0.588236
v	-12.0325114	-3.9215141	14.509803	v	5.45146149	-20.000002	10.1960146	v	5.45146149	-15.980394	14.509801	v	-2.1440851	-6.9362145	-0.588236
v	-20.1414146114	-3.9215141	14.509803	v	5.45146149	-20.000002	5.882350	v	5.45146149	-11.9601486	14.509802	v	-2.1440851	-5.9313143	-0.588236
v	-3.2814419	-3.9215140	5.882353	v	9.830228	-20.000002	5.882350	v	5.45146149	-20.000002	14.509801	v	-3.2814419	-5.9313143	-0.588236
v	-3.2814419	-3.9215141	14.509803	v	9.830228	-20.000002	14.509801	v	-3.2814419	-5.9313143	0.490195	v	-2.194282	-6.433824	-0.588236
v	-3.2814419	-3.921568	-2.1445099	v	5.45146149	-20.000002	14.509801	v	-3.2814419	-5.9313143	-0.588236	v	-2.194282	-5.9313143	-0.588236
v	-3.2814419	-3.9215140	5.882353	v	14.202141414	-20.000002	10.1960146	v	-2.194282	-5.9313143	-0.588236	v	-2.194282	-6.9362145	-0.588236
v	-3.2814419	-3.921568	-2.1445099	v	14.202141414	-20.000002	14.509801	v	-2.194282	-5.9313143	1.5686214	v	-2.194282	-6.9362145	-1.1214452
v	-3.2814419	4.1114648	-2.14450914	v	14.202141414	-20.000002	5.882350	v	-3.2814419	-5.9313143	1.5686214	v	-2.194282	-6.9362144	-1.666668
v	-3.2814419	4.1114645	14.509805	v	14.202141414	-20.000002	10.1960146	v	-1.101145	-5.9313143	0.490195	v	-1.64141413	-6.9362144	-1.666668
v	-3.2814419	-3.9215141	14.509803	v	14.202141414	-20.000002	5.882350	v	-1.101145	-5.9313143	1.5686214	v	-1.64141413	-6.9362145	-0.588236
v	-3.2814419	12.156862	5.882355	v	14.202141414	-15.980393	5.882351	v	-1.101145	-5.9313143	-0.588236	v	-2.194282	-6.9362145	-0.588236
v	-3.2814419	12.156861	14.509806	v	14.202141414	-15.980394	14.509801	v	-1.101145	-5.9313143	0.490195	v	-1.101145	-6.9362145	-1.1214452
v	-3.2814419	12.156863	-2.1445096	v	14.202141414	-20.000002	14.509801	v	-1.101145	-5.9313143	-0.588236	v	-1.101145	-6.9362145	-0.588236
v	-3.2814419	12.156862	5.882355	v	14.202141414	-11.9601486	10.19601414	v	-1.101145	-4.9264141	-0.588236	v	-1.101145	-6.9362144	-1.666668
v	-3.2814419	12.156863	-2.1445096	v	14.202141414	-11.9601485	5.882351	v	-1.101145	-4.9264141	1.5686214	v	-1.101145	-6.9362145	-1.1214452
v	-12.0325114	12.156863	-2.1445096	v	14.202141414	-11.9601486	14.509802	v	-1.101145	-5.9313143	1.5686214	v	-1.101145	-6.9362144	-1.666668
v	-12.0325114	12.156861	14.509806	v	14.202141414	-11.9601486	10.19601414	v	-1.101145	-3.921569	0.490195	v	-1.101145	-6.433823	-1.666668
v	-3.2814419	12.156861	14.509806	v	14.202141414	-11.9601485	5.882351	v	-1.101145	-3.921569	-0.588236	v	-1.101145	-6.433824	-0.588236
v	-20.1414146114	12.156862	5.882355	v	9.830228	-11.9601485	5.882351	v	-1.101145	-3.921569	1.5686214	v	-1.101145	-6.9362145	-0.588236
v	-20.1414146114	12.156861	14.509806	v	9.830228	-11.9601486	14.509802	v	-1.101145	-3.921569	0.490195	v	-1.101145	-5.9313143	-1.1214452
v	-20.1414146114	12.156863	-2.1445096	v	14.202141414	-11.9601486	14.509802	v	-1.101145	-3.921569	-0.588236	v	-1.101145	-5.9313143	-0.588236
v	-20.1414146114	12.156862	5.882355	v	5.45146149	-11.9601486	10.19601414	v	-2.194282	-3.921569	-0.588236	v	-1.101145	-5.9313142	-1.666668
v	-20.1414146114	12.156863	-2.1445096	v	5.45146149	-11.9601486	14.509802	v	-2.194282	-3.921569	1.5686214	v	-1.101145	-5.9313143	-1.1214452
v	-20.1414146114	4.1114648	-2.14450914	v	5.45146149	-11.9601485	5.882351	v	-1.101145	-3.921569	1.5686214	v	-1.101145	-5.9313142	-1.666668
v	-20.1414146114	4.1114645	14.509805	v	5.45146149	-11.9601486	10.19601414	v	-3.2814419	-3.921569	0.490195	v	-1.64141413	-5.9313142	-1.666668
v	-20.1414146114	12.156861	14.509806	v	5.45146149	-11.9601485	5.882351	v	-3.2814419	-3.921569	1.5686214	v	-1.64141413	-5.9313143	-0.588236
v	-20.1414146114	-3.9215140	5.882353	v	5.45146149	-15.980393	5.882351	v	-3.2814419	-3.921569	-0.588236	v	-1.101145	-5.9313143	-0.588236
v	-20.1414146114	-3.9215141	14.509803	v	5.45146149	-15.980394	14.509801	v	-3.2814419	-3.921569	0.490195	v	-2.194282	-5.9313143	-1.1214452
v	-20.1414146114	-3.921568	-2.1445099	v	5.45146149	-11.9601486	14.509802	v	-3.2814419	-3.921569	-0.588236	v	-2.194282	-5.9313143	-0.588236
v	-12.0325114	-3.921568	-2.1445099	v	5.45146149	-20.000002	10.1960146	v	-3.2814419	-4.9264141	-0.588236	v	-2.194282	-5.9313142	-1.666668
v	-20.1414146114	-3.921568	-2.1445099	v	5.45146149	-20.000002	5.882350	v	-3.2814419	-4.9264141	1.5686214	v	-2.194282	-5.9313143	-1.1214452
v	-20.1414146114	4.1114648	-2.14450914	v	5.45146149	-20.000002	14.509801	v	-3.2814419	-3.921569	1.5686214	v	-2.194282	-5.9313142	-1.666668
v	-3.2814419	4.1114648	-2.14450914	v	9.830228	-20.000002	5.882350	v	-3.2814419	-5.9313143	0.490195	v	-2.194282	-6.433823	-1.666668
v	-3.2814419	-3.921568	-2.1445099	v	5.45146149	-20.000002	5.882350	v	-3.2814419	-5.9313143	-0.588236	v	-2.194282	-6.433824	-0.588236
v	-12.0325114	12.156863	-2.1445096	v	5.45146149	-15.980393	5.882351	v	-3.2814419	-5.9313143	1.5686214	v	-2.194282	-5.9313143	-0.588236
v	-3.2814419	12.156863	-2.1445096	v	14.202141414	-15.980393	5.882351	v	-2.194282	-5.9313143	-0.588236	v	-2.194282	-6.9362145	-1.1214452
v	-20.1414146114	12.156863	-2.1445096	v	14.202141414	-20.000002	5.882350	v	-3.2814419	-5.9313143	-0.588236	v	-2.194282	-6.9362145	-0.588236
v	-20.1414146114	4.1114645	14.509805	v	9.830228	-11.9601485	5.882351	v	-3.2814419	-4.9264141	-0.588236	v	-2.194282	-6.9362144	-1.666668
v	-20.1414146114	-3.9215141	14.509803	v	5.45146149	-11.9601485	5.882351	v	-1.101145	-4.9264141	-0.588236	v	-1.64141413	-6.9362144	-1.666668
v	-12.0325114	-3.9215141	14.509803	v	14.202141414	-11.9601485	5.882351	v	-1.101145	-5.9313143	-0.588236	v	-2.194282	-6.9362144	-1.666668
v	-12.0325114	12.156861	14.509806	v	5.45146149	-15.980394	14.509801	v	-2.194282	-3.921569	-0.588236	v	-2.194282	-6.433823	-1.666668
v	-20.1414146114	12.156861	14.509806	v	5.45146149	-20.000002	14.509801	v	-3.2814419	-3.921569	-0.588236	v	-1.101145	-6.433823	-1.666668
v	-3.2814419	4.1114645	14.509805	v	9.830228	-20.000002	14.509801	v	-1.101145	-3.921569	-0.588236	v	-1.101145	-6.9362144	-1.666668
v	-3.2814419	12.156861	14.509806	v	9.830228	-11.9601486	14.509802	v	-3.2814419	-4.9264141	1.5686214	v	-1.64141413	-5.9313142	-1.666668
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v	1.085130	-11.9601485	5.882351	v	14.202141414	-20.000002	14.509801	v	-3.2814419	-3.921569	1.5686214	v	-2.194282	-6.9362145	-0.588236
v	1.085130	-11.9601486	14.509802	v	-3.2814419	-20.000002	10.1960146	v	-1.101145	-4.9264141	1.5686214	v	-1.64141413	-6.9362145	-0.588236
v	-3.2814419	-11.9601486	14.509802	v	-3.2814419	-20.000002	5.882350	v	-1.101145	-3.921569	1.5686214	v	-1.64141413	-5.9313143	-0.588236
v	5.45146149	-11.9601486	10.19601414	v	1.085130	-20.000002	5.882350	v	-1.101145	-5.9313143	1.5686214	v	-2.194282	-5.9313143	-0.588236
v	5.45146149	-11.9601486	14.509802	v	1.085130	-20.000002	14.509801	v	-3.2814419	-6.9362145	-1.1214452	v	-1.101145	-6.433824	-0.588236
v	5.45146149	-11.9601485	5.882351	v	-3.2814419	-20.000002	14.509801	v	-3.2814419	-6.9362144	-1.666668	v	-1.101145	-5.9313143	-0.588236
v	5.45146149	-11.9601486	10.19601414	v	5.45146149	-20.000002	10.1960146	v	-2.1440851	-6.9362144	-1.666668	v	-1.101145	-6.9362145	-0.588236
v	5.45146149	-11.9601485	5.882351	v	5.45146149	-20.000002	14.509801	v	-2.1440851	-6.9362145	-0.588236	v	-3.2814419	-14.9411146	-2.205884
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v	5.45146149	-3.9215140	5.882353	v	5.45146149	-20.000002	14.509801	v	-2.194282	-6.9362144	-1.666668	v	-2.194282	-14.9411146	-1.666668
v	5.45146149	-3.9215140	10.1960148	v	5.45146149	-11.9601486	10.19601414	v	-2.194282	-6.433823	-1.666668	v	-2.194282	-14.9411146	-2.1445099
v	5.45146149	-3.9215140	5.882353	v	5.45146149	-11.9601485	5.882351	v	-2.194282	-6.433824	-0.588236	v	-2.194282	-14.9411146	-2.205884
v	1.085130	-3.9215140	5.882353	v	5.45146149	-11.9601486	14.509802	v	-2.194282	-6.9362145	-0.588236	v	-2.194282	-14.9411146	-2.1445099
v	1.085130	-3.9215141	14.509803	v	5.45146149	-11.9601486	10.19601414	v	-2.194282	-5.9313143	-1.1214452	v	-2.194282	-14.4381425	-2.1445099
v	5.45146149	-3.9215141	14.509803	v	5.45146149	-11.9601485	5.882351	v	-2.194282	-5.9313143	-0.588236	v	-2.194282	-14.4381425	-1.666668
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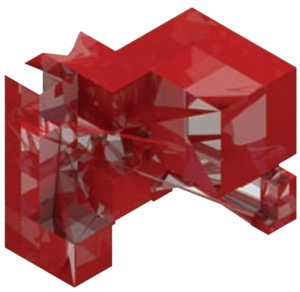
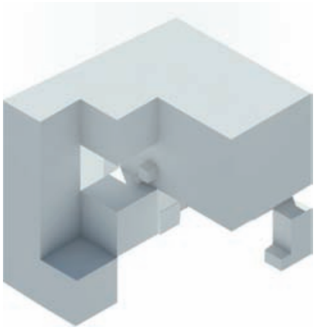
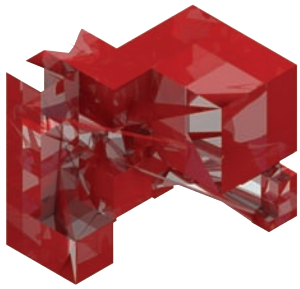
v	-3.2814419	-3.9215140	5.882353	v	-3.2814419	-11.9601486	14.509802	v	-2.1440851	-5.9313143	-0.588236	v	-2.194282	-6.9362144	-2.205884
v	-3.2814419	-14.94111414	5.882352	v	-3.2814419	-11.9601485	5.882351	v	-2.194282	-5.9313143	-0.588236	v	-2.194282	-6.9362144	-2.1445099
v	-3.2814419	-14.9411149	14.509803	v	-3.2814419	-11.9601486	10.19601414	v	-3.2814419	-5.9313143	-1.1214452	v	-2.1440851	-6.9362144	-2.1445099
v	-3.2814419	-3.9215141	14.509803	v	-3.2814419	-11.9601485	5.882351	v	-3.2814419	-5.9313143	-0.588236	v	-2.1440851	-6.9362144	-1.666668
v	-3.2814419	-11.9601486	10.19601414	v	-3.2814419	-15.980393	5.882351	v	-3.2814419	-5.9313142	-1.666668	v	-2.194282	-6.9362144	-1.666668
v	-3.2814419	-11.9601486	14.509802	v	-3.2814419	-15.980394	14.509801	v	-3.2814419	-5.9313143	-1.1214452	v	-3.2814419	-6.9362144	-2.205884
v	-3.2814419	-11.9601485	5.882351	v	-3.2814419	-11.9601486	14.509802	v	-3.2814419	-5.9313142	-1.666668	v	-3.2814419	-6.9362144	-1.666668
v	1.085130	-11.9601485	5.882351	v	-3.2814419	-20.000002	10.1960146	v	-3.2814419	-6.433823	-1.666668	v	-3.2814419	-6.9362144	-2.1445099
v	-3.2814419	-11.9601485	5.882351	v	-3.2814419	-20.000002	5.882350	v	-3.2814419	-6.433824	-0.588236	v	-3.2814419	-6.9362144	-2.205884
v	-3.2814419	-14.94111414	5.882352	v	-3.2814419	-20.000002	14.509801	v	-3.2814419	-5.9313143	-0.588236	v	-3.2814419	-6.9362144	-2.1445099
v	5.45146149	-14.94111414	5.882352	v	1.085130	-20.000002	5.882350	v	-3.2814419	-6.9362145	-1.1214452	v	-3.2814419	-14.4381425	-2.1445099
v	5.45146149	-11.9601485	5.882351	v	-3.2814419	-20.000002	5.882350	v	-3.2814419	-6.9362145	-0.588236	v	-3.2814419	-14.4381425	-1.666668
v	1.085130	-3.9215140	5.882353	v	-3.2814419	-15.980393	5.882351	v	-3.2814419	-6.9362144	-1.666668	v	-3.2814419	-6.9362144	-1.666668
v	5.45146149	-3.9215140	5.882353	v	5.45146149	-15.980393	5.882351	v	-2.1440851	-6.9362144	-1.666668	v	-3.2814419	-14.9411146	-2.205884
v	-3.2814419	-3.9215140	5.882353	v	5.45146149	-20.000002	5.882350	v	-3.2814419	-6.9362144	-1.666668	v	-3.2814419	-14.9411146	-1.666668
v	-3.2814419	-14.9411149	14.509803	v	1.085130	-11.9601485	5.882351	v	-3.2814419	-6.433823	-1.666668	v	-3.2814419	-14.9411146	-2.1445099
v	-3.2814419	-11.9601486	14.509802	v	-3.2814419	-11.9601485	5.882351	v	-2.194282	-6.433823	-1.666668	v	-2.1440851	-14.9411146	-2.1445099
v	1.085130	-11.9601486	14.509802	v	5.45146149	-11.9601485	5.882351	v	-2.194282	-6.9362144	-1.666668	v	-3.2814419	-14.9411146	-2.1445099
v	1.085130	-3.9215141	14.509803	v	-3.2814419	-15.980394	14.509801	v	-2.1440851	-5.9313142	-1.666668	v	-3.2814419	-14.4381425	-2.1445099
v	-3.2814419	-3.9215141	14.509803	v	-3.2814419	-20.000002	14.509801	v	-2.194282	-5.9313142	-1.666668	v	-2.194282	-14.4381425	-2.1445099

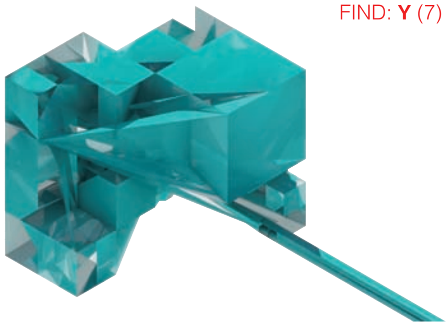




GRASSHOPPER PRODUCED FORM

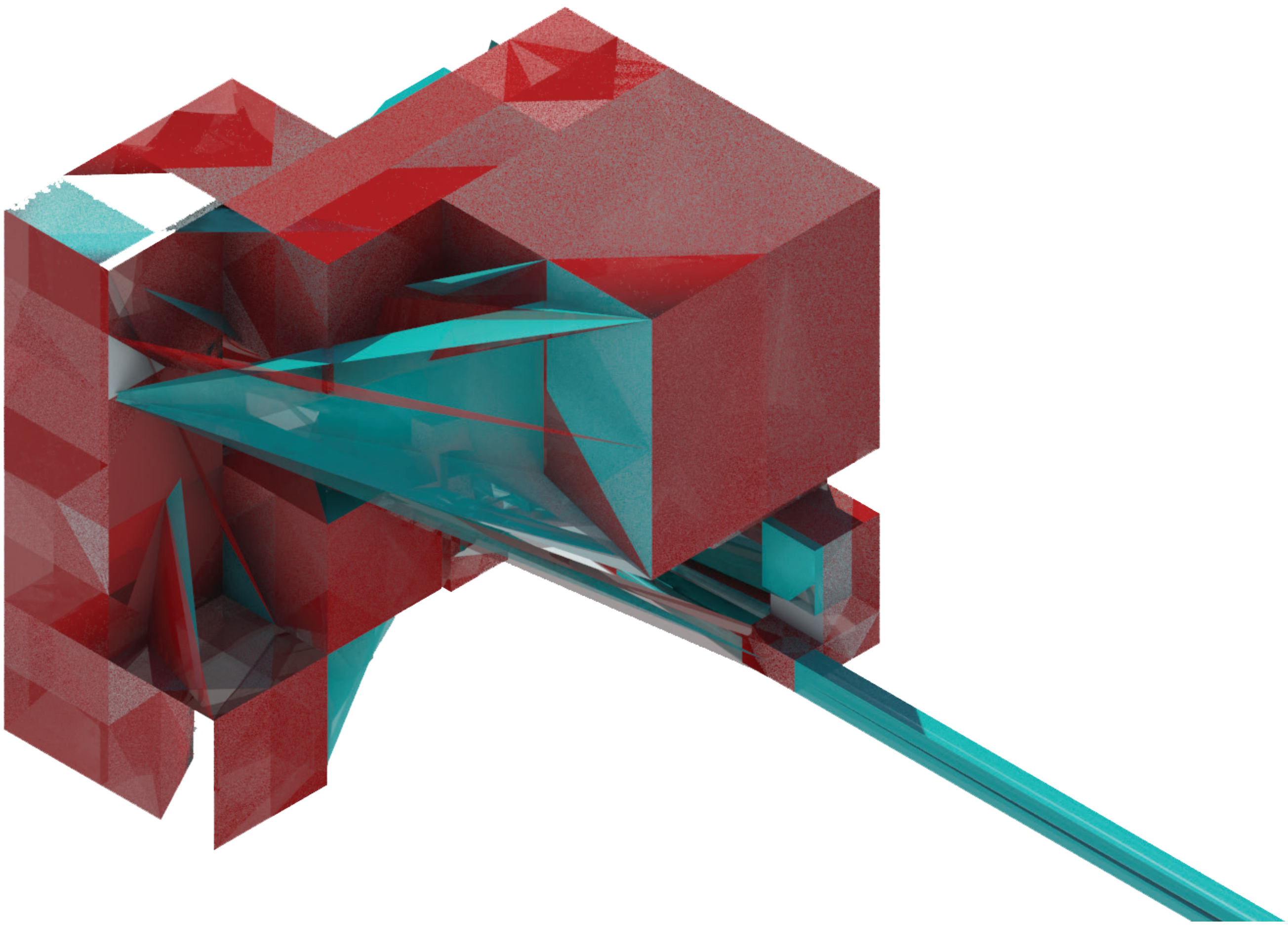


FIND: **Y** (7) REPLACE: **X** (14)

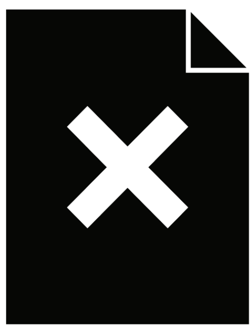


FIND: **X** (14) REPLACE: **Y** (7)

HEX GLITHING COMBINED 3D RESULT



We discovered that the forms do not reopen in Blender, instead we received an error message detailing “corrupt file.” We turned back to Rhinoceros which surprisingly opened the manually code manipulated files. The laborious process described results in three forms per cube (900 forms) that are then combined, red manipulation, cyan manipulation and original grey per cube. All 300 of these new sets are then placed in their original MCU grid co-ordinate position to gain a relationship with their original neighbour once again. The combination of these sets creates an unimaginable architectural interpretation of digital decay processes. When the forms are viewed with the anaglyph red and cyan glasses, the perception of space and depth is further distorted in the brain creating a chaotic three dimensional spatial architectural interpretation of digital decay.



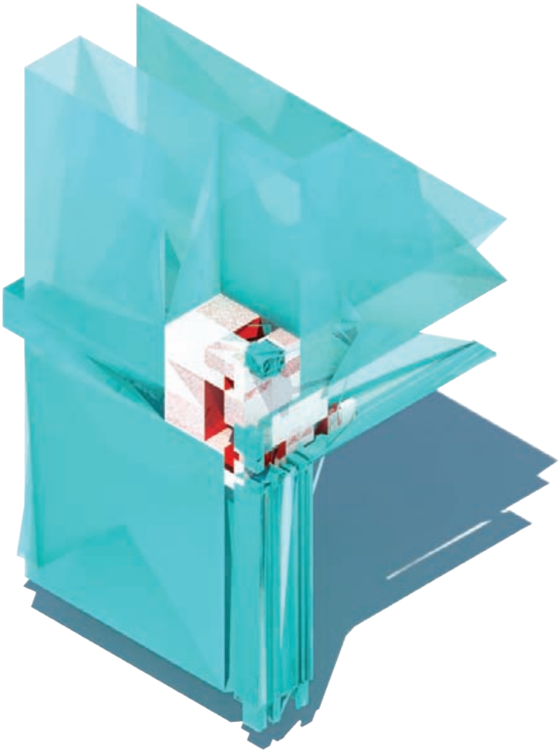
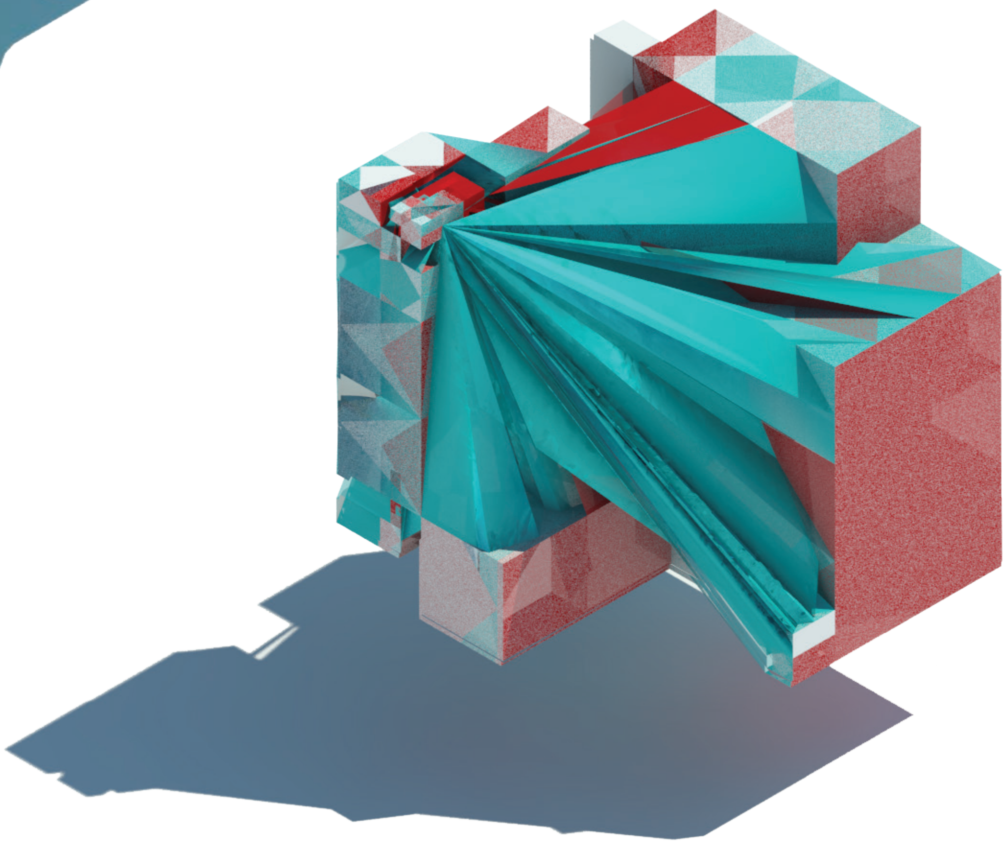
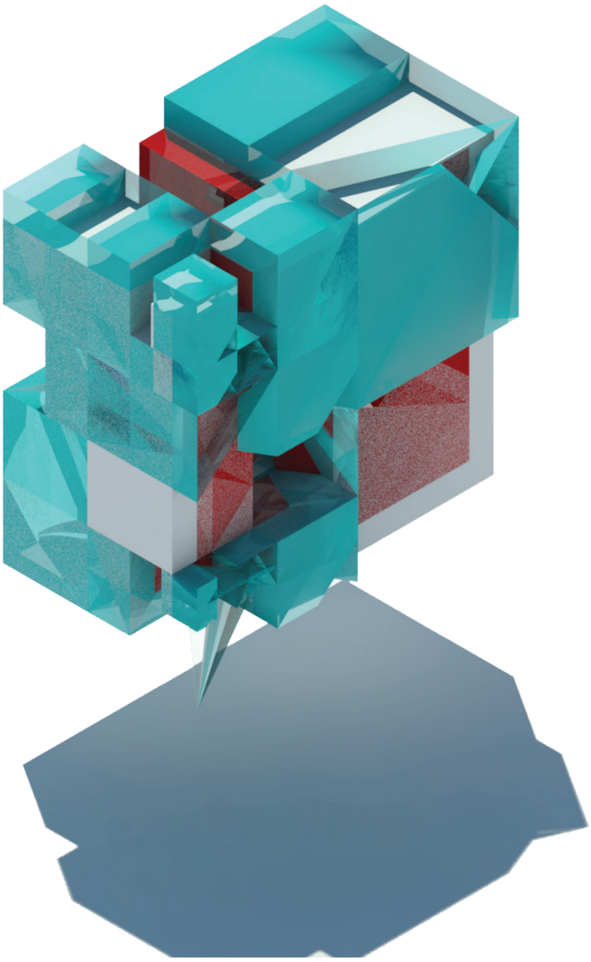
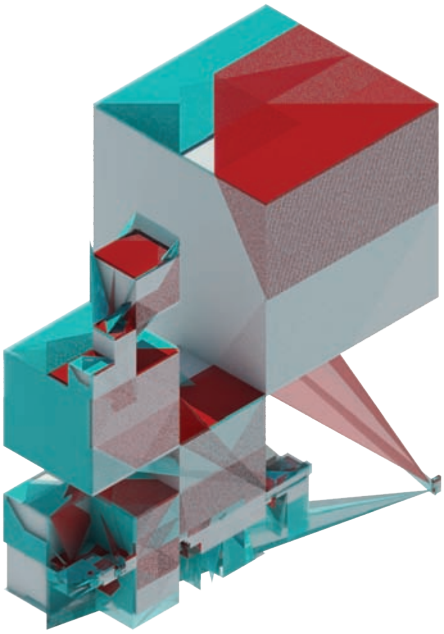
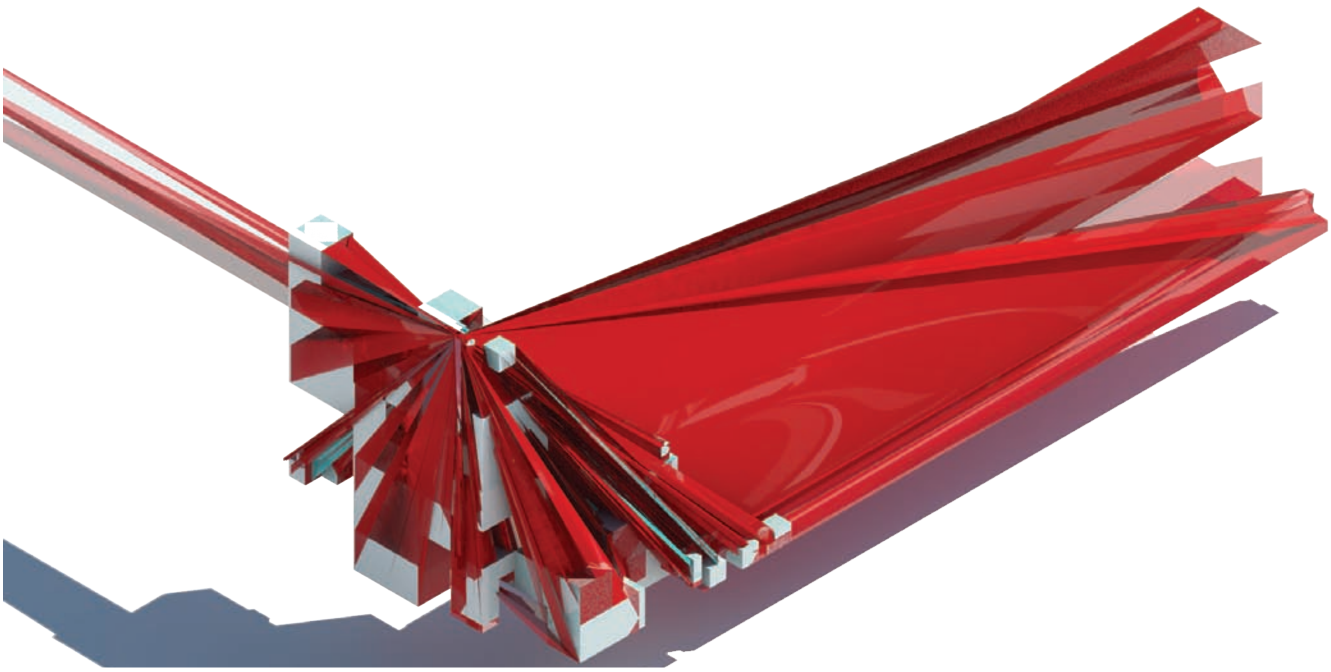
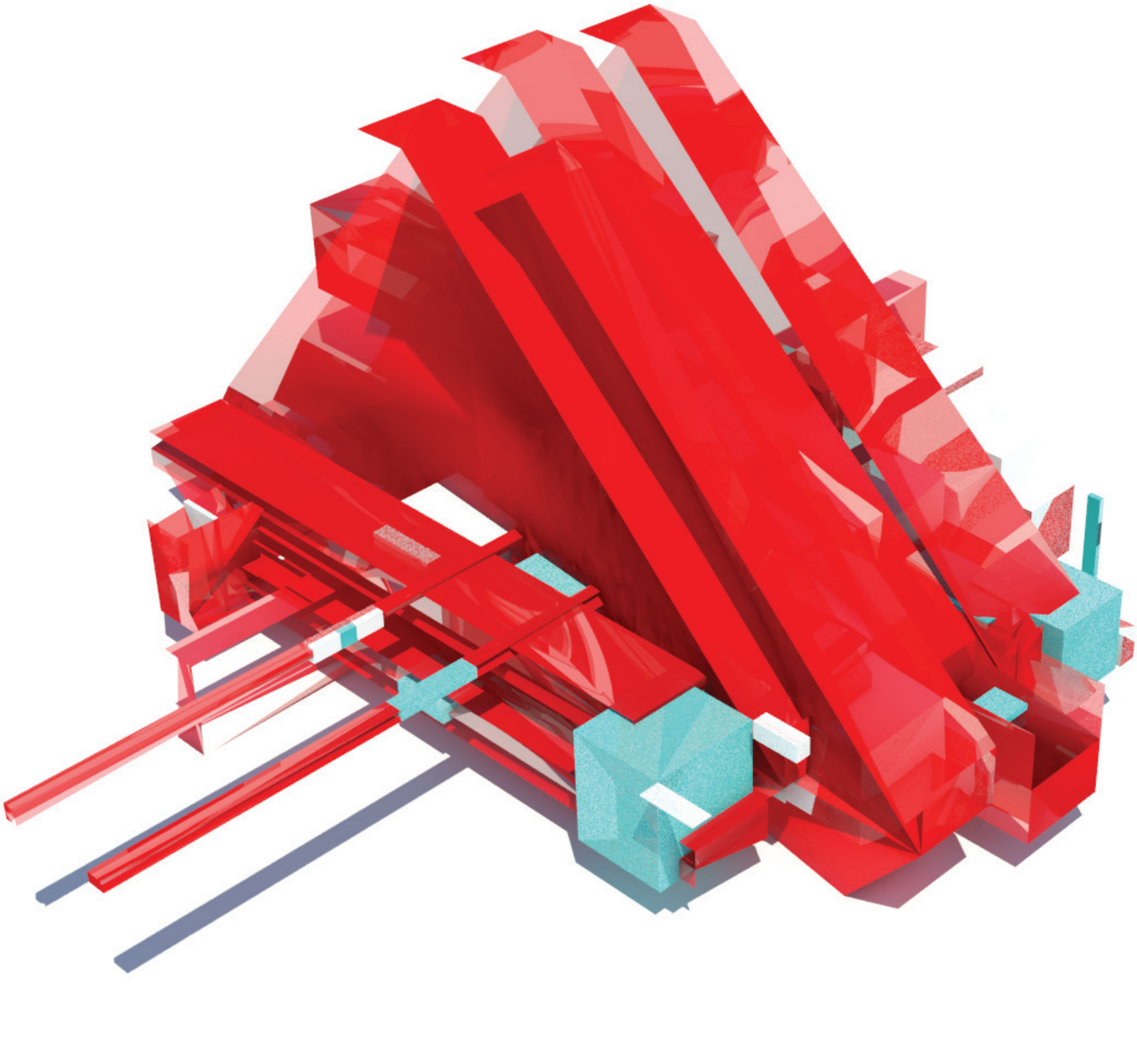




Figure 6.63 ‘Parts’ to the MCU ‘whole’ (Schumacher, 2012) of the anaglyph 3d digital form









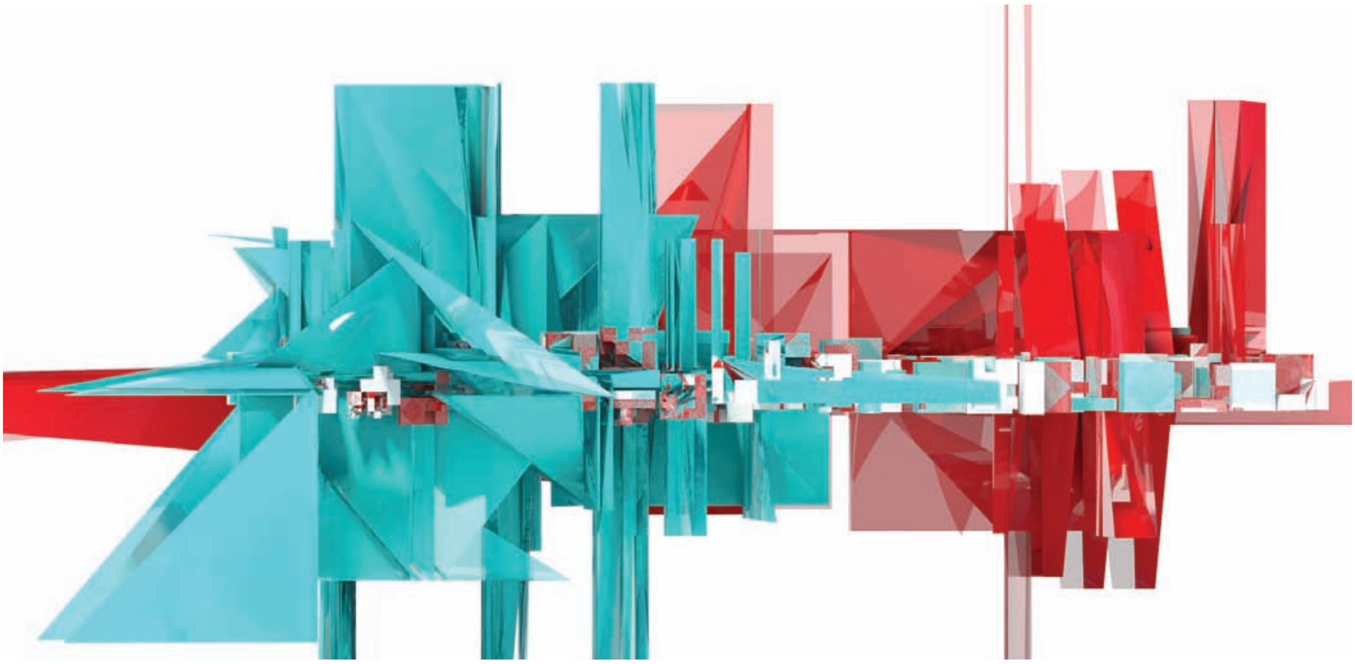


Figure 6.64 3d elevation view of anaglyph digital form

Figure 6.65 3d isometric view of anaglyph digital form

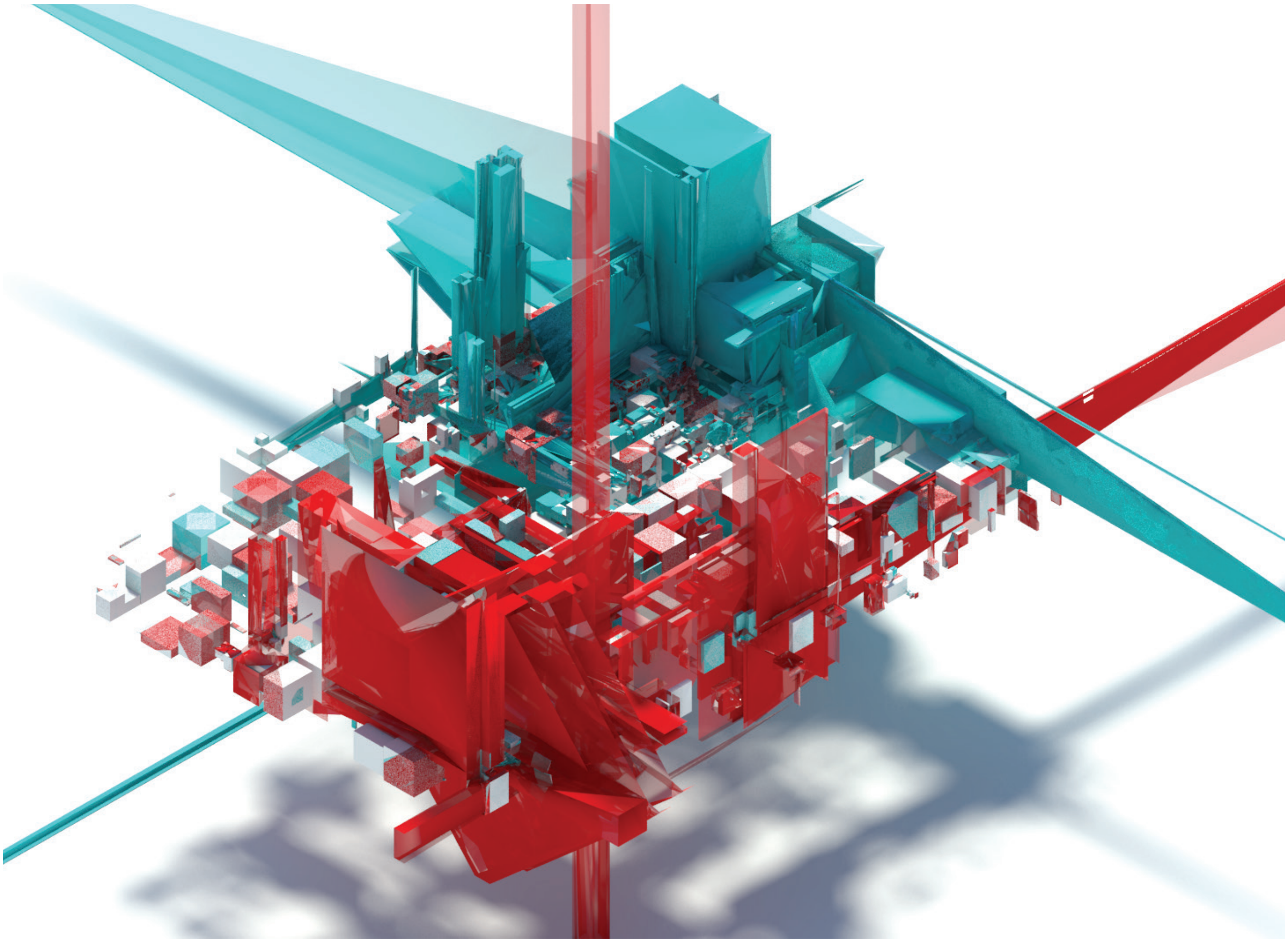


Figure 6.66 Linear plan view of anaglyph 3d digital form

10
11
12
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Y
X

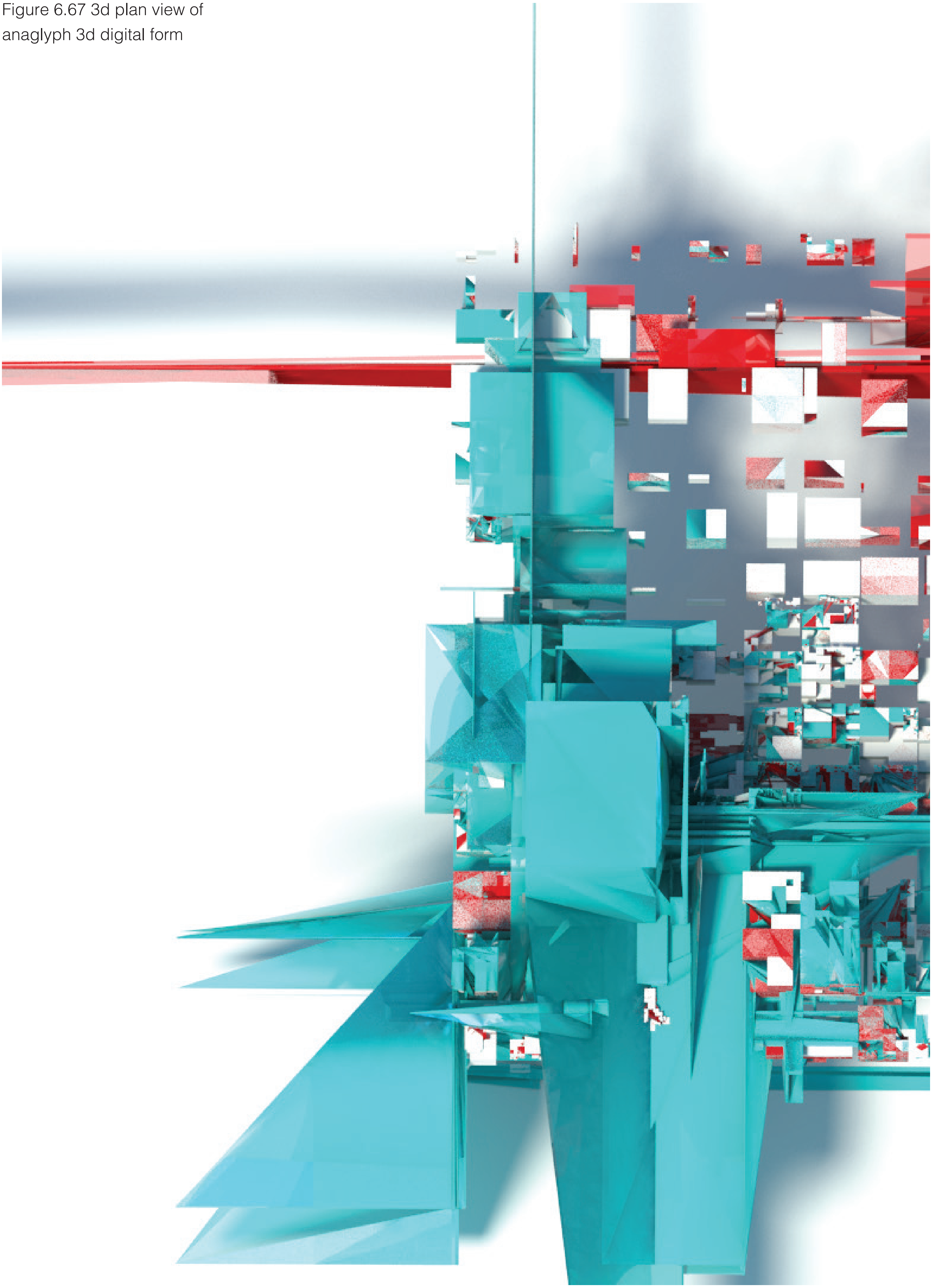
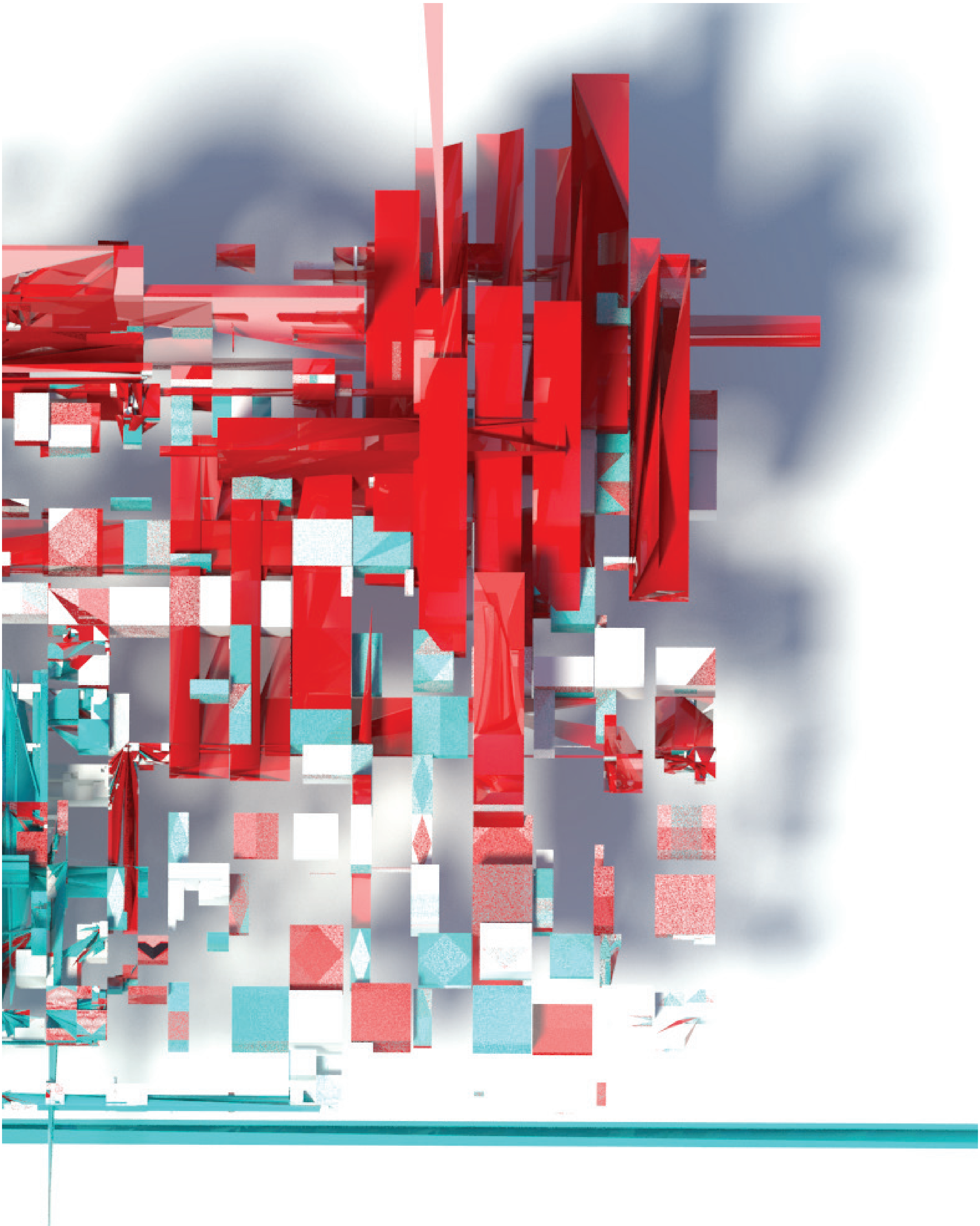
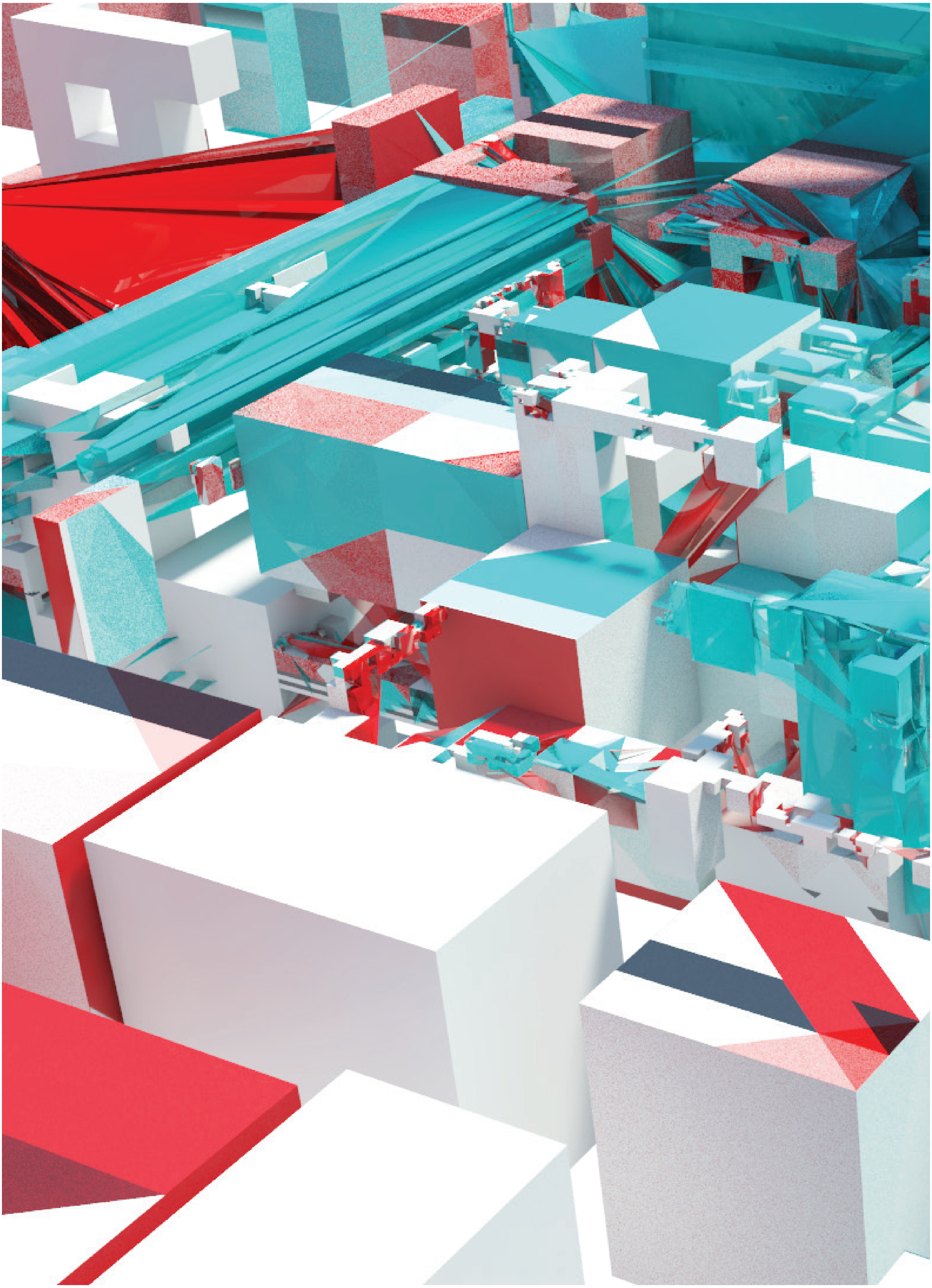
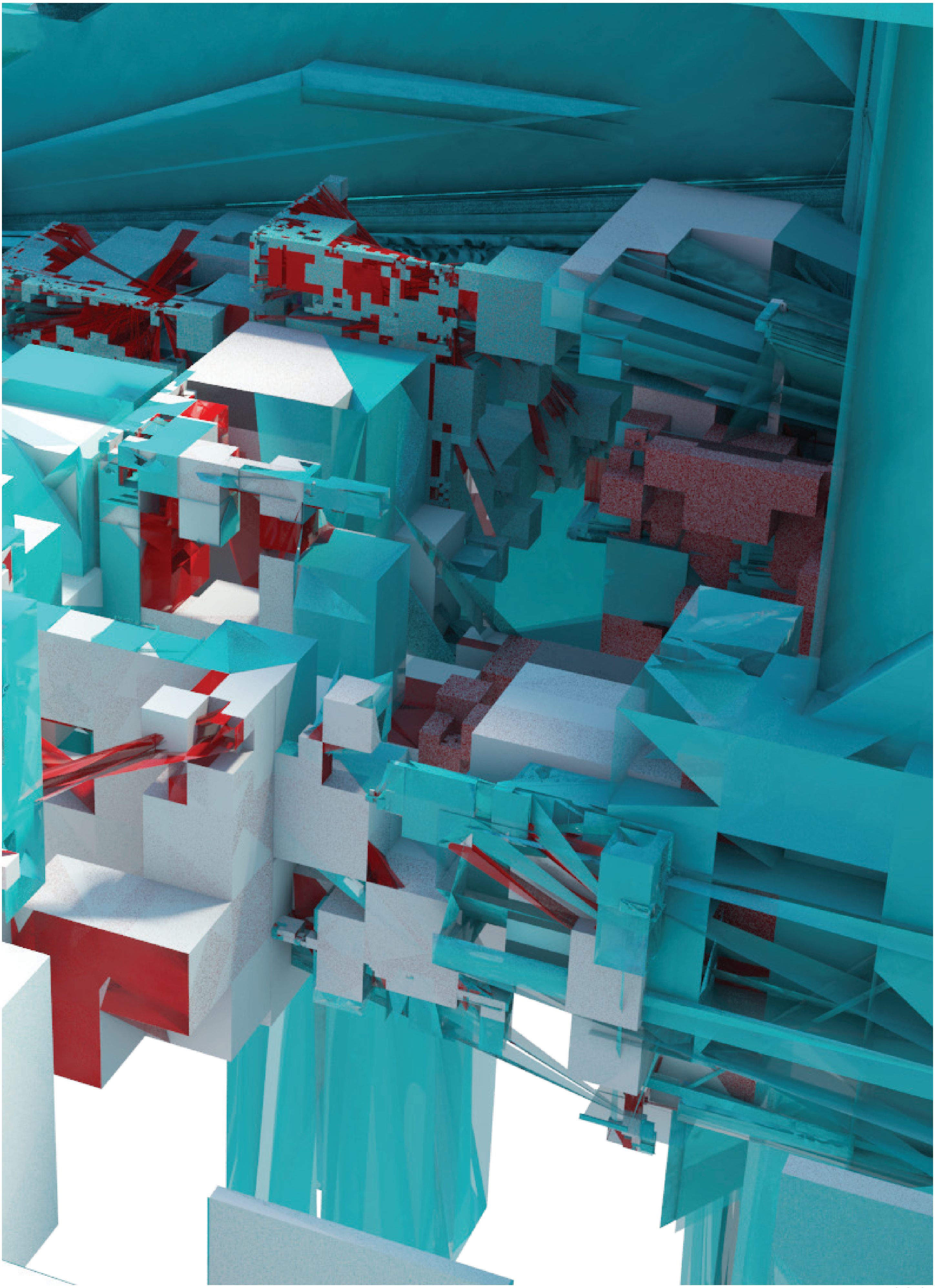
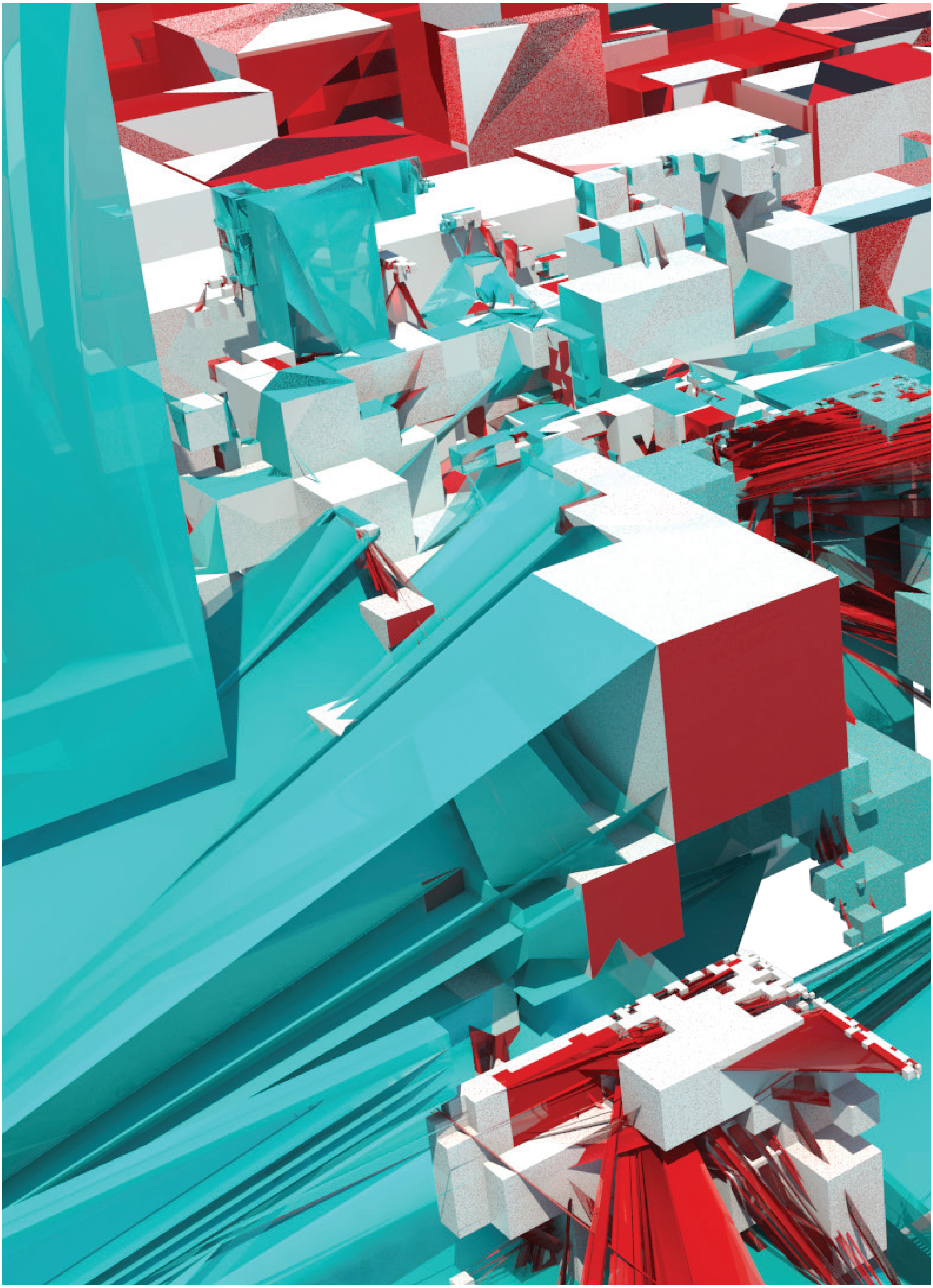


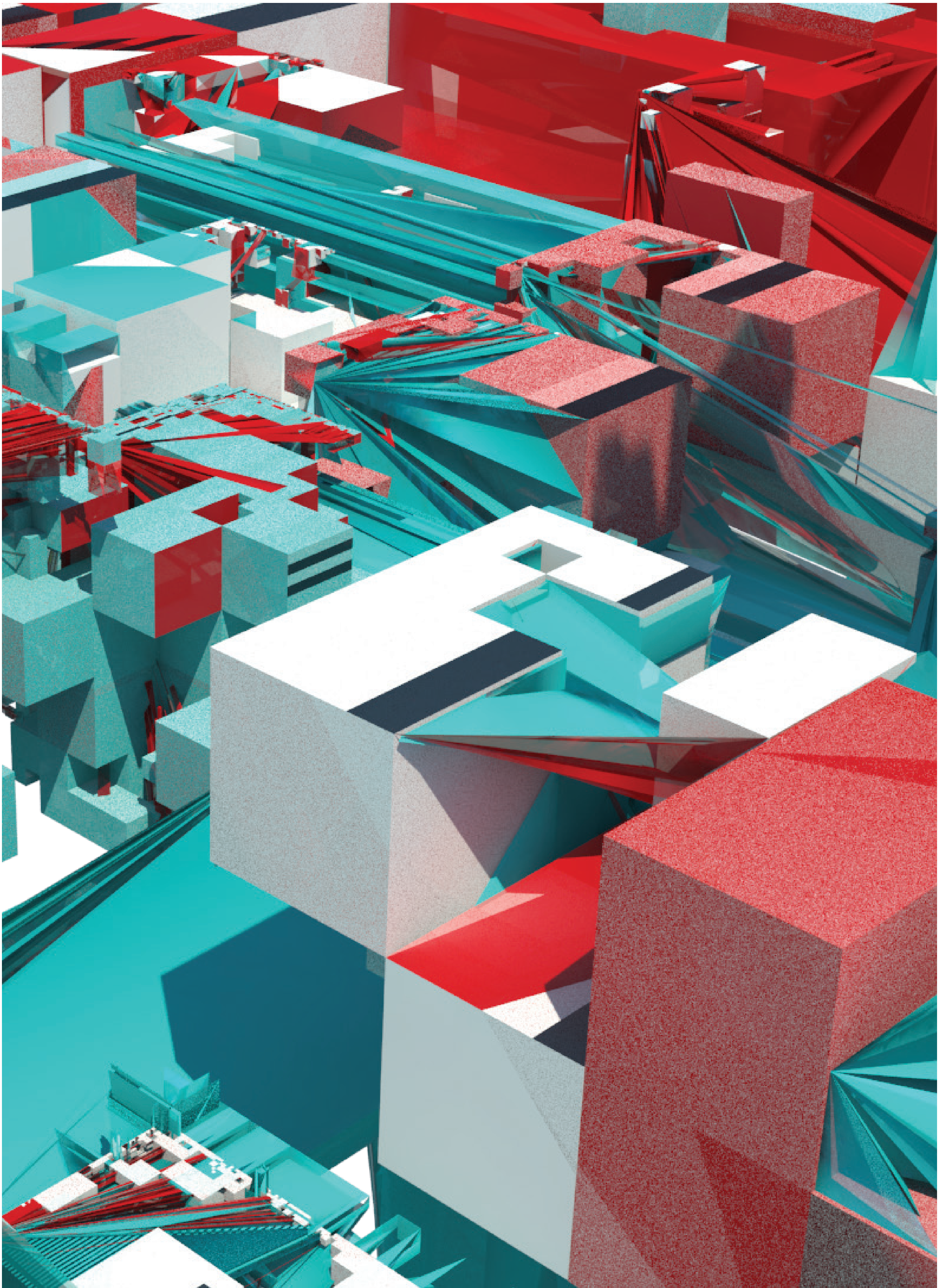
Figure 6.67 3d plan view of anaglyph 3d digital form

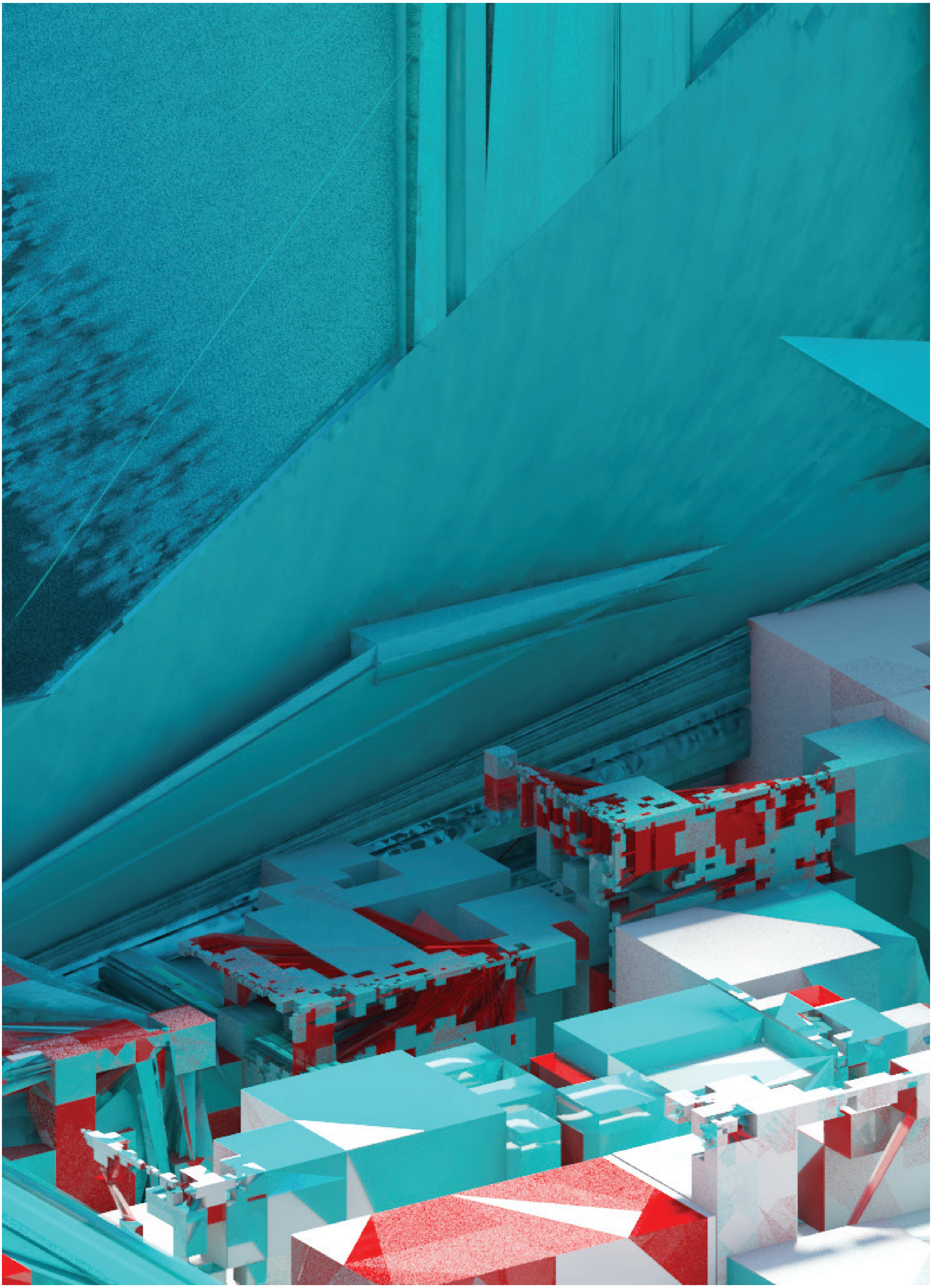


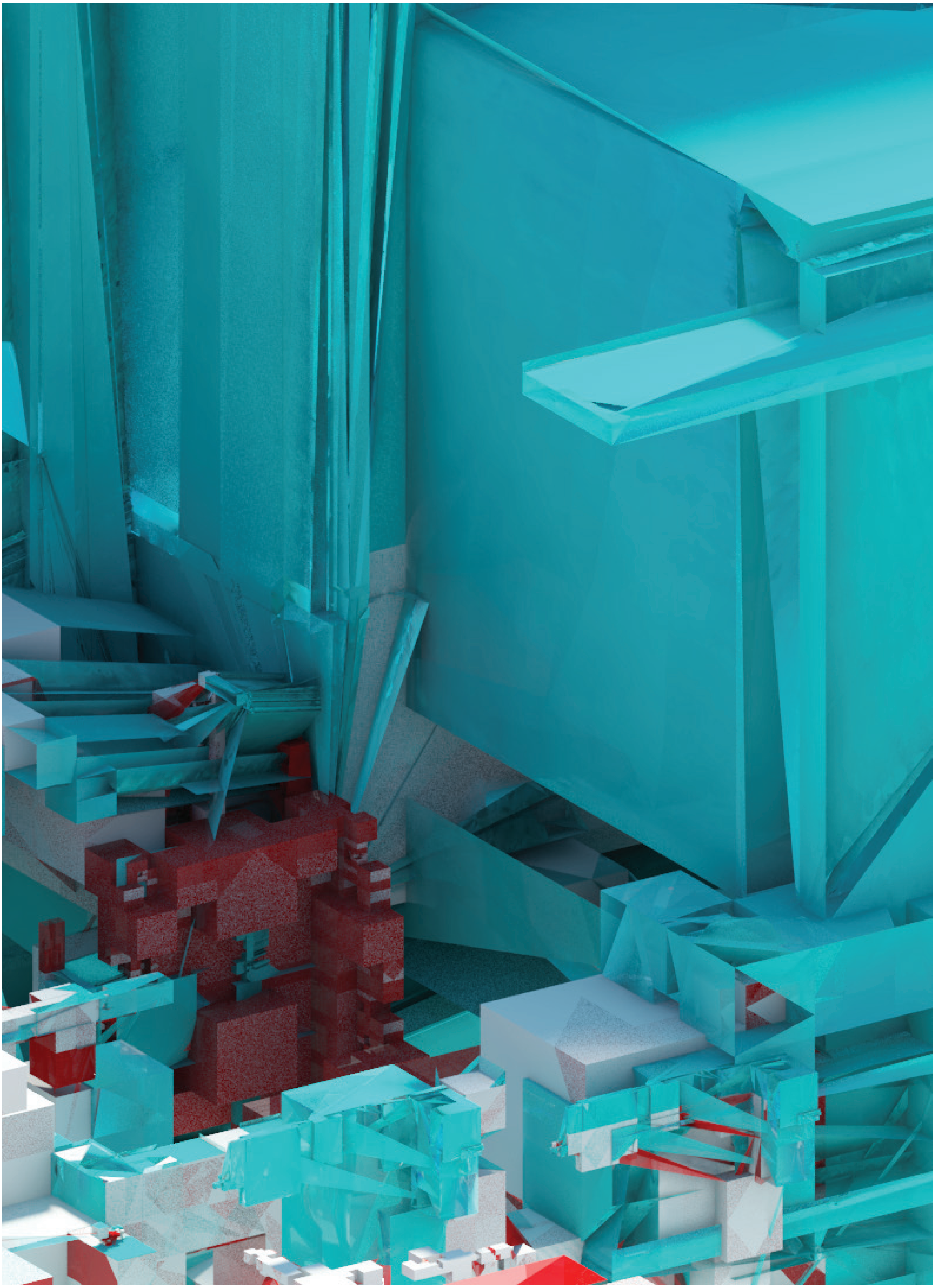


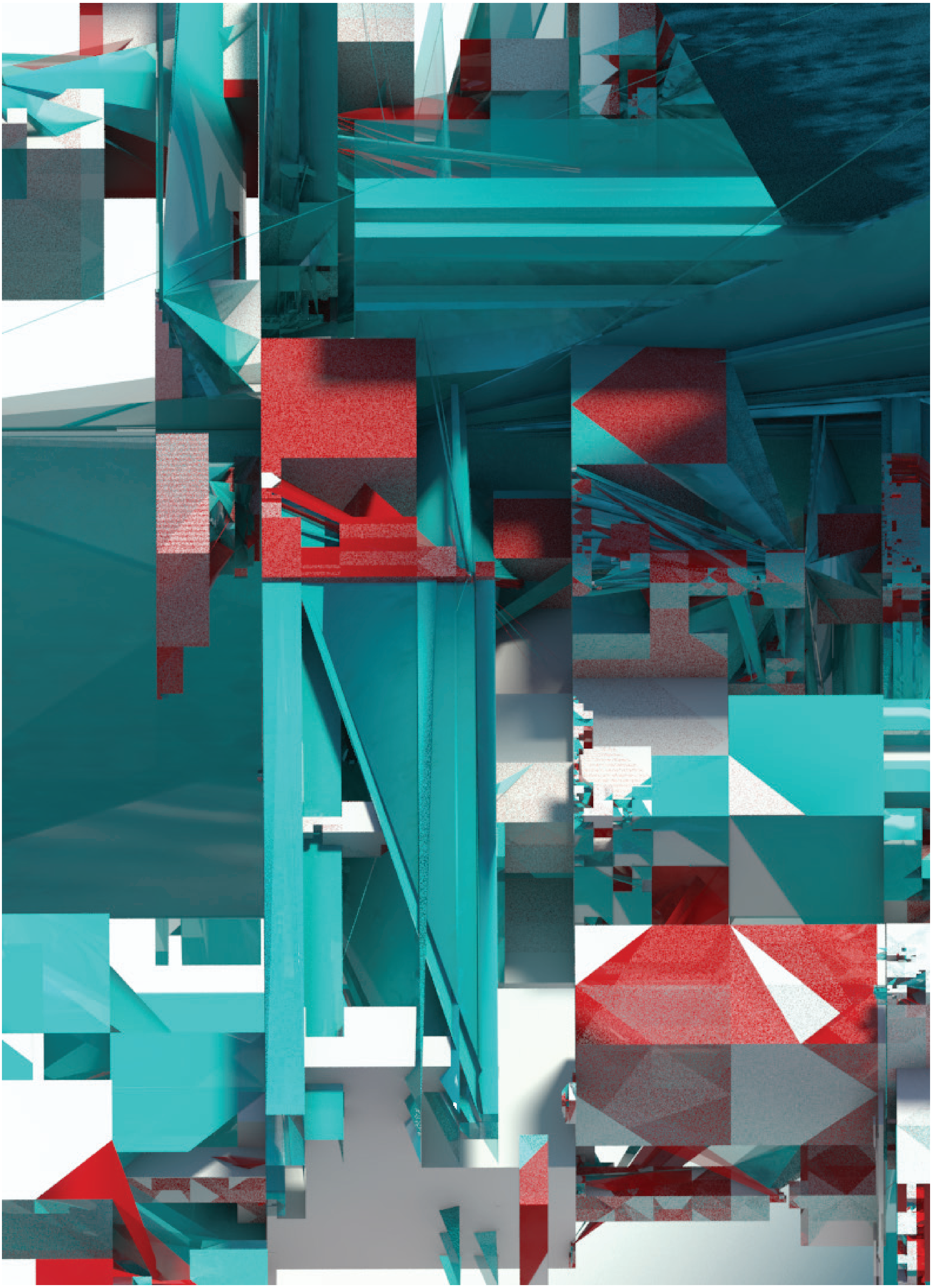












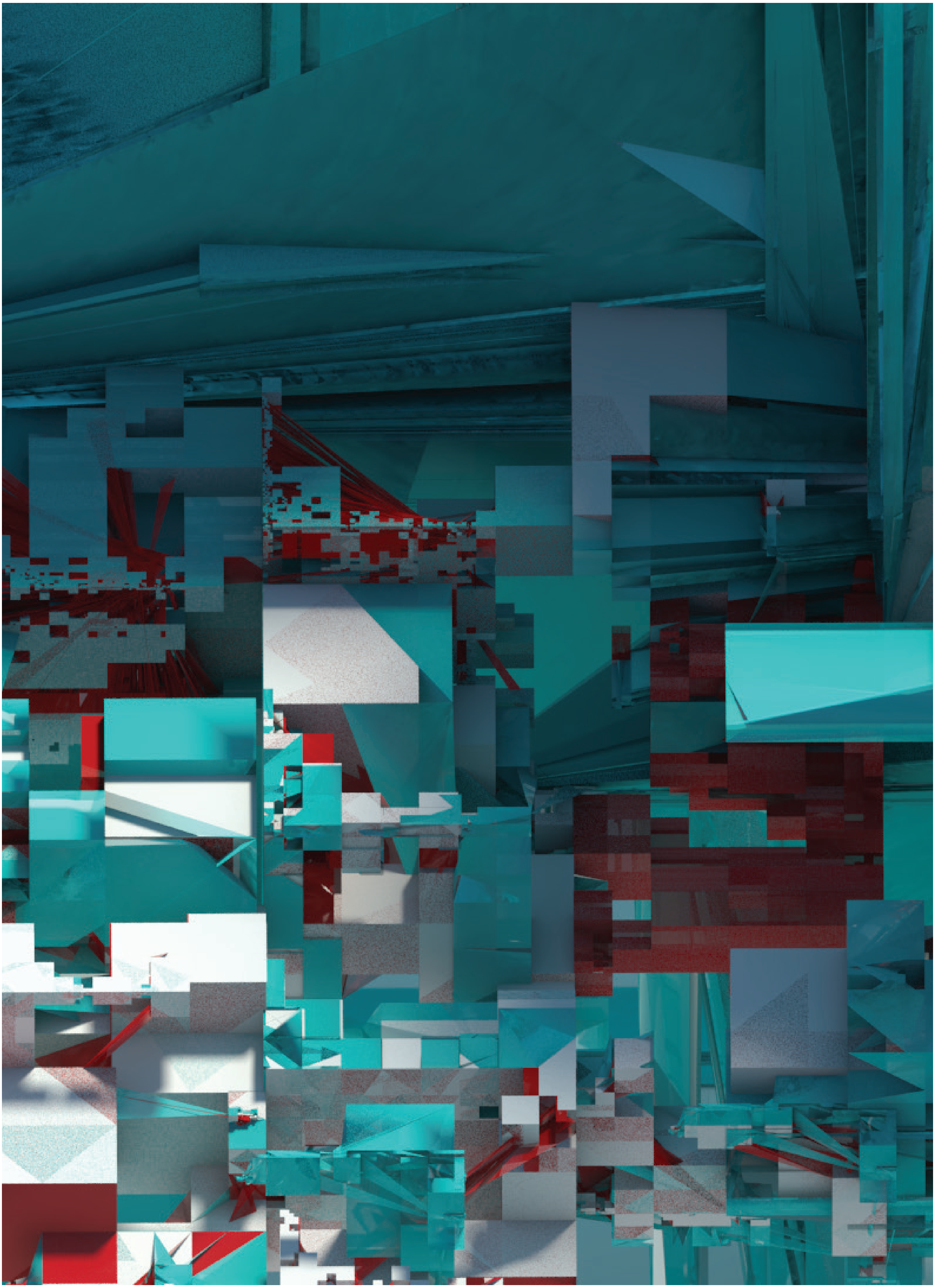
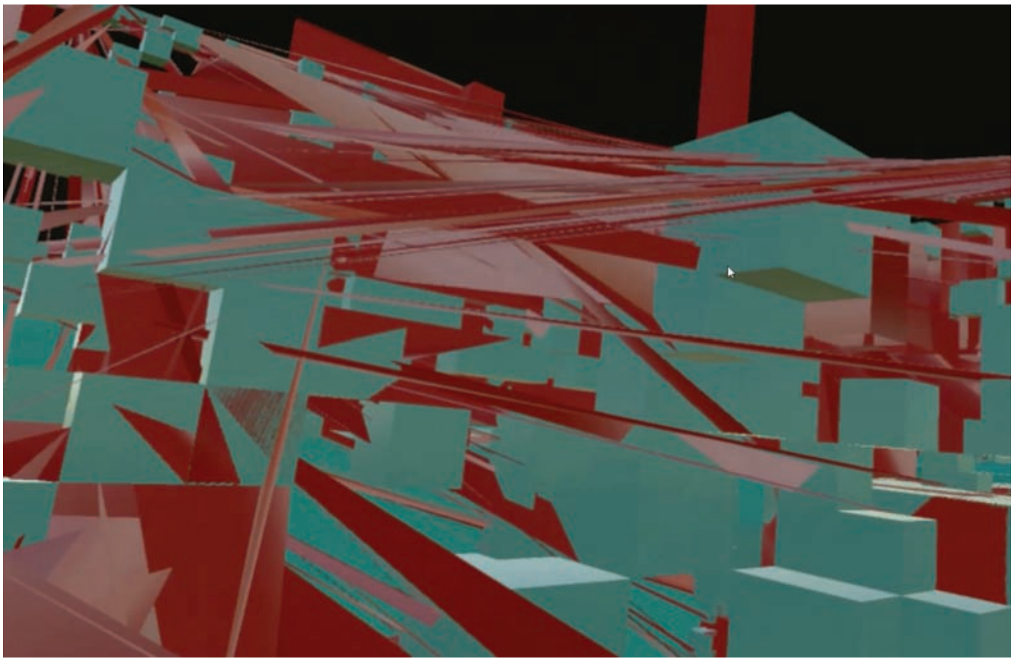
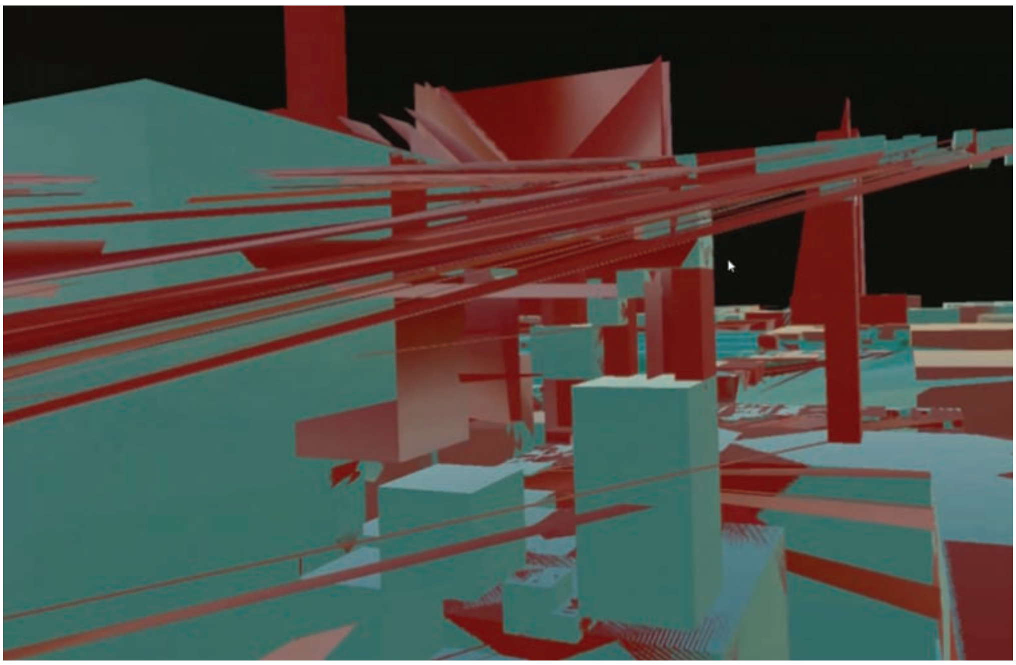
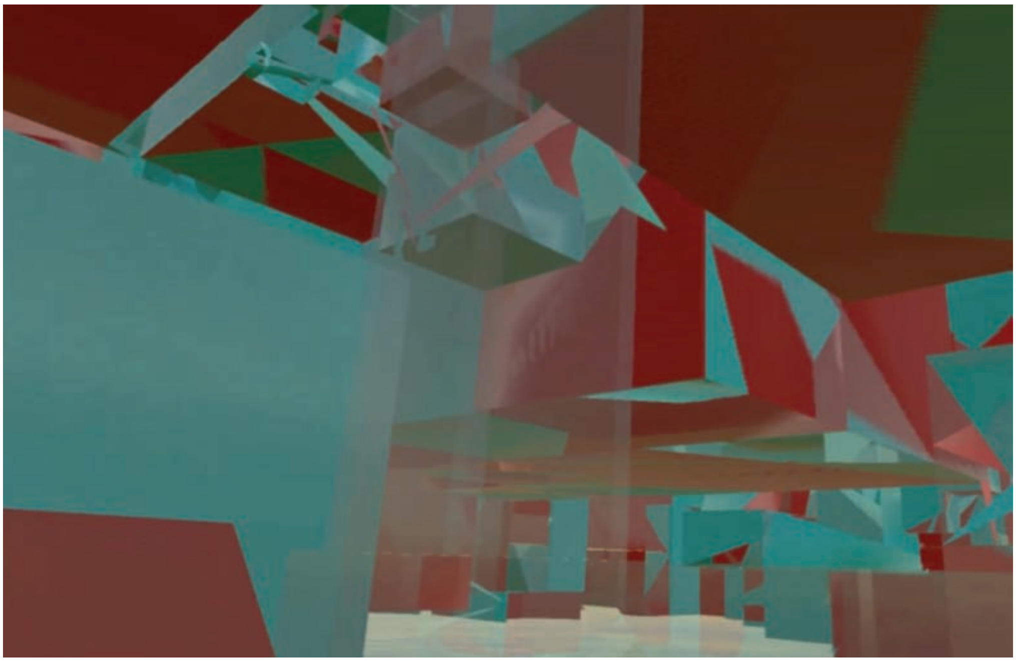
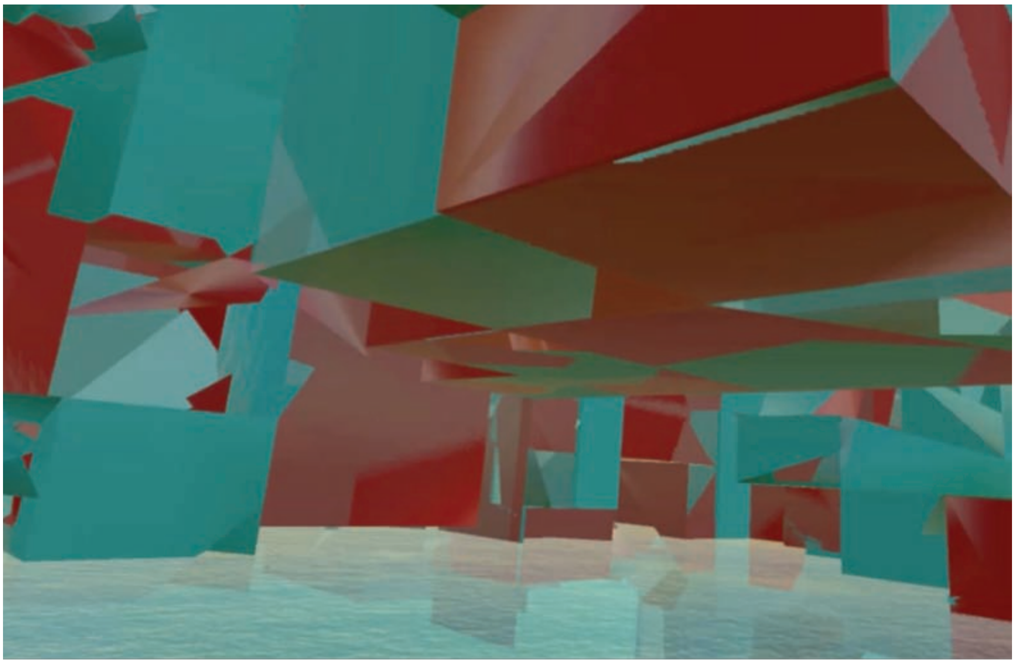


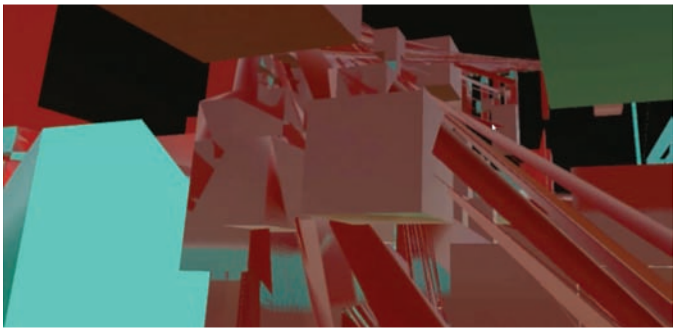
Figure 6.68 Walking around in Anaglyph form experience in VR environment

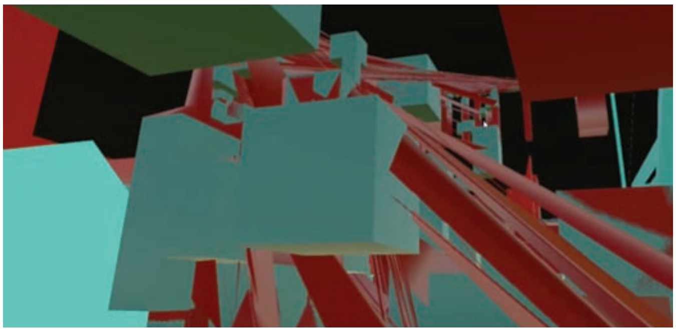






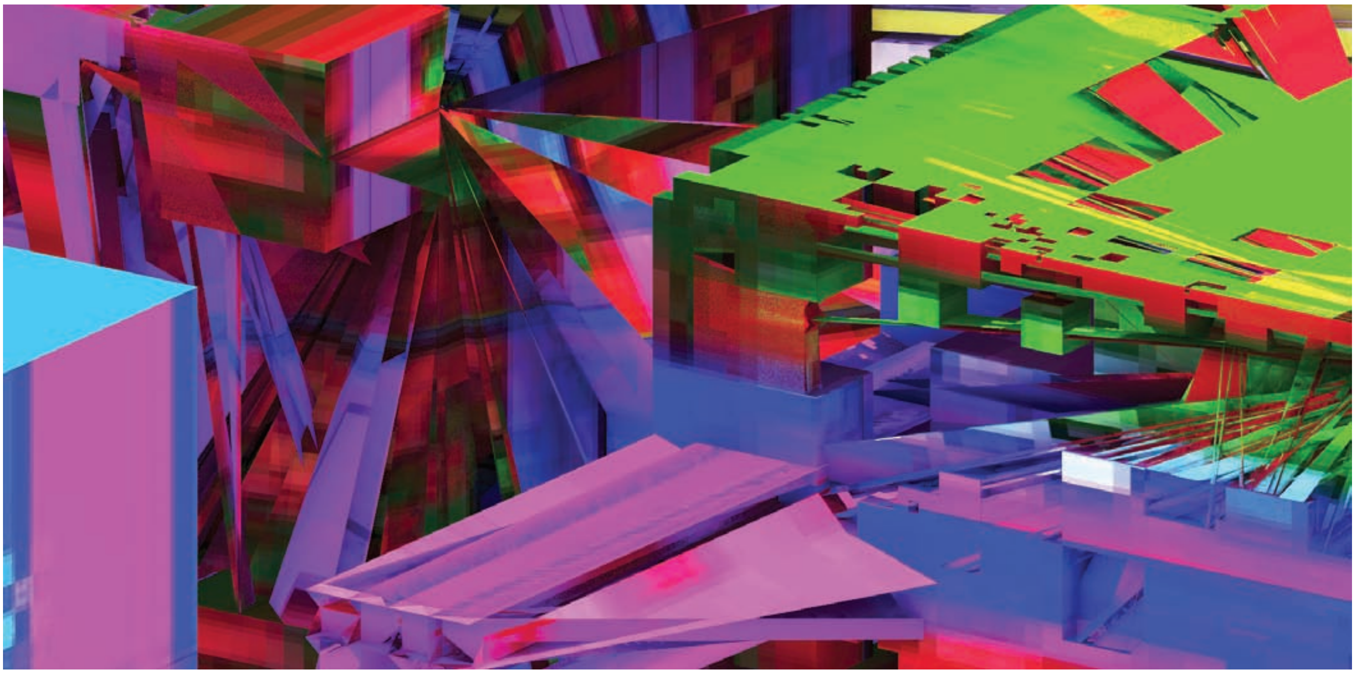


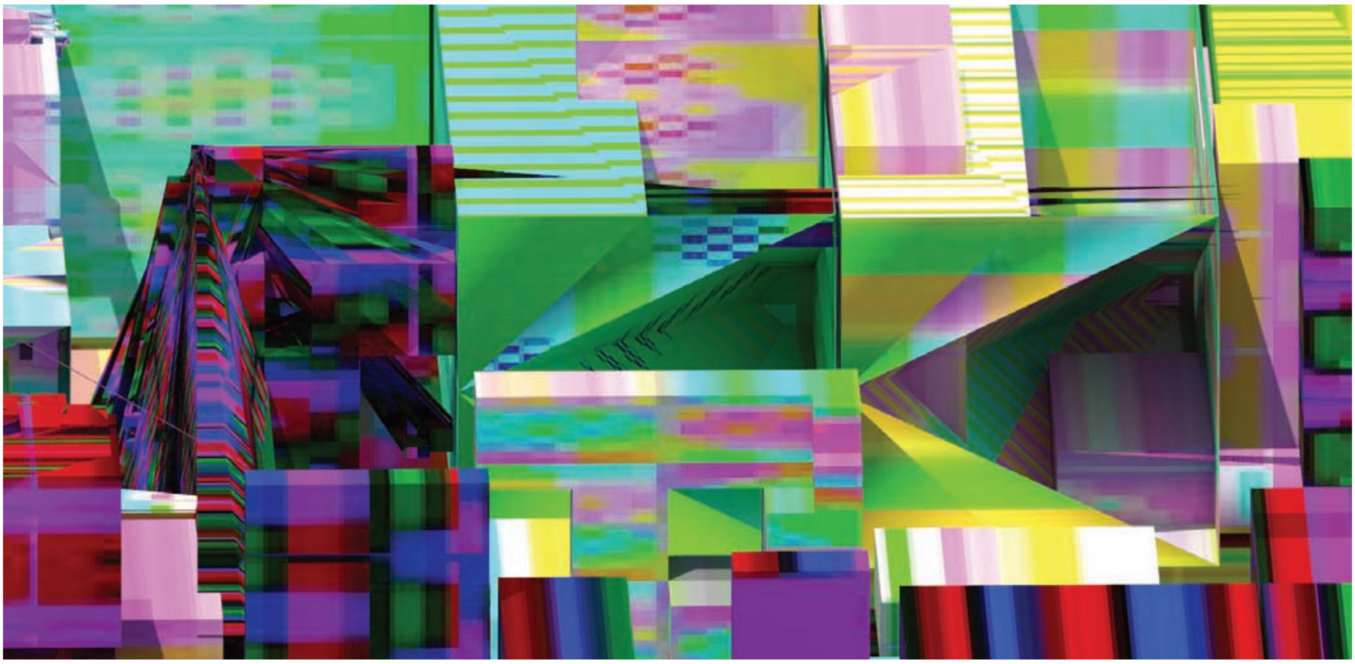




DIGITAL ARCHITECTURE IN DIGITAL REALM

Digital architectural projects that explore digital spaces allow for a freedom of expression that references reality while also designing the unimaginable. Digital decay expresses what we cannot comprehend, catalyzing the reinterpretation of glitch as a means of designing digital architecture. This is not reality to virtual where we digitally model something that is built in the physical, nor is it virtual to reality where we digital model something that could be built in the physical. This means of designing is virtual to virtual where we reinterpret the constraints and natural forces impeding our digital architectural workflows through digital architectural design. The architectural outcome of this research is an expression of something that is happening within the digital realm, we as humans then translate it into something from our reality, however the architecture can cease to exist explicitly within the digital. Zigelbaum enlightens this process writing, “crafting contemporary experience requires the combined efforts of all of us: scientists, designers, philosophers, engineers, artists, etc. If artists don’t learn how to actually implement technologies, such as machine learning or hydraulic fracturing, they will not be able to manipulate and understand them deeply enough to reveal their farthest edge states. Without the artist, our culture cannot metabolize the latent possibilities inherent in the world around us.” (Zigelbaum, 2012) By stretching the programs available to us, as designers we are exploring the constraints within our digital design work flows. We are not mimicking reality in the digital realm, we are expressing incomprehensible digital happenings through digital form, we are expressing digital decay through digital architecture.





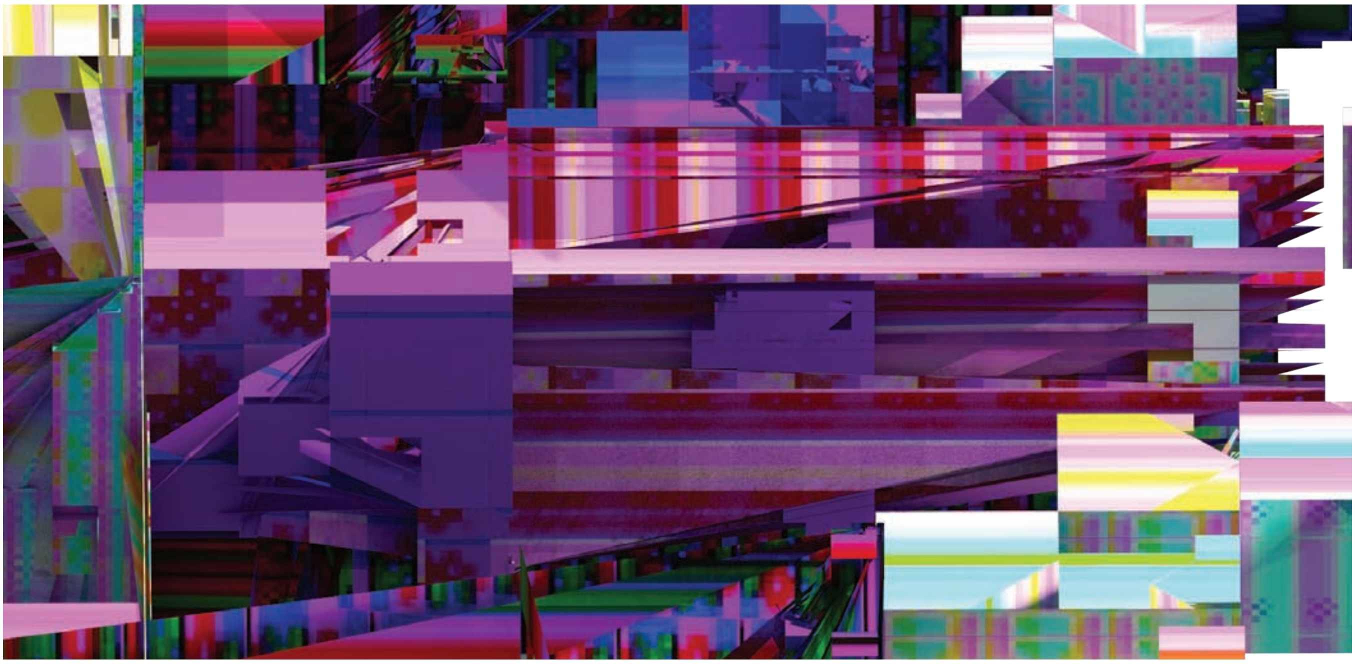


Figure 6.69 Each MCU square form texture mapped using the original MCU square from the original glitched image creating chaotic three dimensional glitch environments representing the original image.

VIRTUAL REALITY

Virtual Reality tools such as the Vive enable us to further bend the play between virtual and reality by preserving the digital experience while enabling a physical sensory involvement within the digital realm.

A phenomenological intrusion occurs while experiencing the digital architecture in VR due to many of the forms possessing identical vertices's. Within a digital environment, surfaces flicker between themselves due to neither being certainly on top of the other. This is an explicit attribute to the digital as overlap confusion of surfaces cannot occur in physical reality. Manon writes, "a computer interface, by contrast, is immersive—we cannot help but misperceive skeumorphic user interfaces such as buttons, drop-down menus and browser windows as bearing a real physicality. We do not expect two windows to become entangled or intertwined. When glitches manifest, they are a sudden phenomenological intrusion, a break in the order of logic. The shock comes because when we work with the machine we are contained by it. A glitch ruptures this immersive environment, undercutting the sovereignty of the digital by revealing its pervasiveness." (Manon, 2011) The flickering of two surfaces possessing identical vertices's while immersed in a VR environment reminds us how digital architecture is not constrained by physical laws and its explicit existence within the digital can bring about unique manifestations.

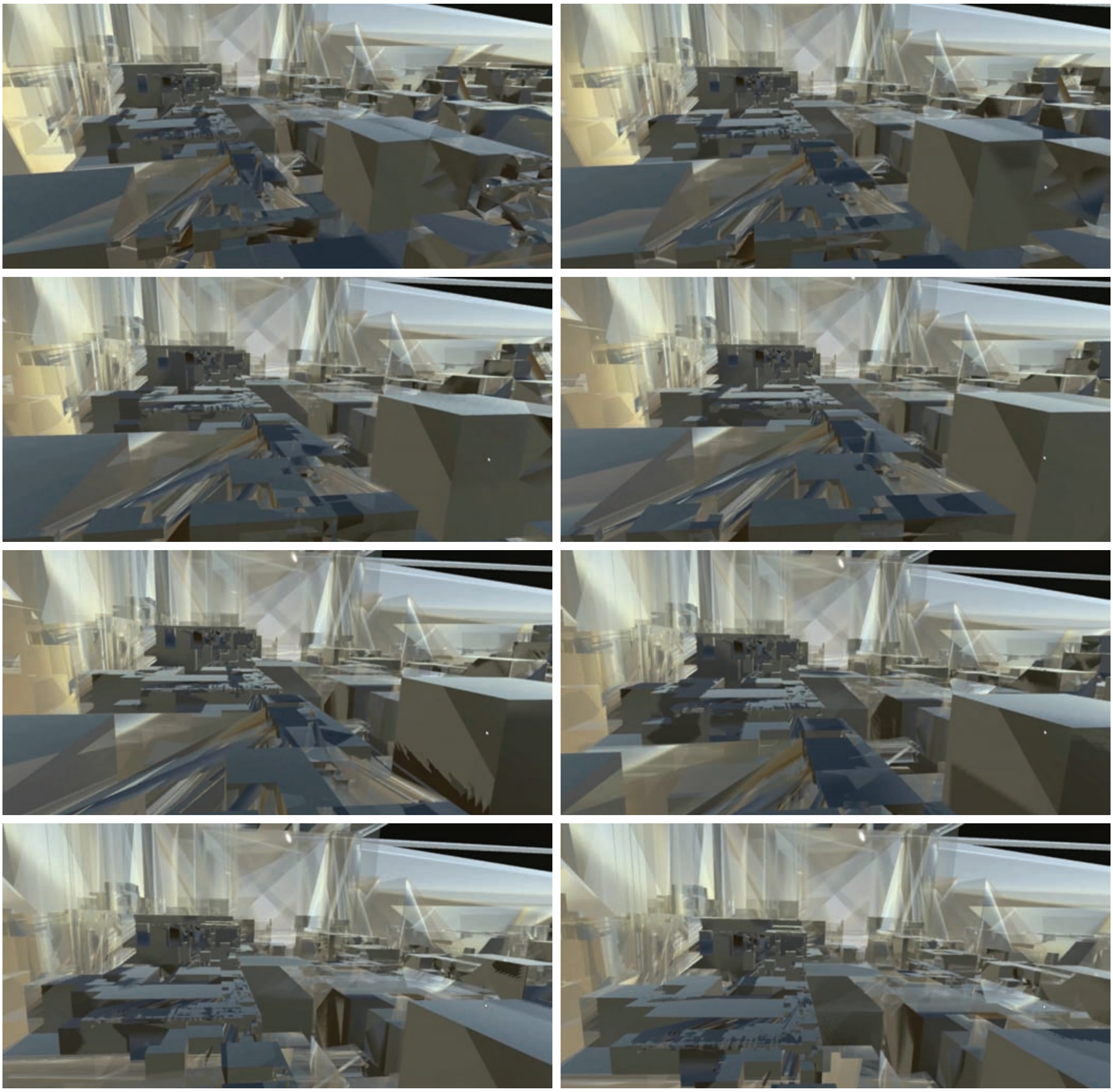
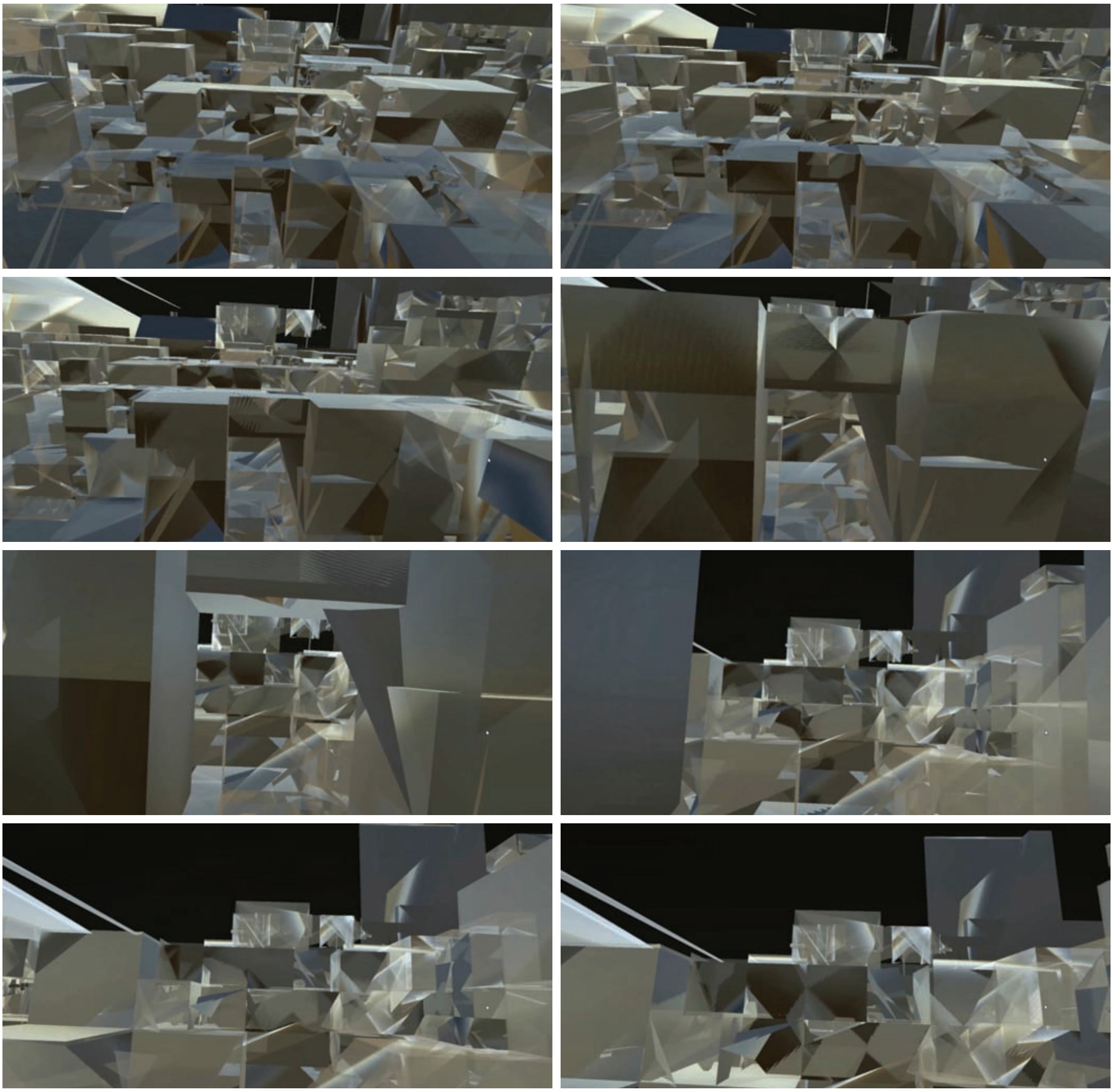
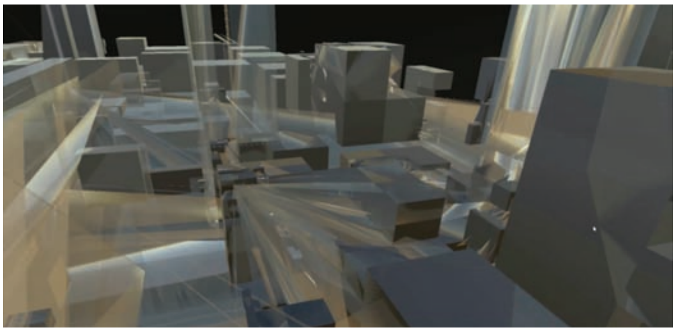
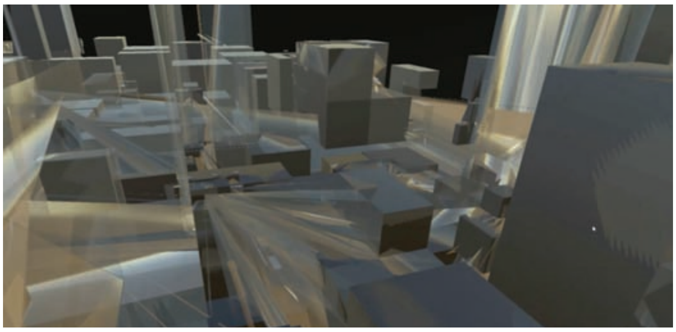
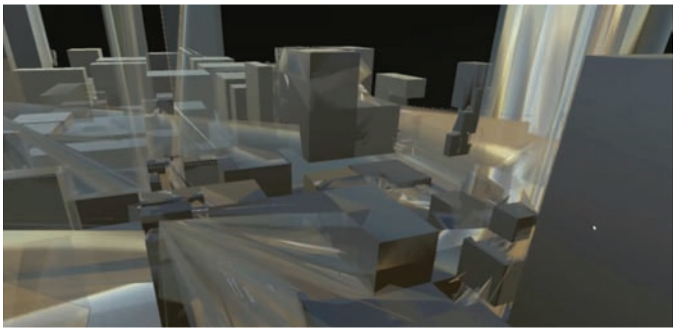
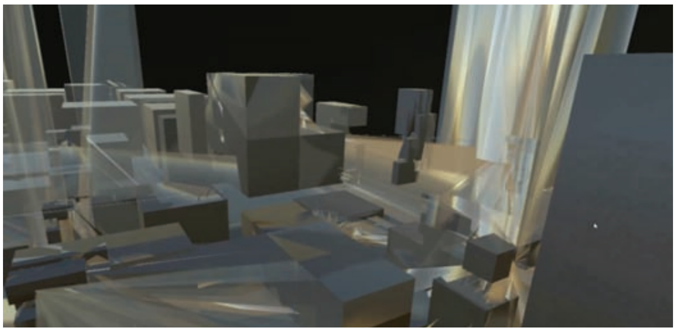
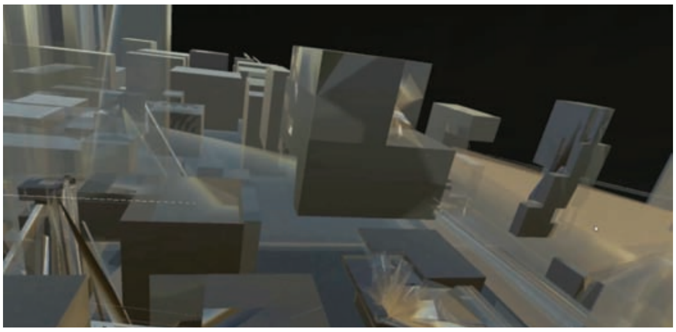
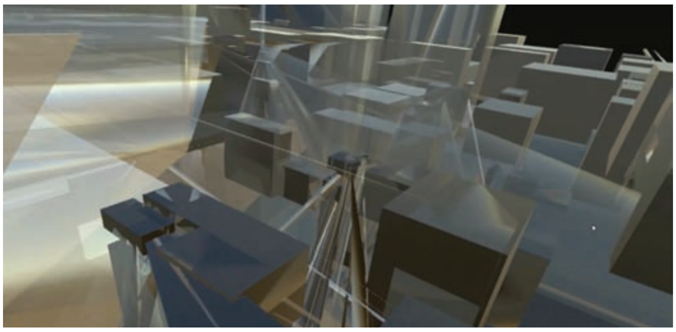
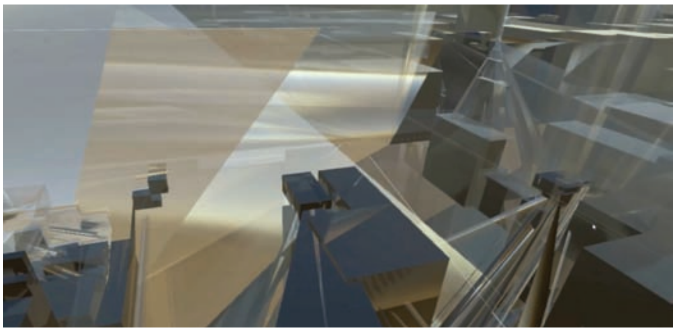
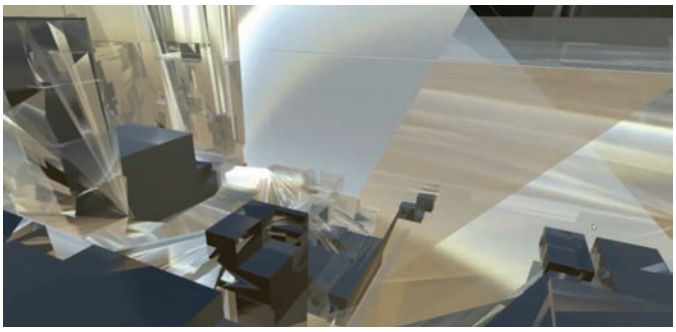


Figure 6.70 Screen captured moments of VR environment showing the surface confusion flicker. This VR experience can be viewed via Youtube on the link below.

https://www.youtube.com/watch?v=_1PYDKmJOyM

Figure 6.71 Digital architectural form in VR environment



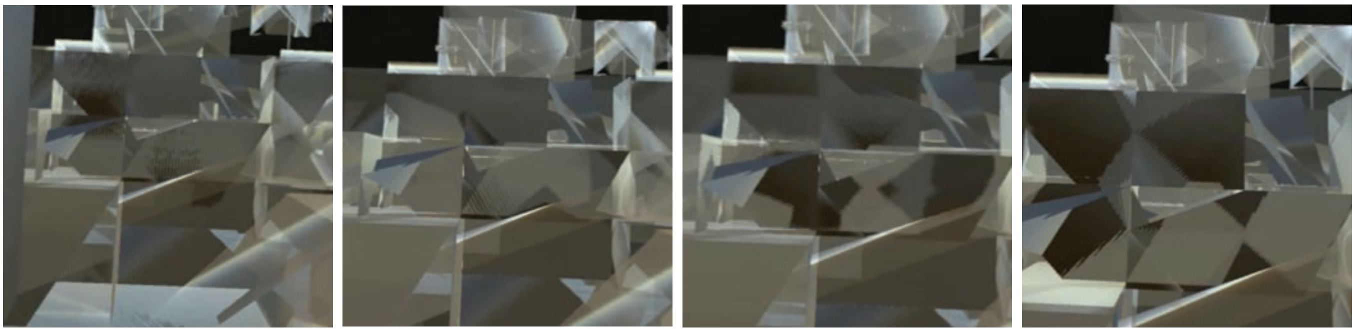
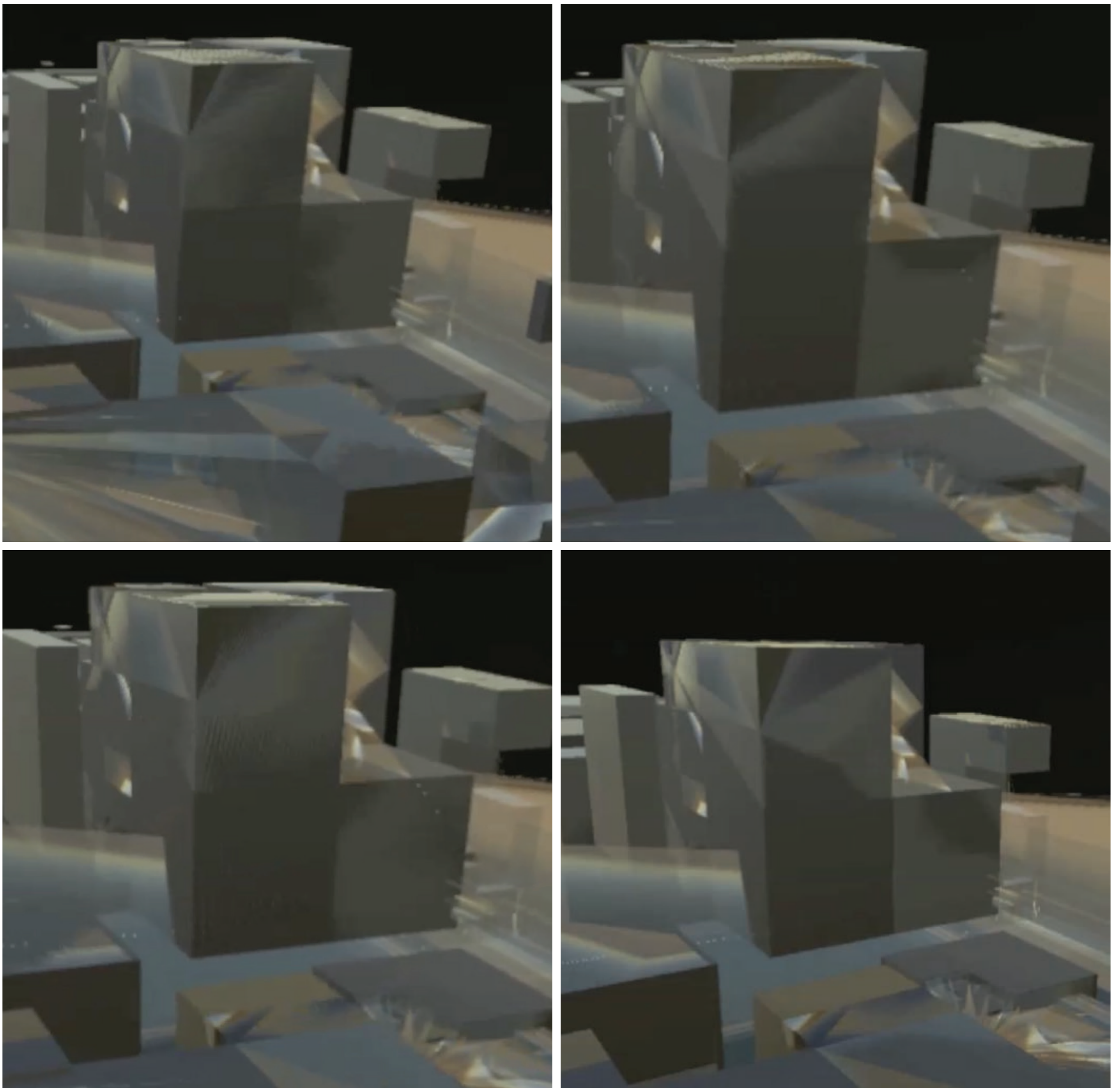
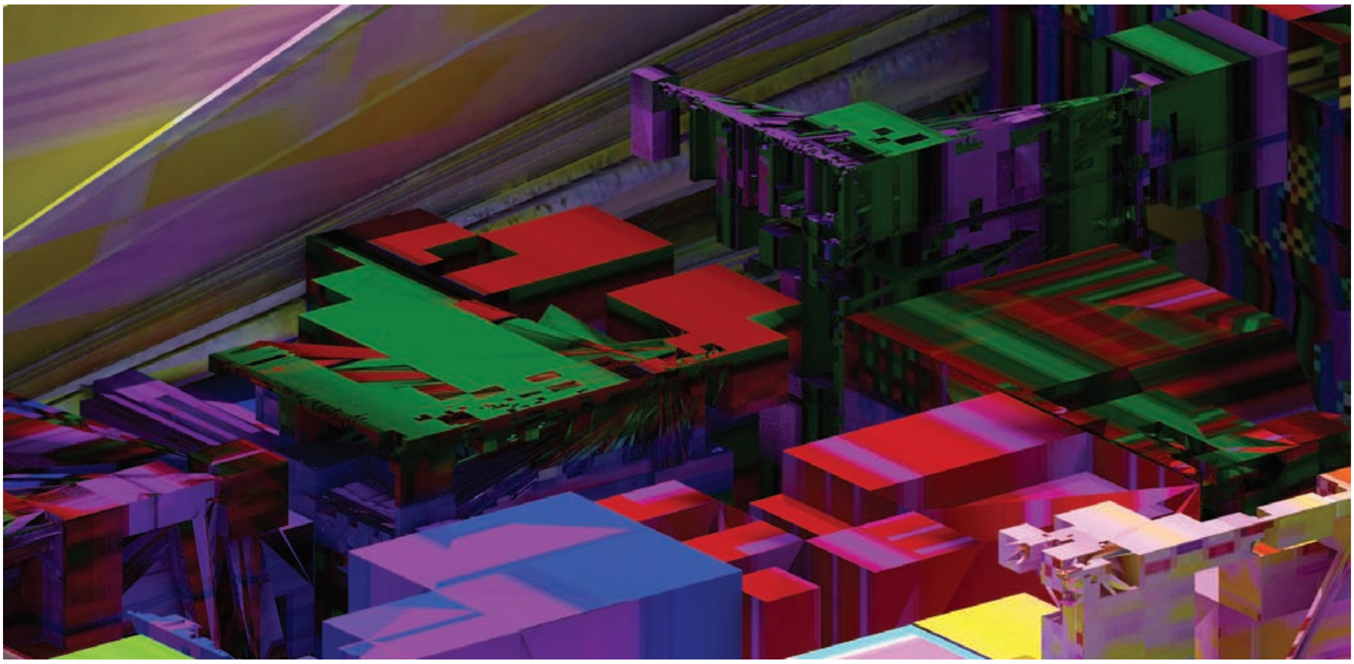


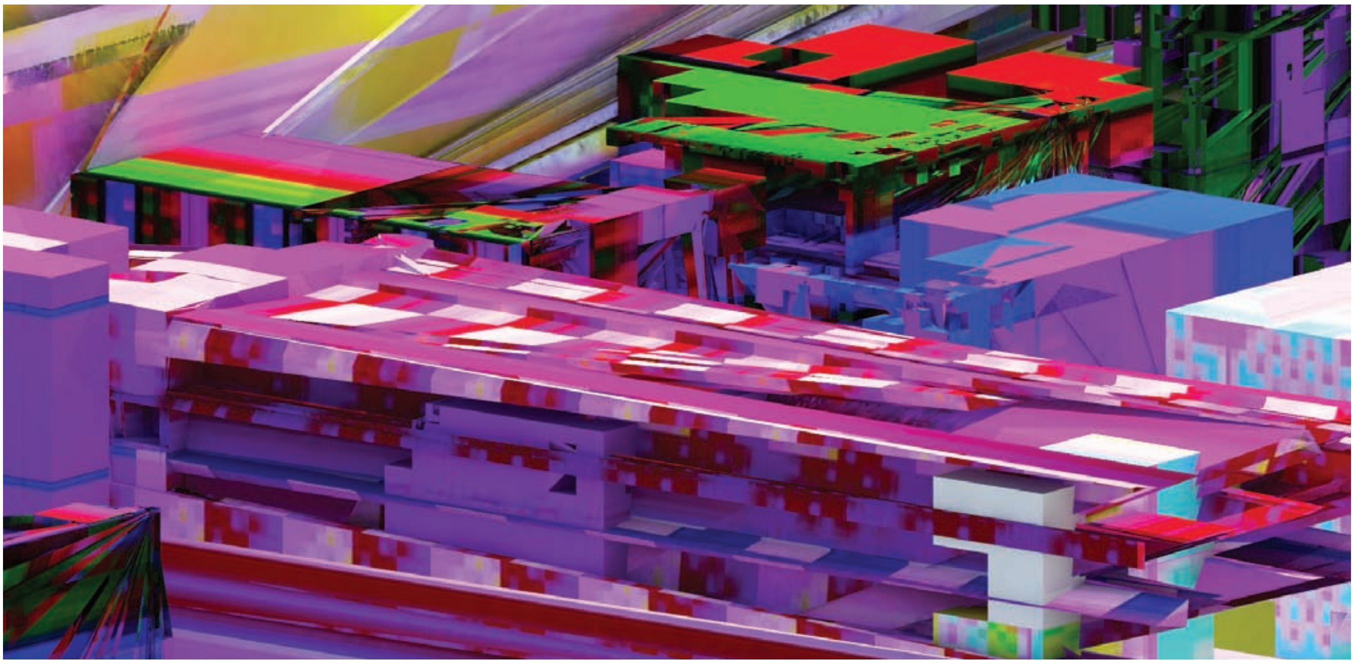
Figure 6.72 VR environment
showing surface confusion

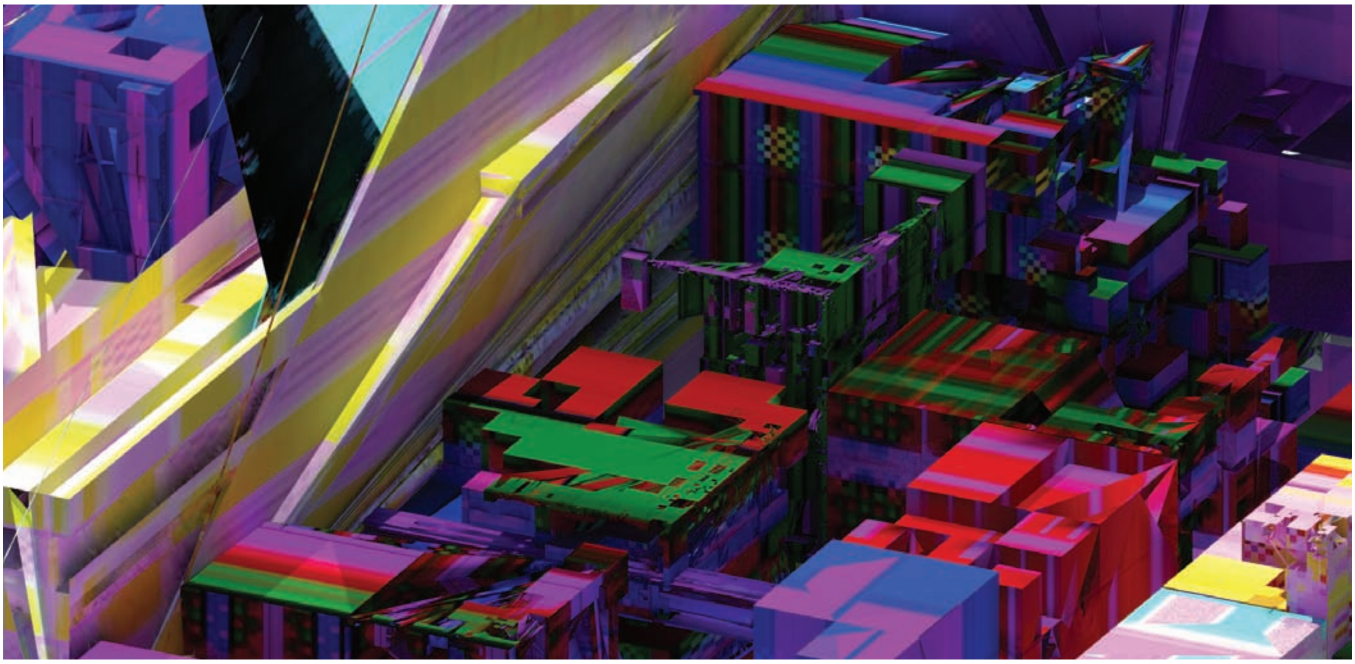


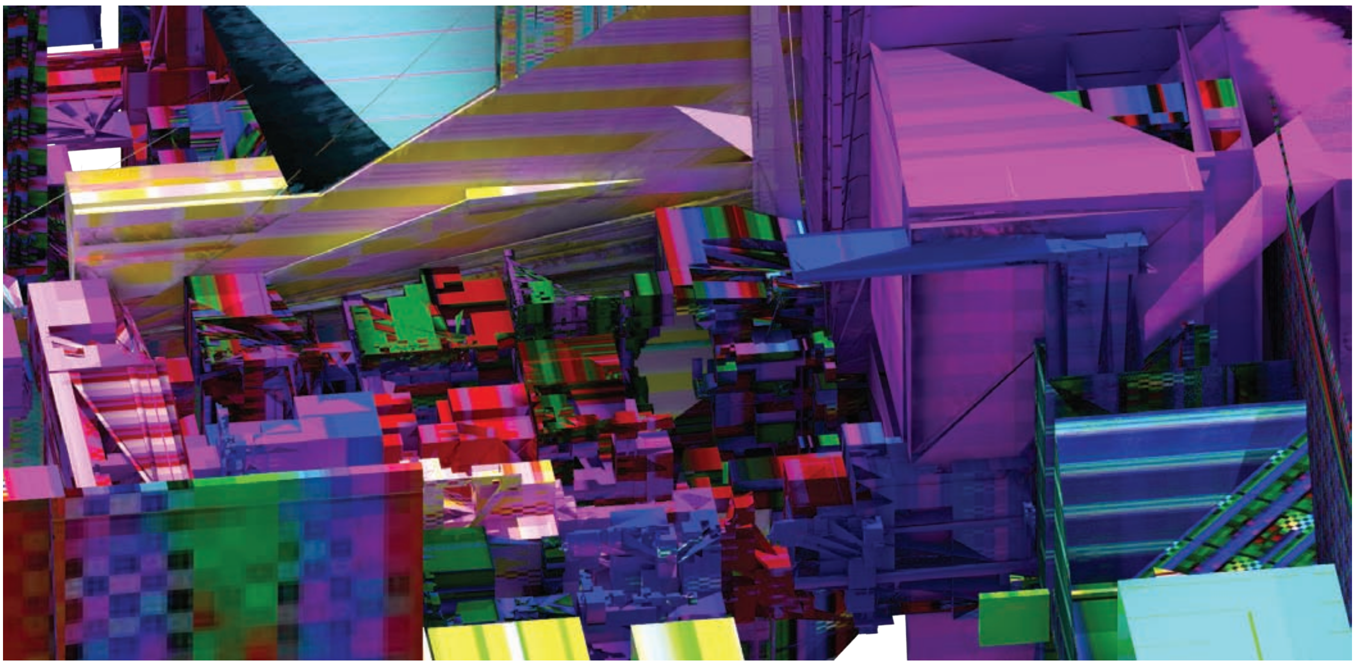
SCALELESS

Digital architecture often has an unresolved discernment around it because as humans who live in a physical world with tangible items and relative scale, we strive to relate what we see in the digital back to something from our physical reality. Digital architecture is not confined to our physical world and therefore does not require an assigned scale or materiality in the way the physical is constrained. In any digitally modeling software forms are conceivably generated at any scale imaginable. Mathews writes in his paper discussing Cedric Price's 'Fun Palace', "a virtual architecture like the Fun Palace would have no singular program but could reprogram and reconfigure itself to accommodate an endless variety of functions. By providing methodologies for coping with indeterminate systems evolving in time, cybernetics and game theory established the groundwork for information and computer technologies as well as for the virtual architecture of the Fun Palace." (Mathews, 2006) Though the Fun Palace was always intended to be built, it remains in the digital realm to this day. Mathews explains that virtual architecture with no singular program can be reinterpreted and adapt to various functions due to their virtual liberty. The scale of digital architecture is ambiguous, each form and every part to whole can exist at any comprehensible scale. Scale in the digital realm is dependent on personal perception, the viewer is able to rapidly and frequently shift between scales for each separate form based on personal experiences of space. The here reached architectural interpretation has no assigned scale.









CONVENTIONAL ARCHITECTURAL MATERIALS

Conventional architectural materials are habitually applied to digital architecture aiding human ability to connect digital form to physical environment, comprehend forms build-ability and tie form to relatable scale. Conventional architectural material application within the digital realm play with the virtual and reality intersection in both a pensive and playful nature simultaneously. Three preeminent material types that are conventional to architectural visualisation have been arbitrarily selected; concrete, metal and glass. When conventional architectural materials are applied to the contemporary architectural forms produced, the forms begin to have similar effects to that of natural glitches activated throughout the datamoshed animation, in the way we experience tension and release in clarity and confusion. Where there is glass we imagine a window, where there is metal we imagine a rusty street alleyway, the piping looks to be a jungle gym or climbing ladder of sorts and the concrete is perhaps a large apartment complex. Where forms relatability to our known physical environments is ambiguous, our perception is blurred. In these moments of confusion, the brain almost skips and jumps along the forms to the applicable moments of clarity. It is this tension and release of confusion and clarity throughout the chaotic digital environment that enhances the communication of the behavior of a glitch through 3d spatial form.

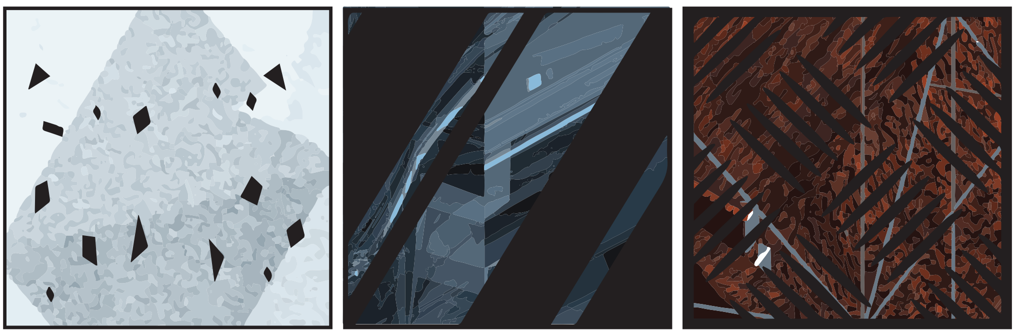


Figure 6.73 Glitch Architecture concrete noise

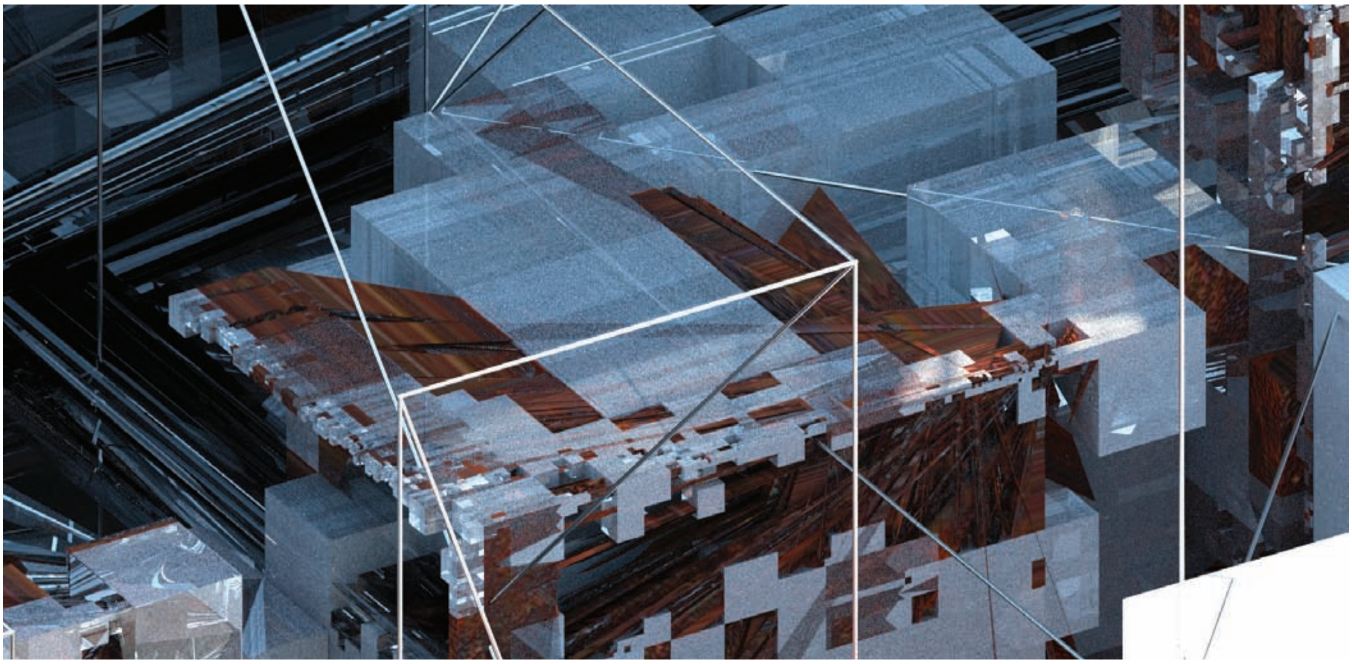


Figure 6.74 Glitch Architecture frosty glass due to digital surface overlap

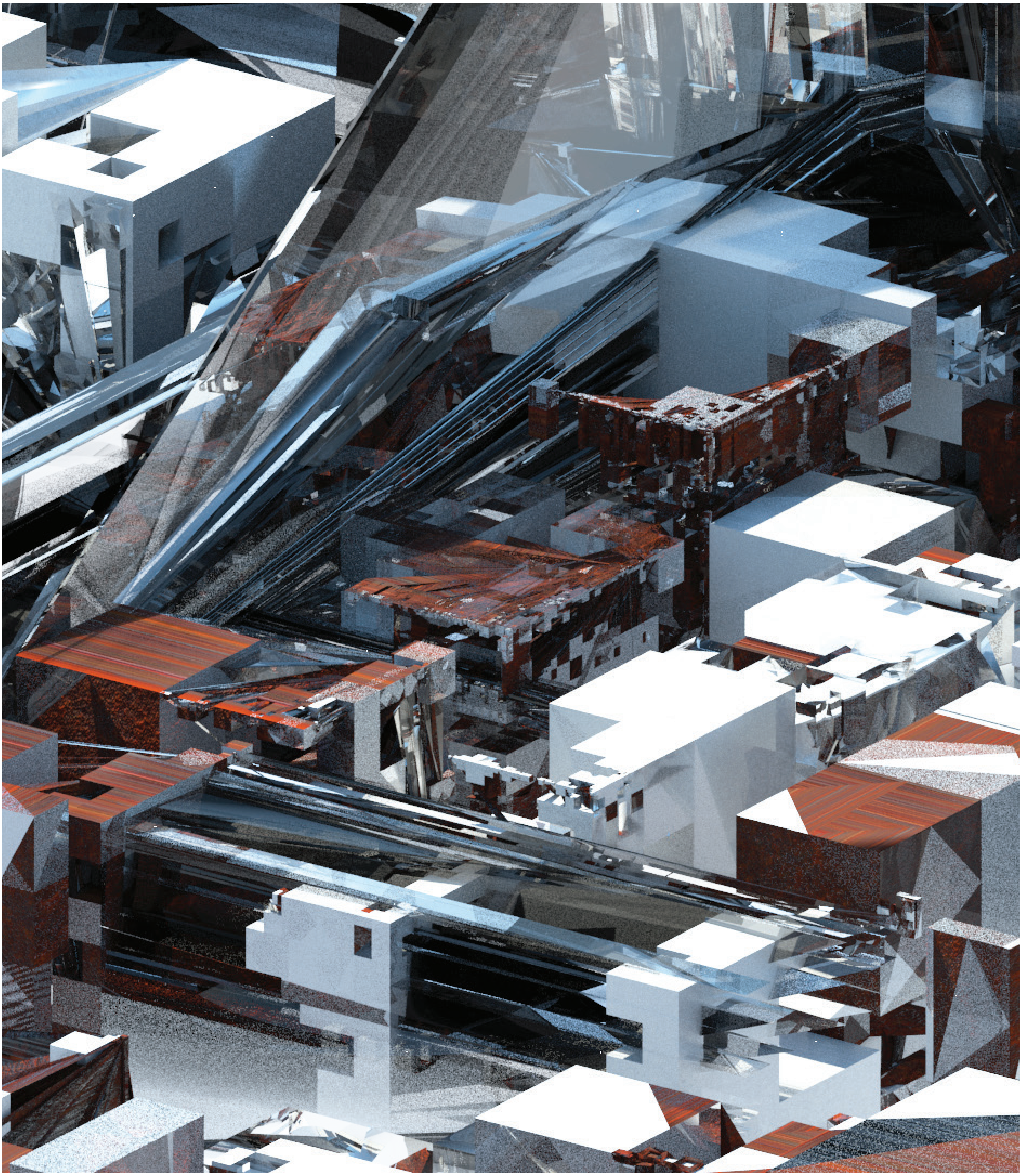
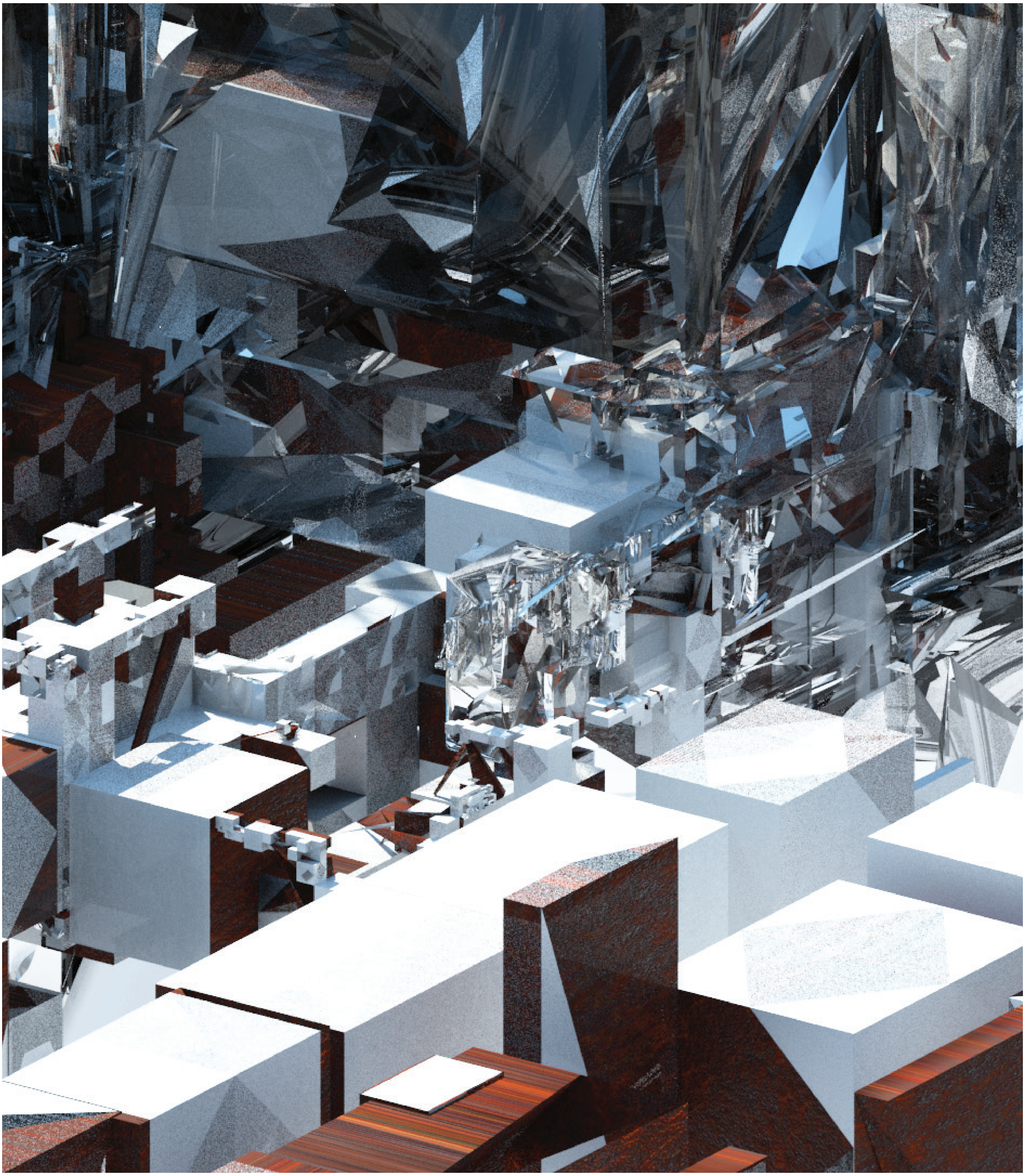


Figure 6.75 Glitched Future



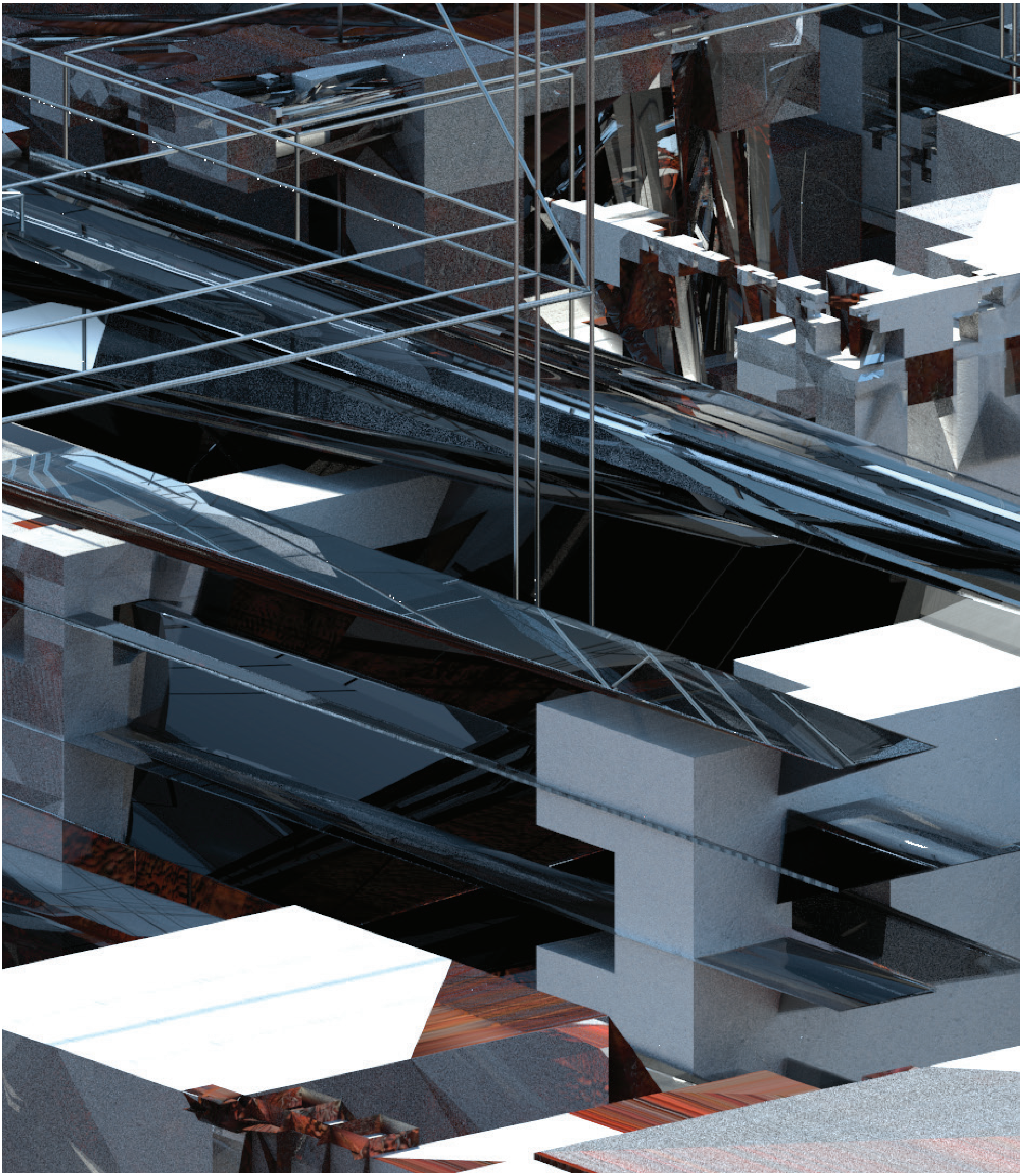
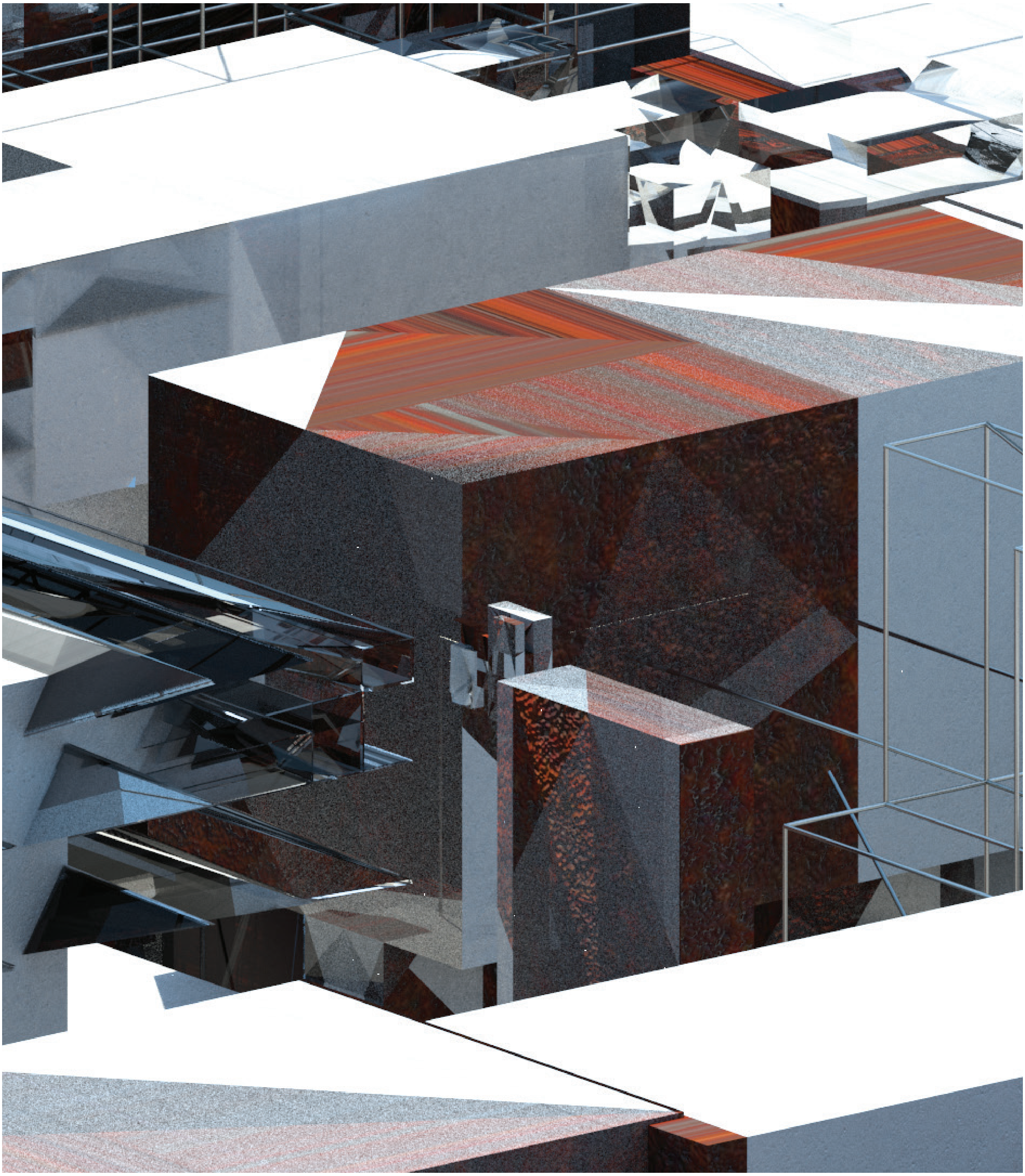


Figure 6.76 Glitch Shards



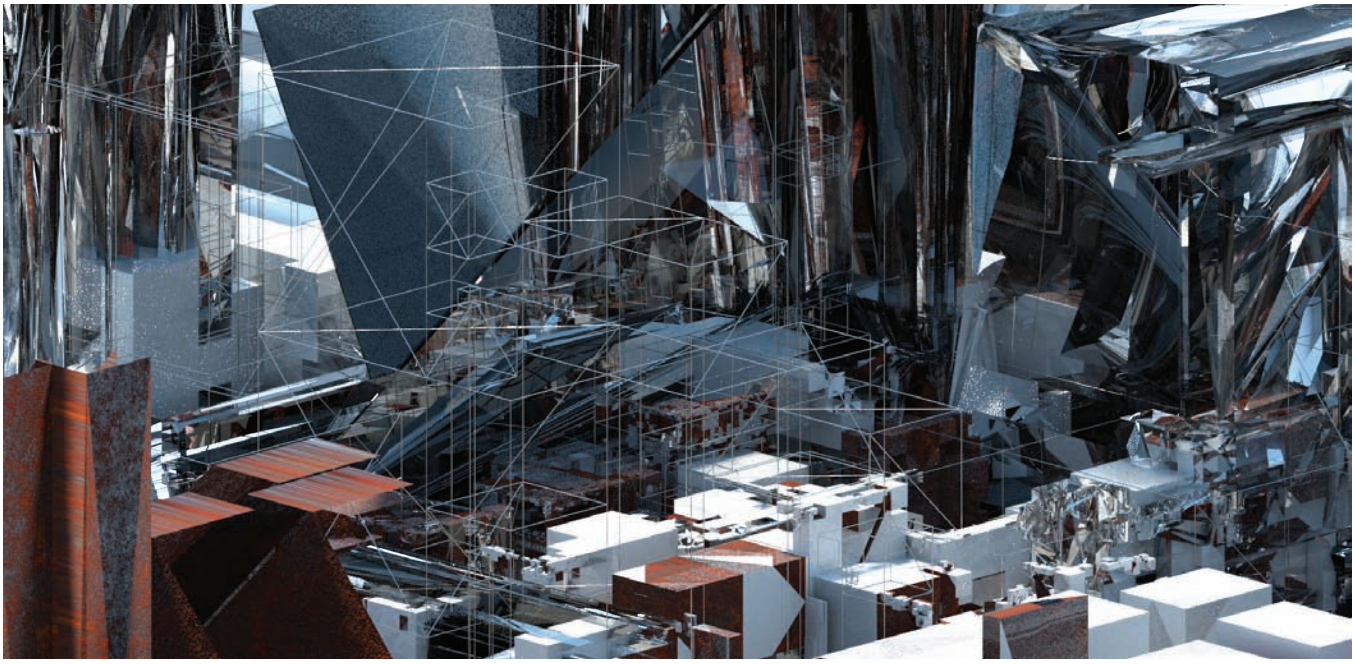


Figure 6.77 Glitch Architecture mixture of materiality

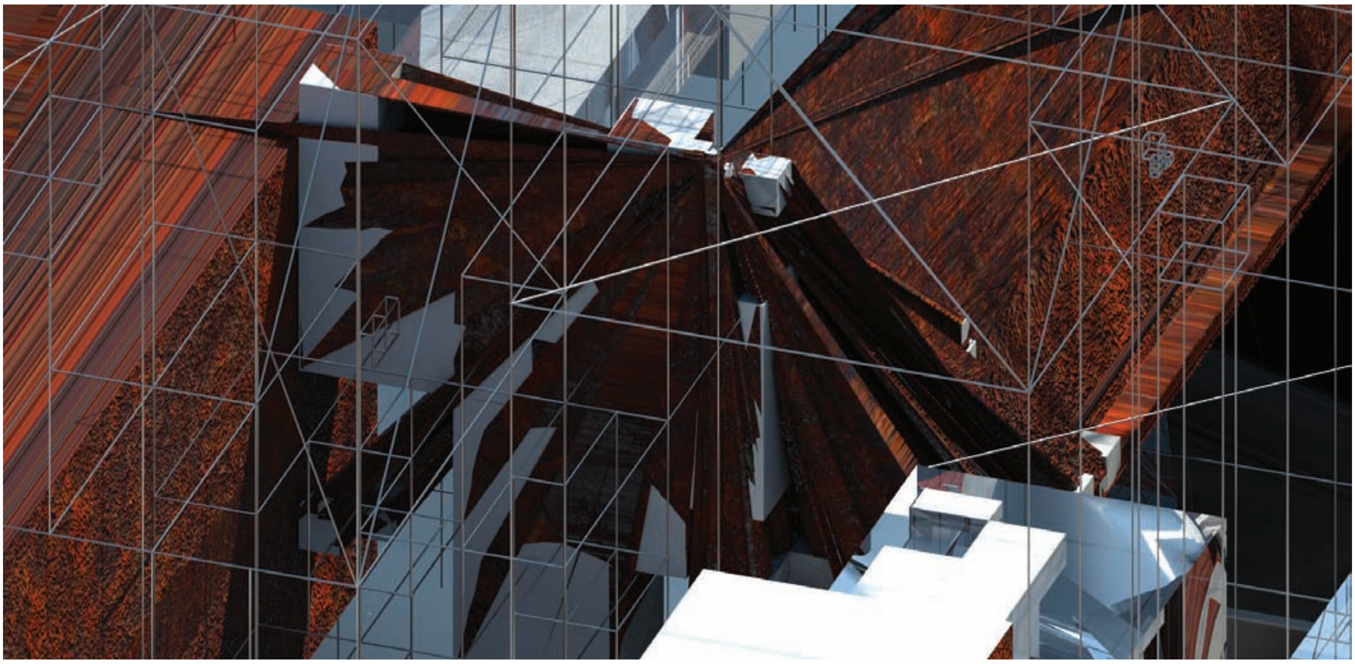


Figure 6.78 Glitch Architecture displaying and disrupting digital natural decay

Figure 6.79 Glitch Architectural Section creating interior spaces

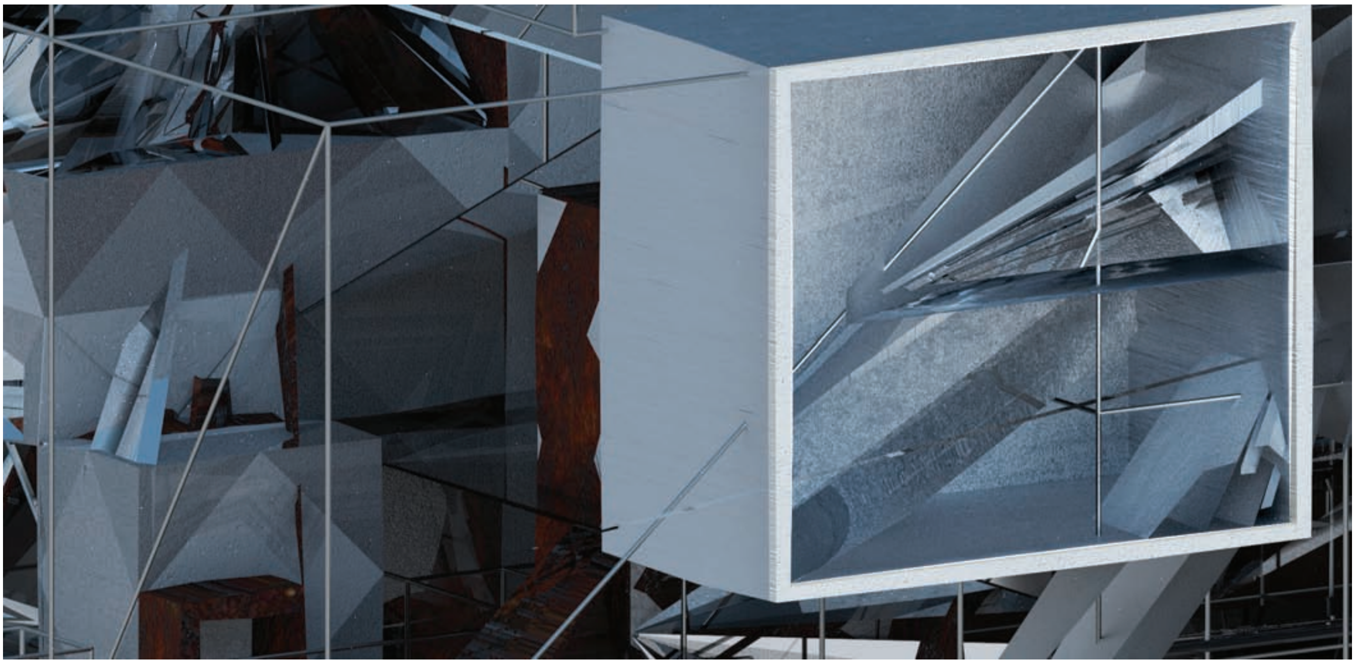
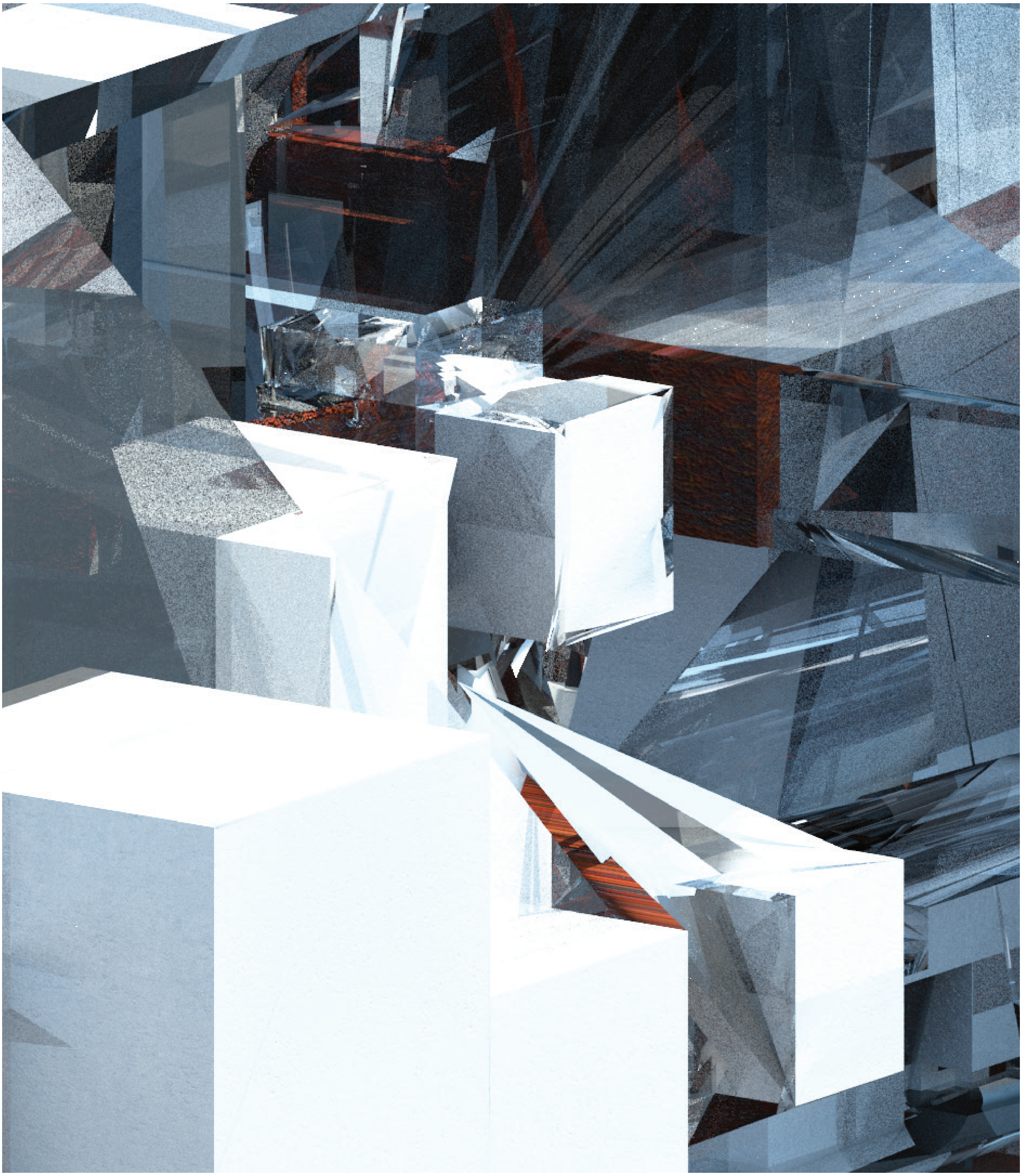


Figure 6.80 Glitch Architecture from below



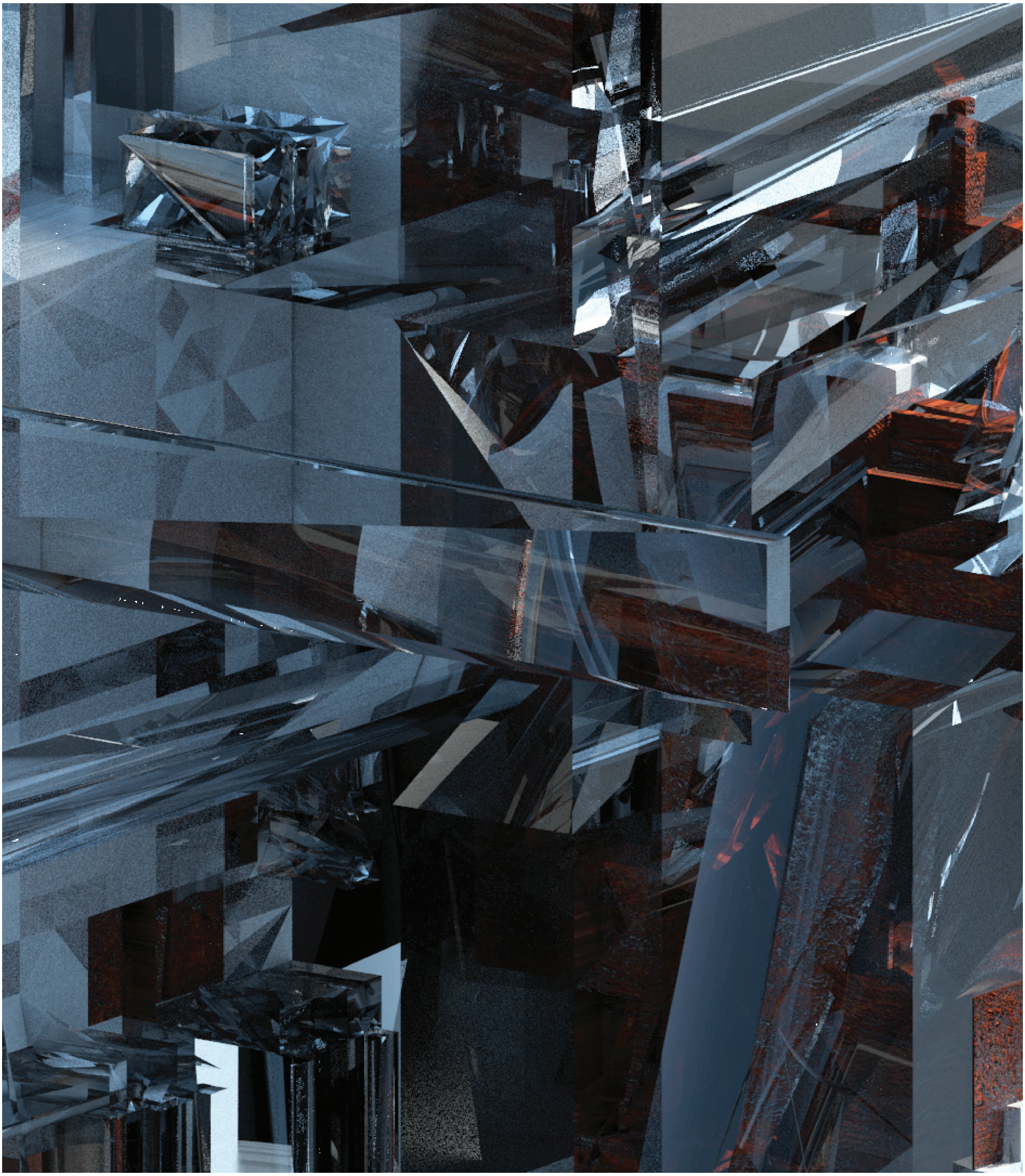


Figure 6.81 Glitch Architecture obscuring perceptions

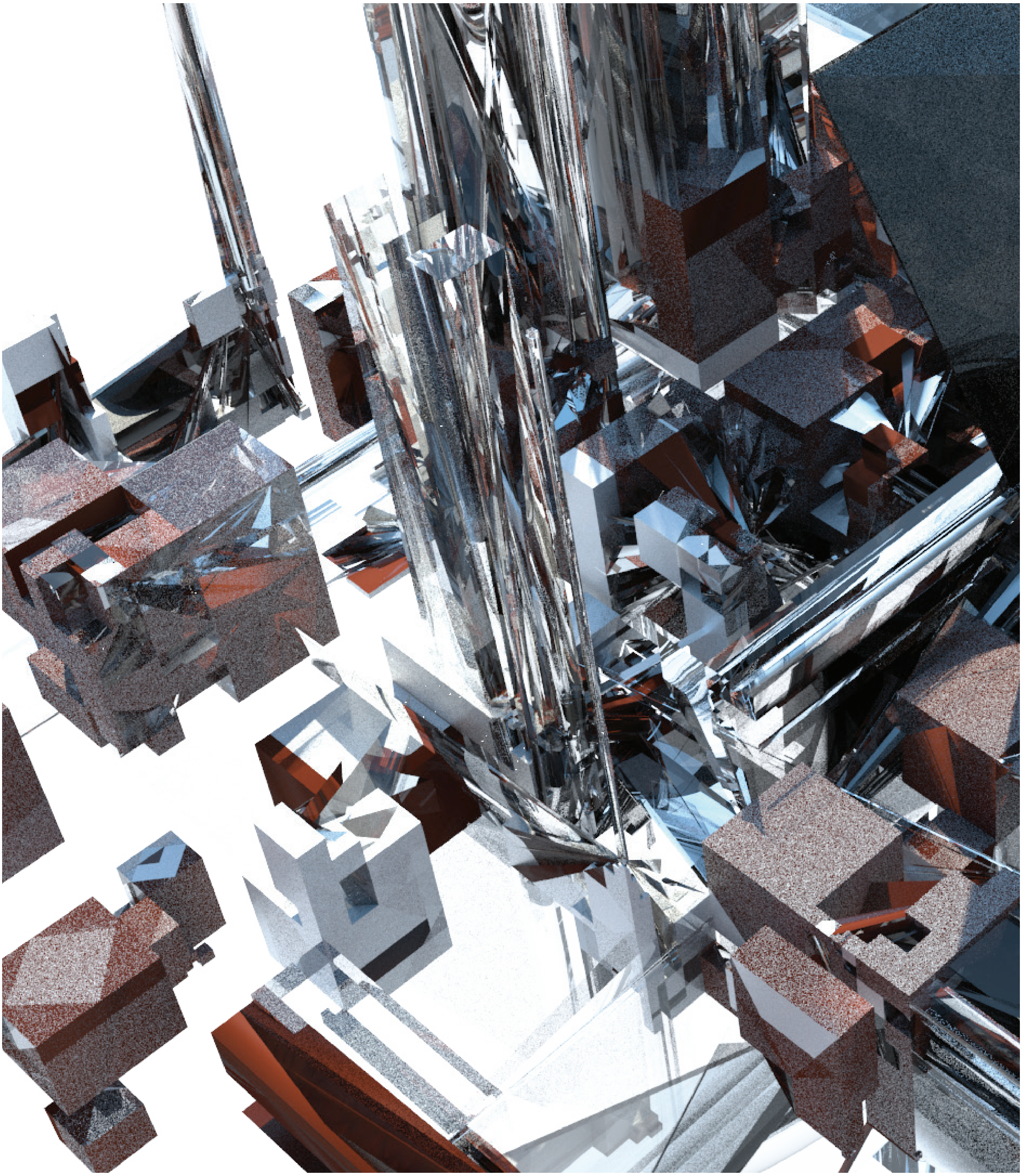
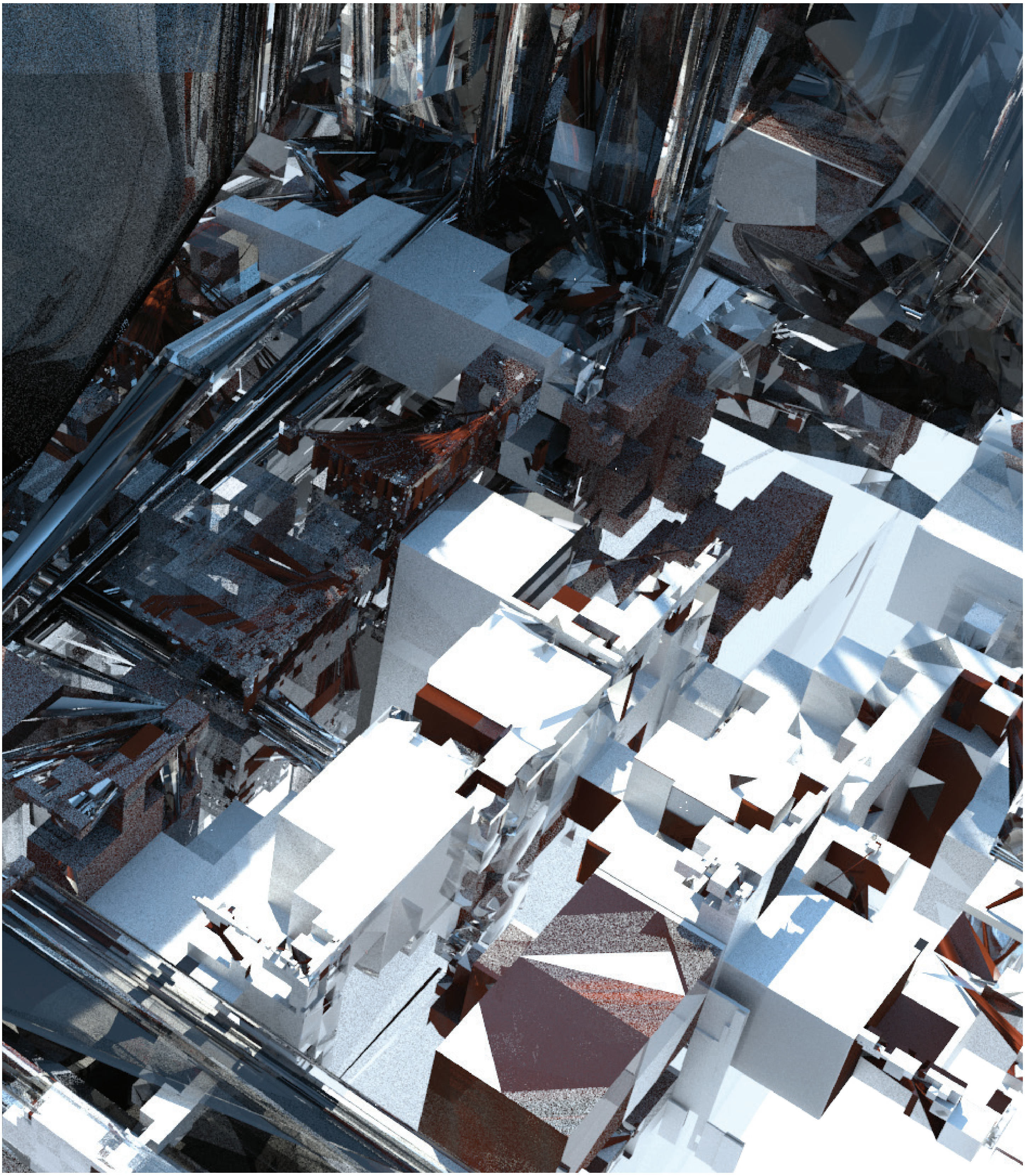
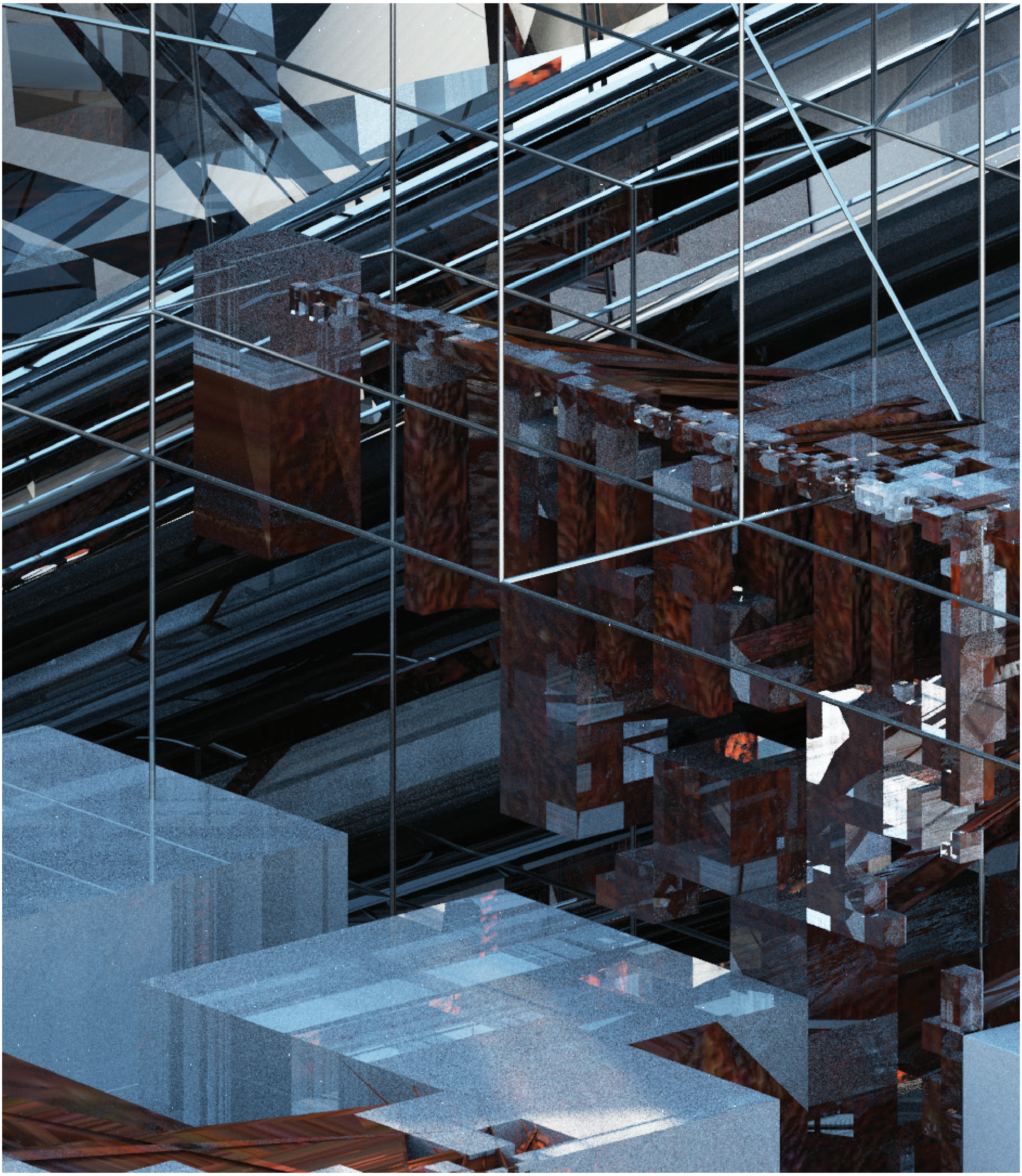


Figure 6.82 Glitch Architecture verticality





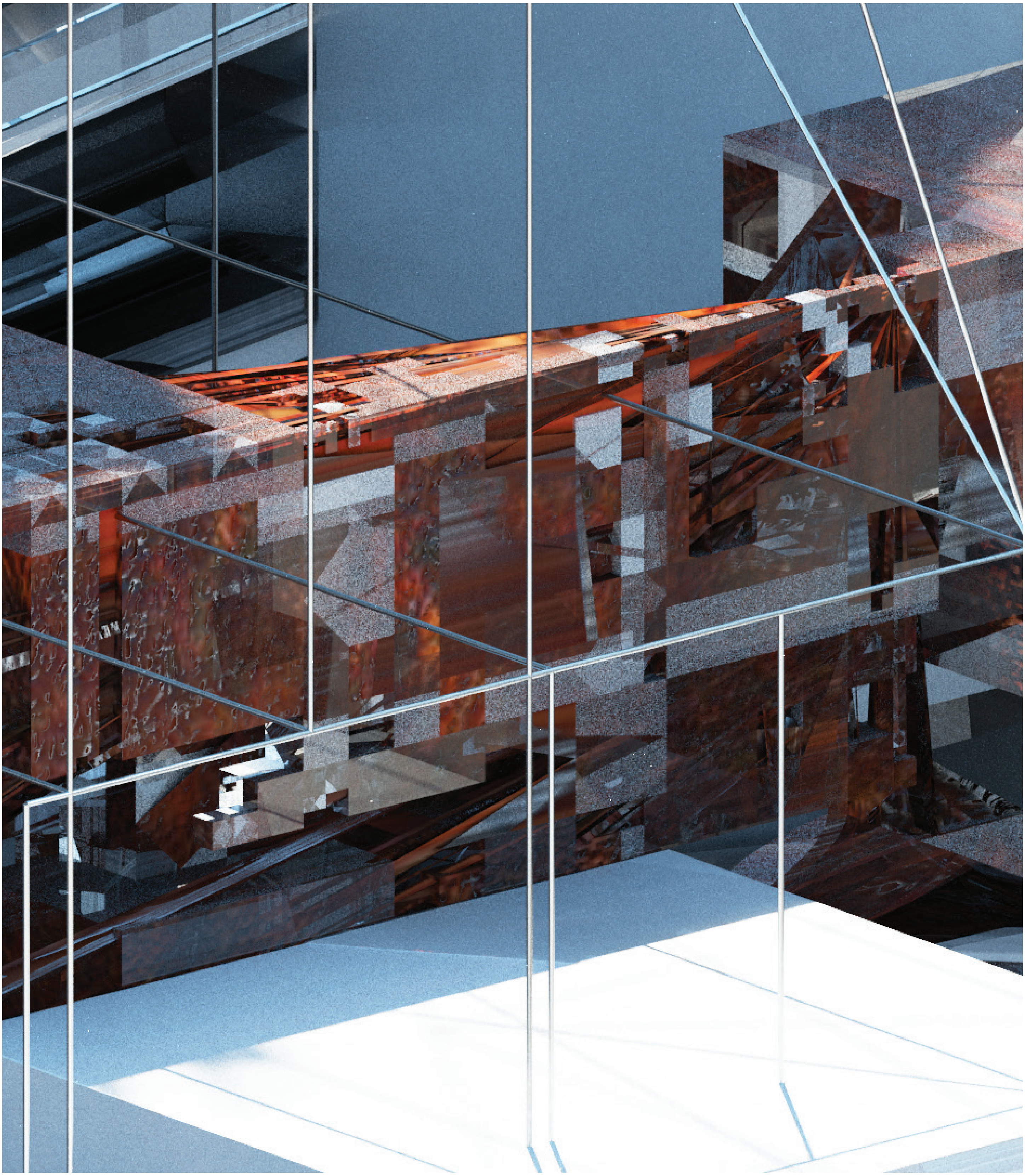
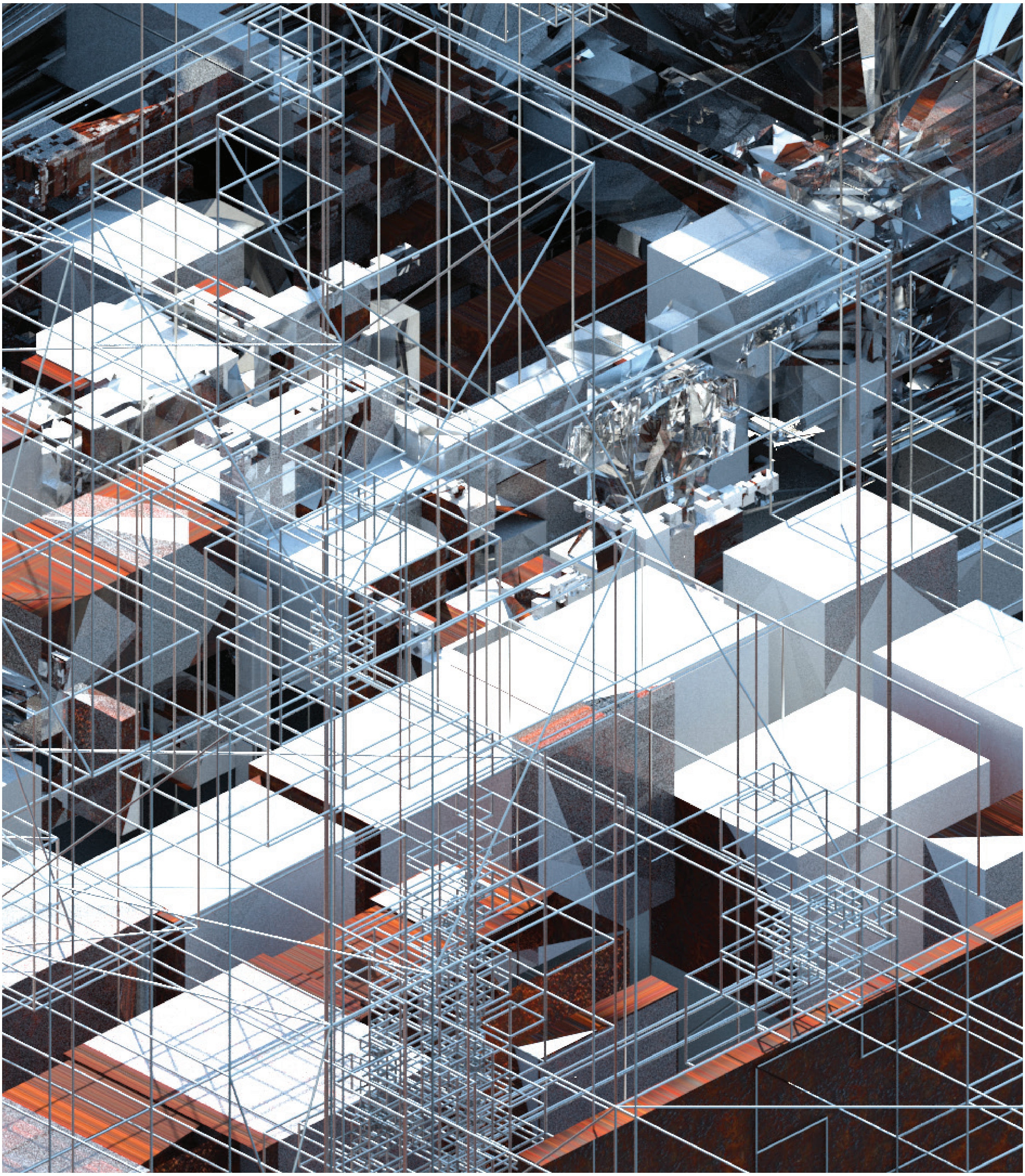


Figure 6.83 Glitch Architecture surface confusion facades

Figure 6.84 Glitch Architecture city chaos



GLITCH ART IS DEAD EXHIBITION

Gamut Gallery in Minnesota will be running the exhibition 'Glitch Art is Dead' from March 11th - 31st 2017. The exhibition will feature 80 international artists work. Out of over 2 thousand submission to the open call exhibition only 41 artists were selected. 4 of the above images were selected and will be included in the exhibition. (Gamut, 2017)

Figure 6.85 Glitch Art is Dead exhibition held at Gamut Gallery, Minnesota. (Gamut, 2017)

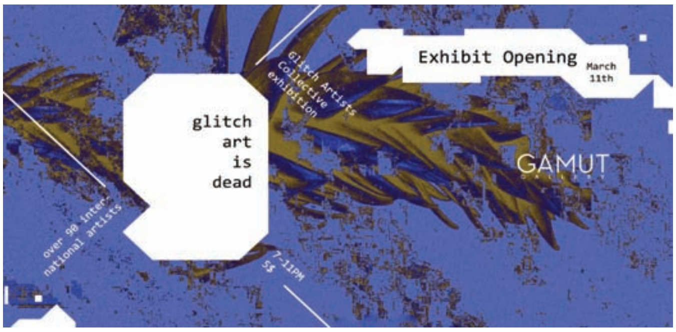
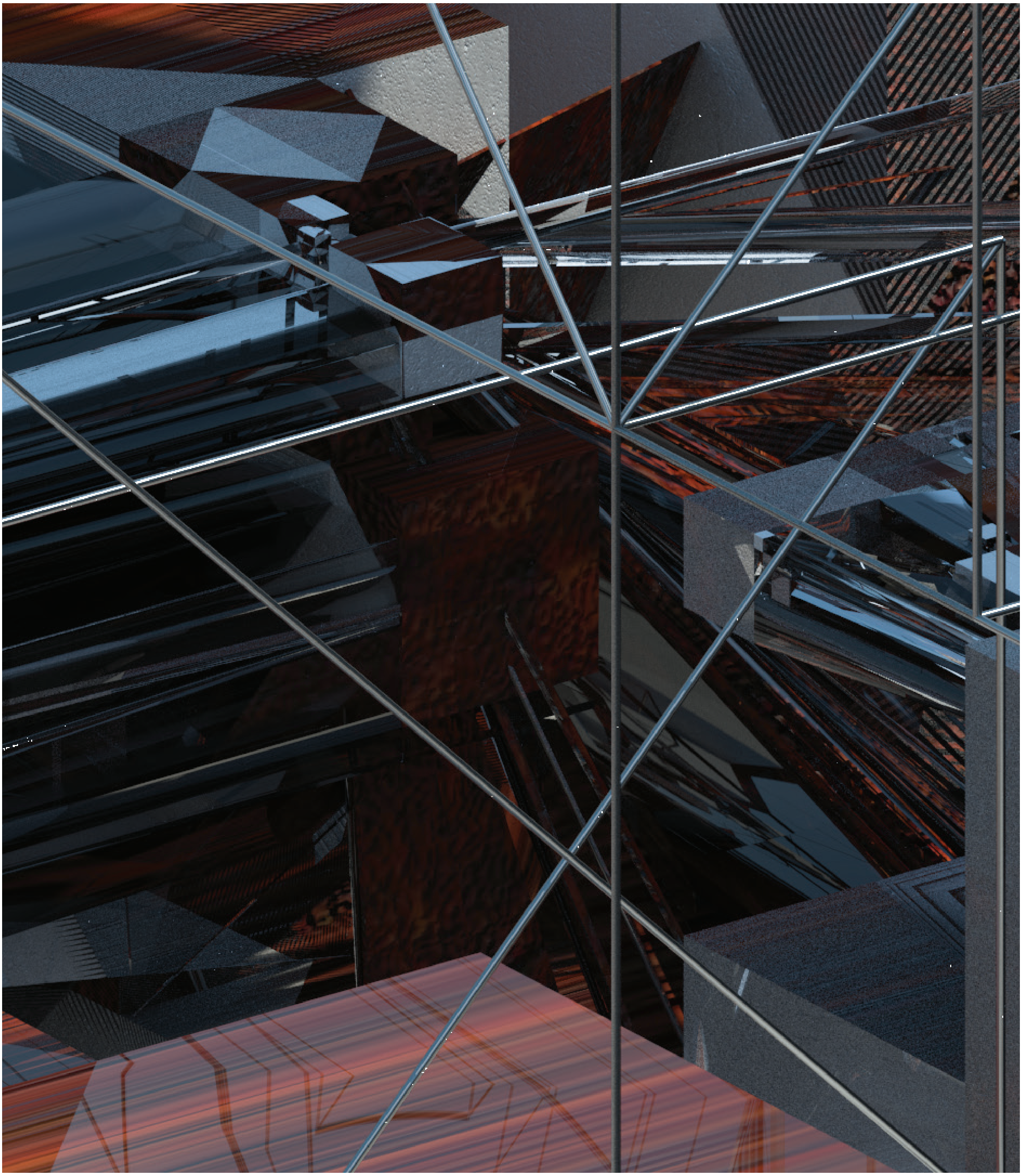


Figure 6.86 Work featuring on Gamut Gallery website for their Glitch Workshop (Gamut, 2017)



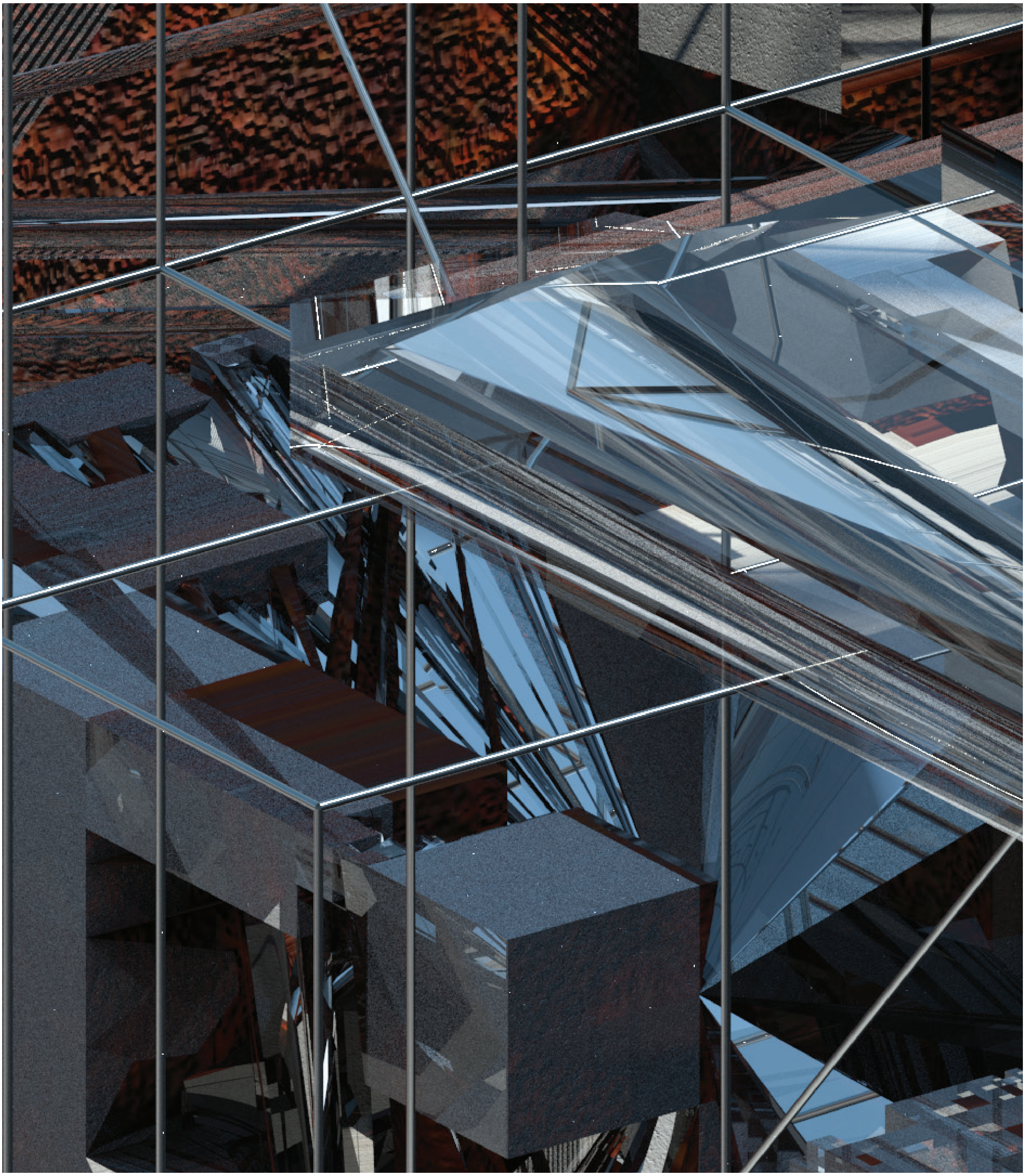
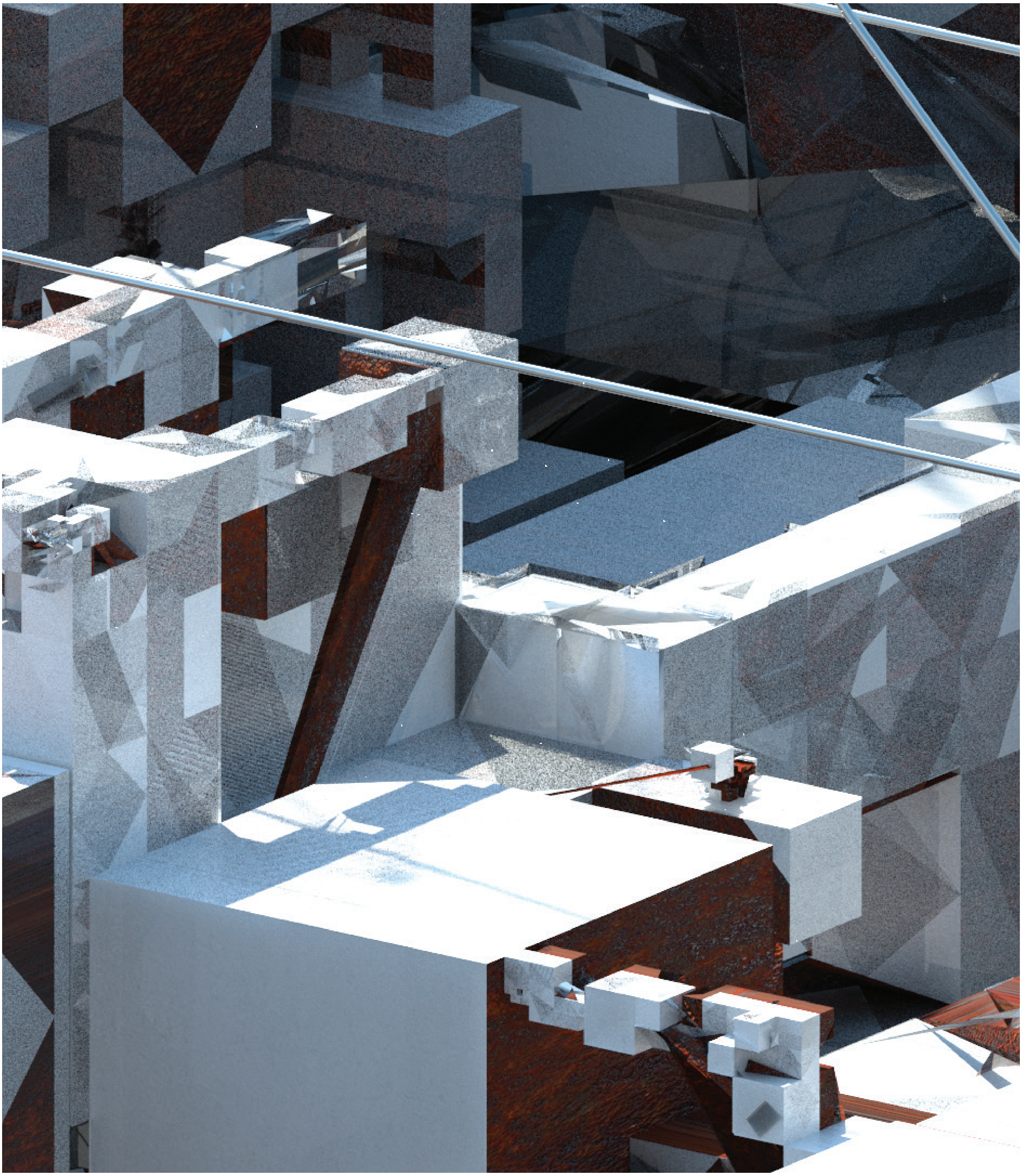


Figure 6.87 Glitch Architecture conventional material application



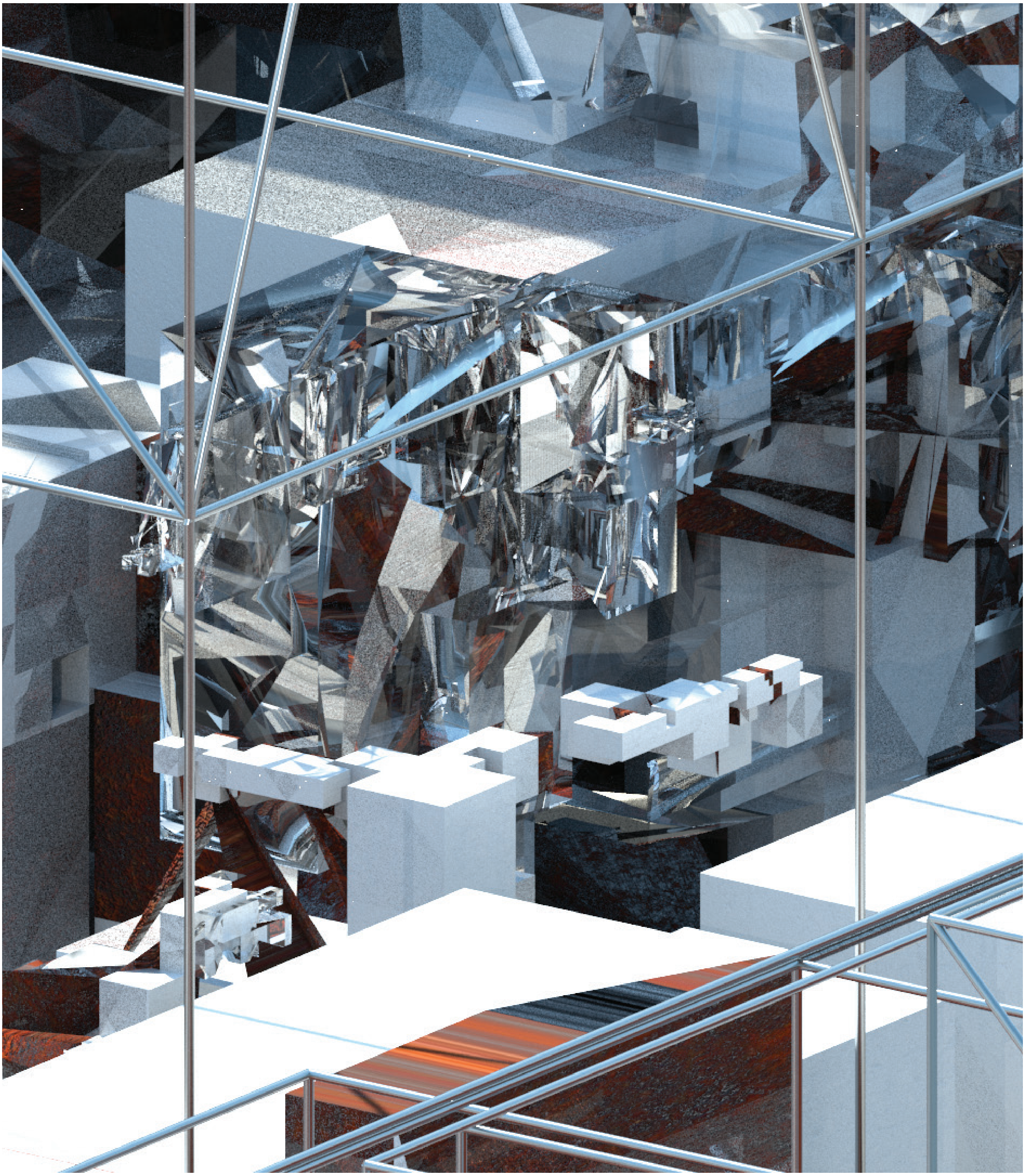
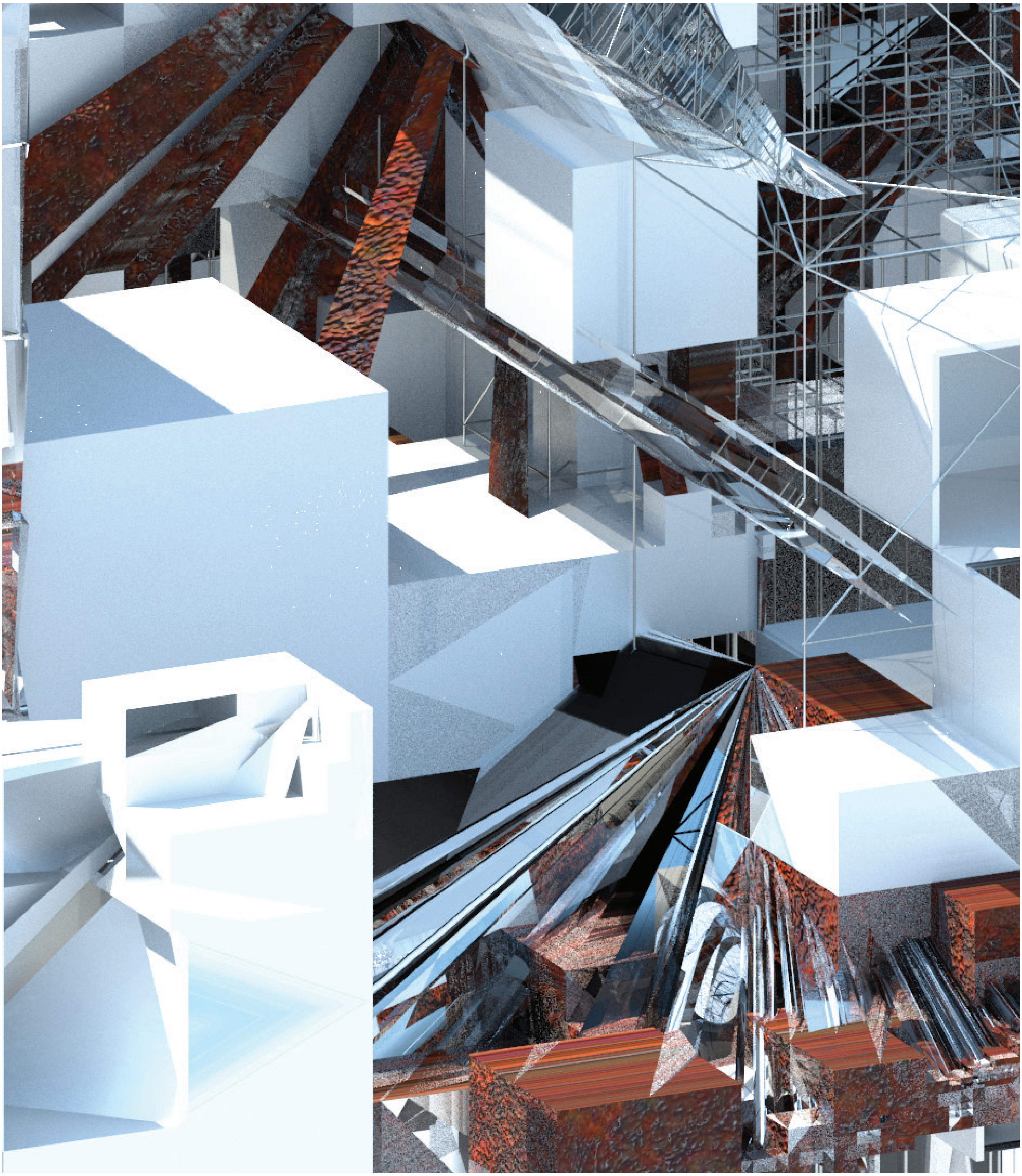


Figure 6.88 Glitch Architecture part to whole



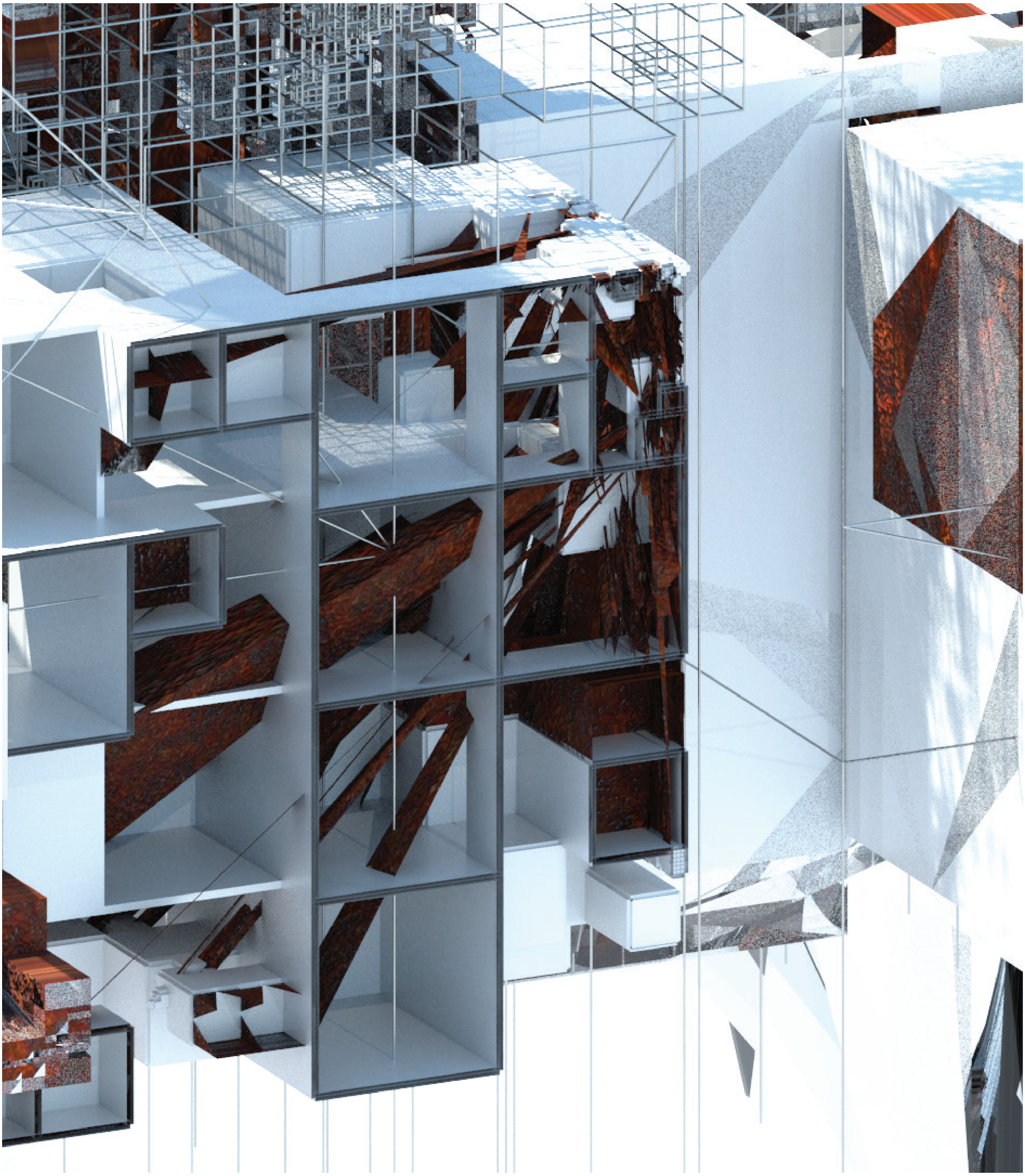
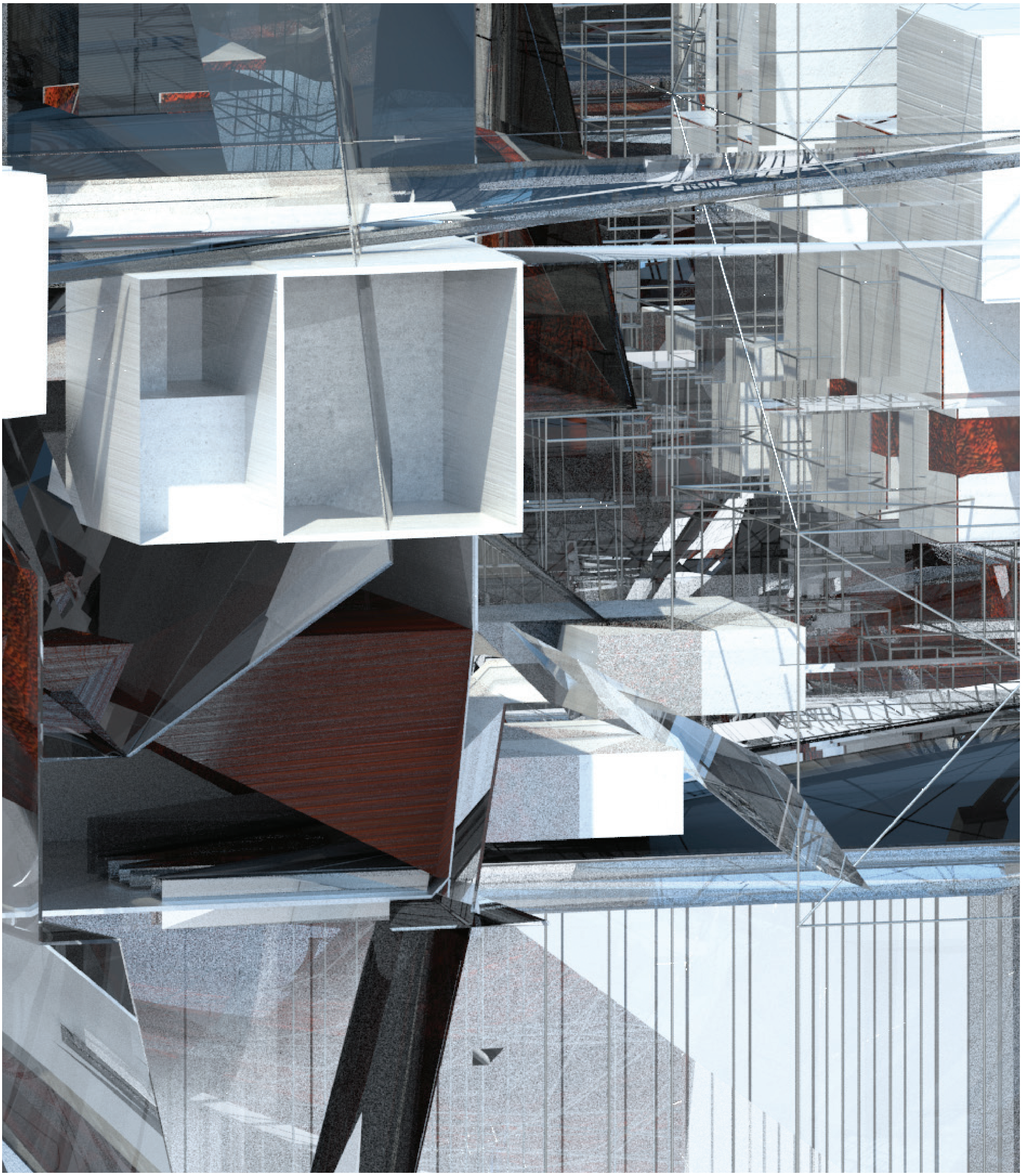


Figure 6.89 Glitch Architectural Section Living



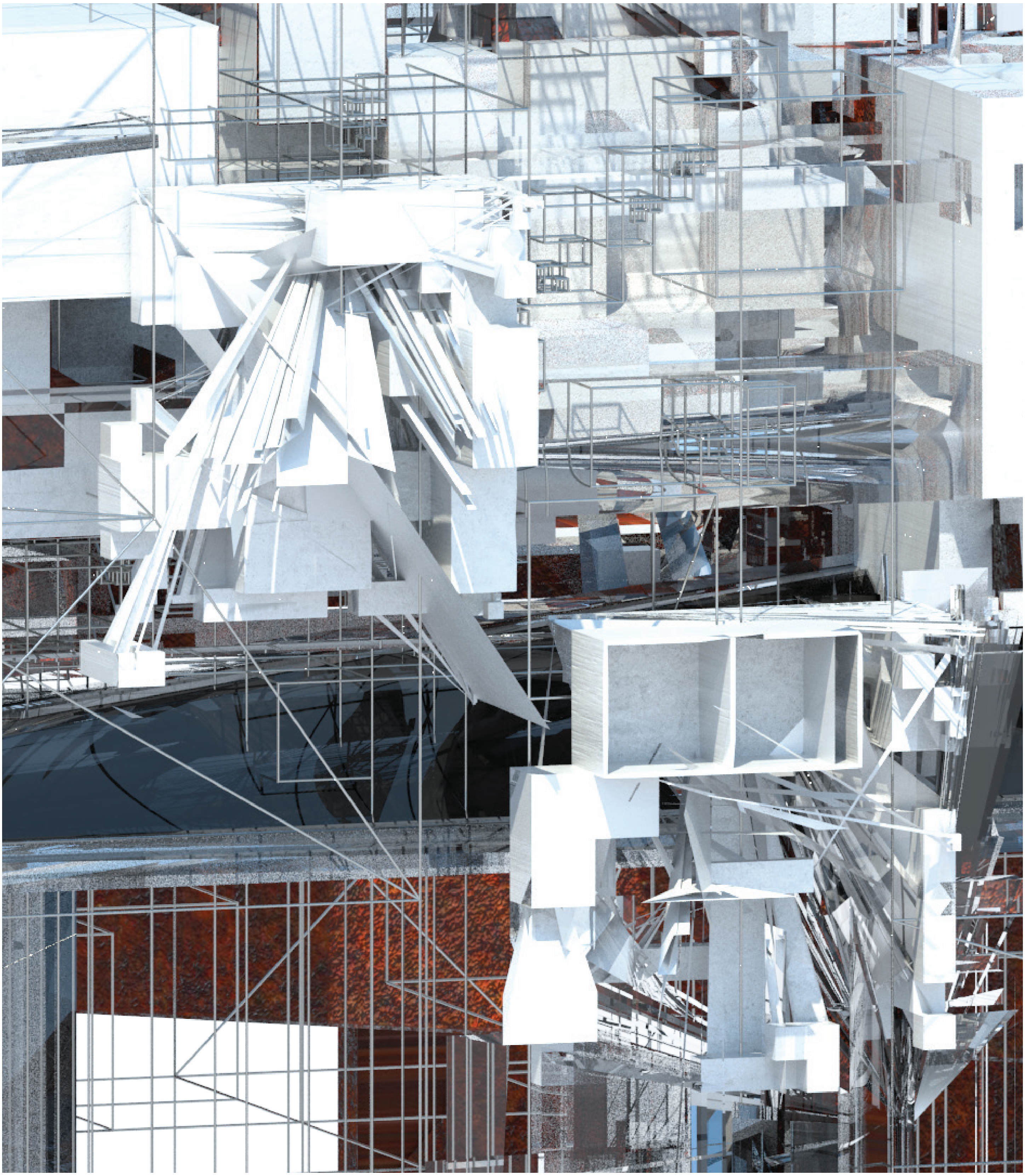
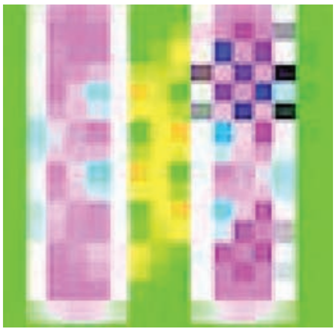
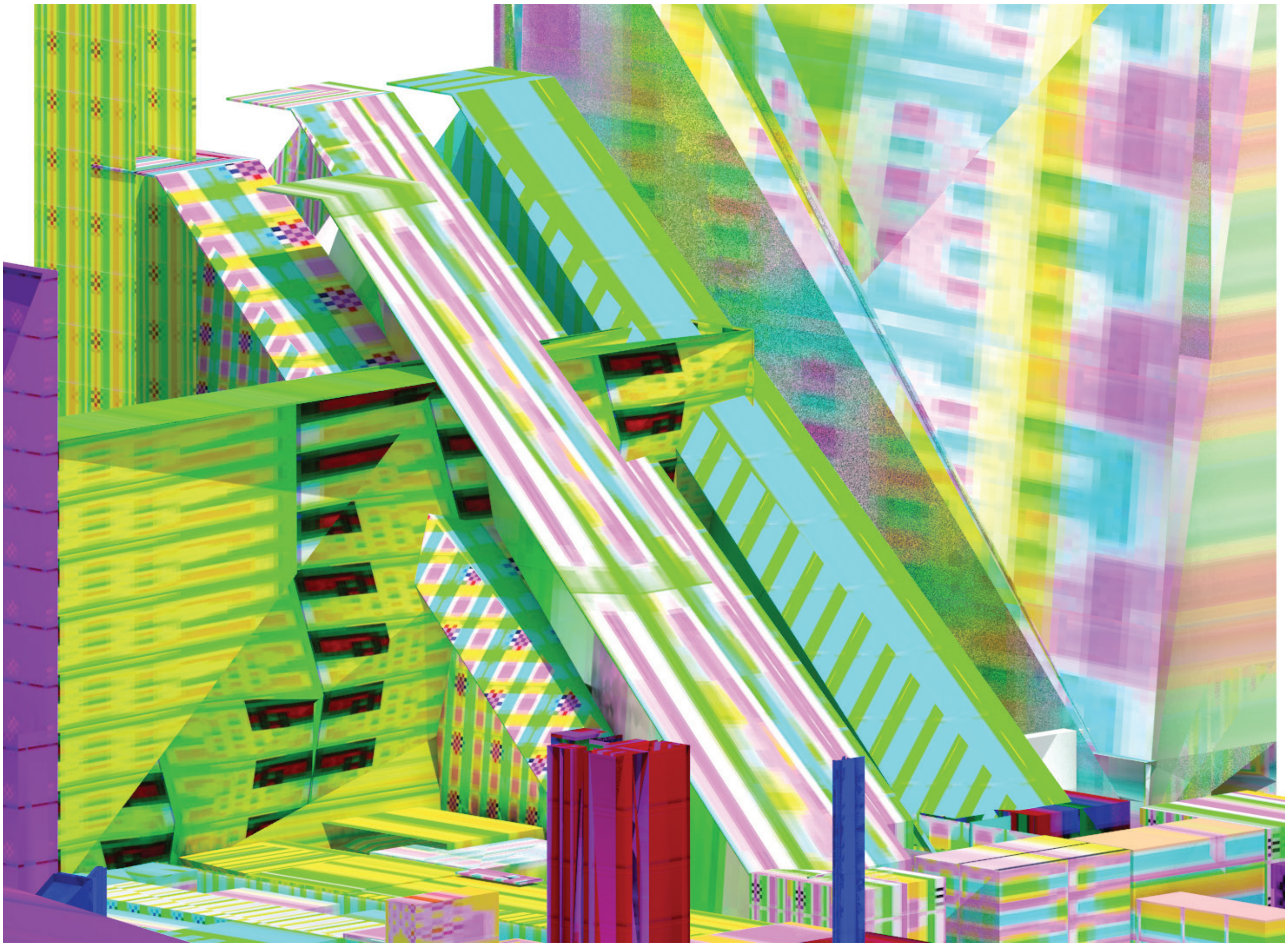


Figure 6.90 Glitch Architecture Post Humanist

DRAWING FUTURES AT UCL

This stage of the research contributed to the lecture presentation ‘Drawing Future’s’ given at The Bartlett School of Architecture UCL in London, UK by Associate Lecturer of University of Technology Sydney, Matthew Austin. (Austin, 2016)





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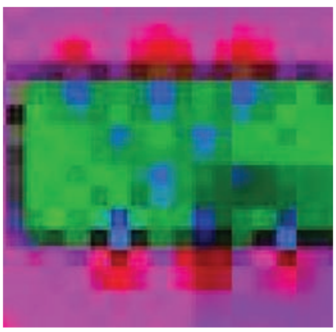
CHAPTER SIX

THE GIVEN AND THE INFORMED

The unique contribution of this research is that it treats glitch in two forms; first as 'the given' and second as 'the in-formed'. In contrast precedent works tend to observe the relation between these two forms in an immediacy. Two glitches are always seen on the same horizon, producing no triumphant hierarchy between each other, which is bounded to a phenomenological deadlock, whereas its subjective capture finds room to grow into static protocols. Therefore, glitch works tend to create monolithic outcome, although the glitch itself seeks a vertical dimension and an excessive remainder between glitch as 'the given' and glitch as 'the in-formed'.

A historicisation of glitch forms is abundant in precedent works as provided above that are mere 2D viewings of glitch. The insufficiency of critical approaches bounds glitch to signification under the broad influence of semiology on architecture. Undertaking a challenging attempt to provide an ontology of glitch-itself, this research looks into the autonomy of glitch towards a theory of glitch-space that emerges from its dichotomised ontology between 2D and 3D. However speculative it may sound, our approach does not totally abandon representational aspects of glitch as an immediate expression of the real. Rather, by using available tools, it makes state of the art data interpretations that are instrumental to the



It was initially observed that the glitched photos encountered at the beginning are rich in 'information aesthetics' that precipitates a decline in 'information perspicuity'. This causal relationship between aesthetics and meaning is not the focus of this research, but the becoming of glitch as 'the in-formed' escaping from an algorithmic system of numerical data as 'the given'. The acceptance of glitch that requires the prioritisation of the aesthetic in excess of the algorithmic is prevalent. The comfort zone of such aesthetic understanding exacerbates the first problem by veiling it behind candy-coloured outcome.

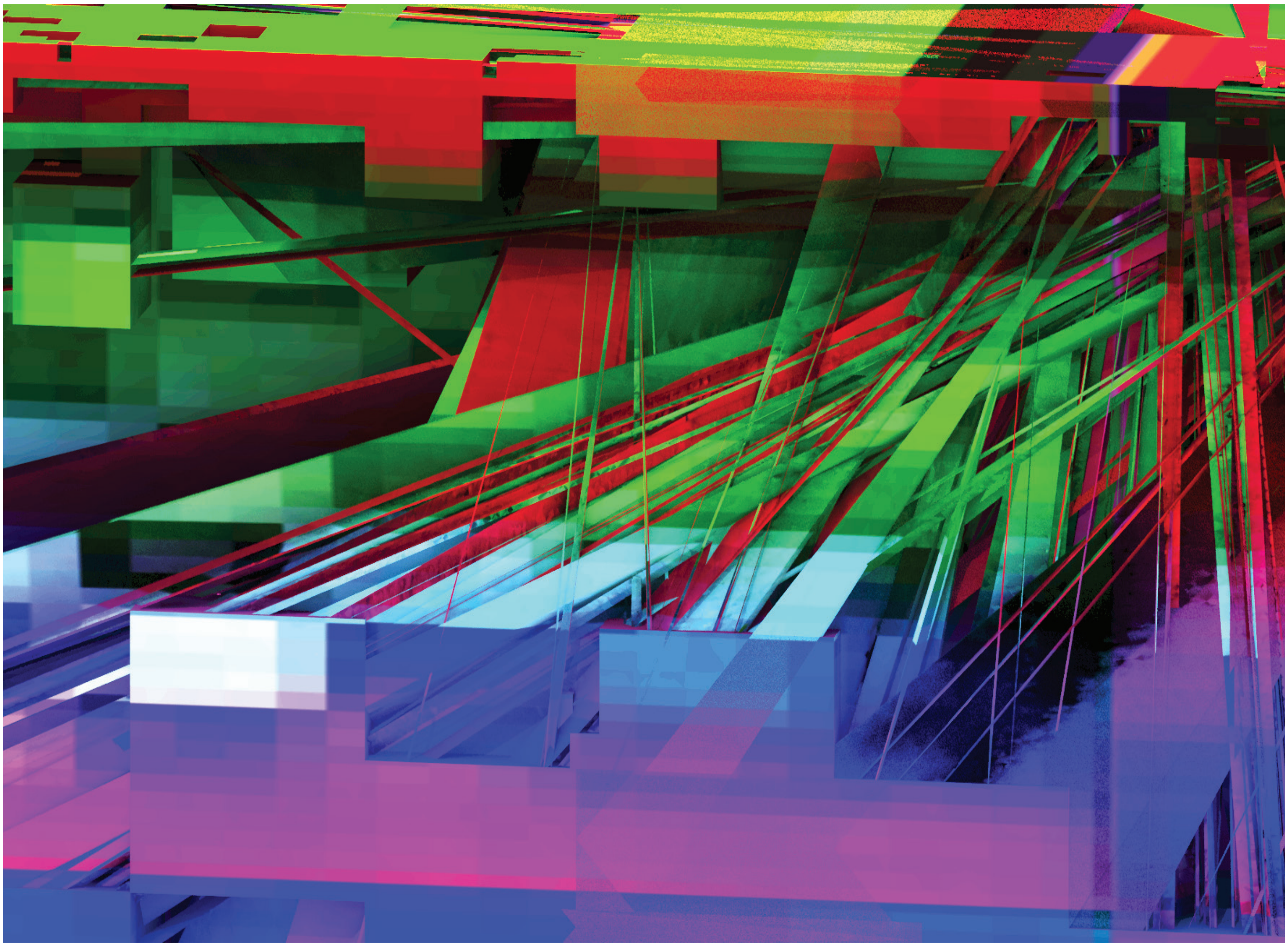
In JPEGsnoop, glitch was initially treated as 'the given' which was actually sitting on a grid in relation to the pixel distribution of the 2D image, i.e. 'the given' was simultaneously 'the in-formed'. The symbiotic relationship between the two forms of glitch was then broken down into further individual pixel units. This exercise led us into 3D conversions of autonomous units where a second problem emerged. Sacrificing the aesthetic in favor of the algorithmic led us think more on the sporadic and ephemeral qualities of glitch becoming. Stereoscopic experiments allowed us remap 3D glitch-space information, yet, without orientation. Further research is planned to continue with glitch in immersive VR technologies in order to provide more insight onto the second problem. However it is aimed to find a new vertical dimension arising from the dual ontology of glitch placed on the same horizon. Transforming from being 'the given' to 'the in-formed' glitch wants a multitude space to exist which is not permitted by the monochromatic channel imposed by the indentured protocols of the algorithm.

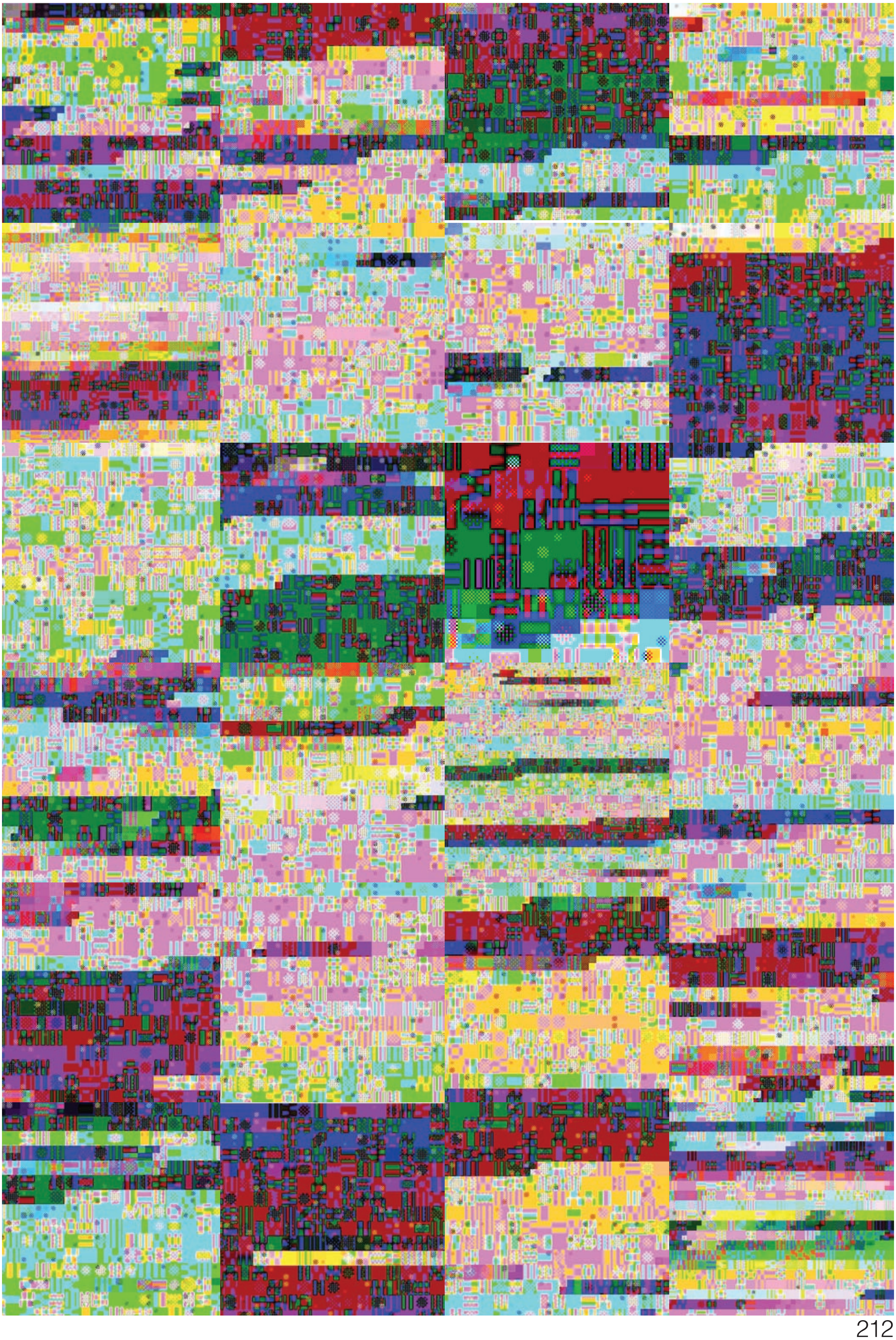
Galloway (2012) identifies the same problems in relation the mode of production. When the modus operandi of glitch is ignored, commodification of its aesthetic outcome takes place with 'the entrainment of universalising behaviours within protocological organisation' that are then unrepresentable and limited to 2D observation. Galloway (2012) further argues that contemporary use of data causes the machine turned into art but never art into machine. The notion of 'glitch-space' requires us to further investigate ways for 'new data types, new if-then statements, and new mathematical functions'. The fuzzy area, between glitch as 'the given' and 'the in-formed', is where 'a vast anti-history of informatics waiting to be written, a vast world of representation waiting to be inscribed.'

CAADRIA CONFERENCE

This research has been accepted to be presented at The Association for Computer-Aided Architectural Design Research in Asia (CAADRIA) at the Xi'an Jiaotong-Liverpool University in Suzhou, China, April 2017. CAADRIA facilitates the dissemination of information about digital architectural processes and promote research in Asia. The research paper 'Glitch Space' nicely aligns with the conference topic 'Protocols, Flows & Glitches.' Proceedings will be published in the International Journal of Architectural Computing (IJAC).

Figure 7.91 Glitch has depth





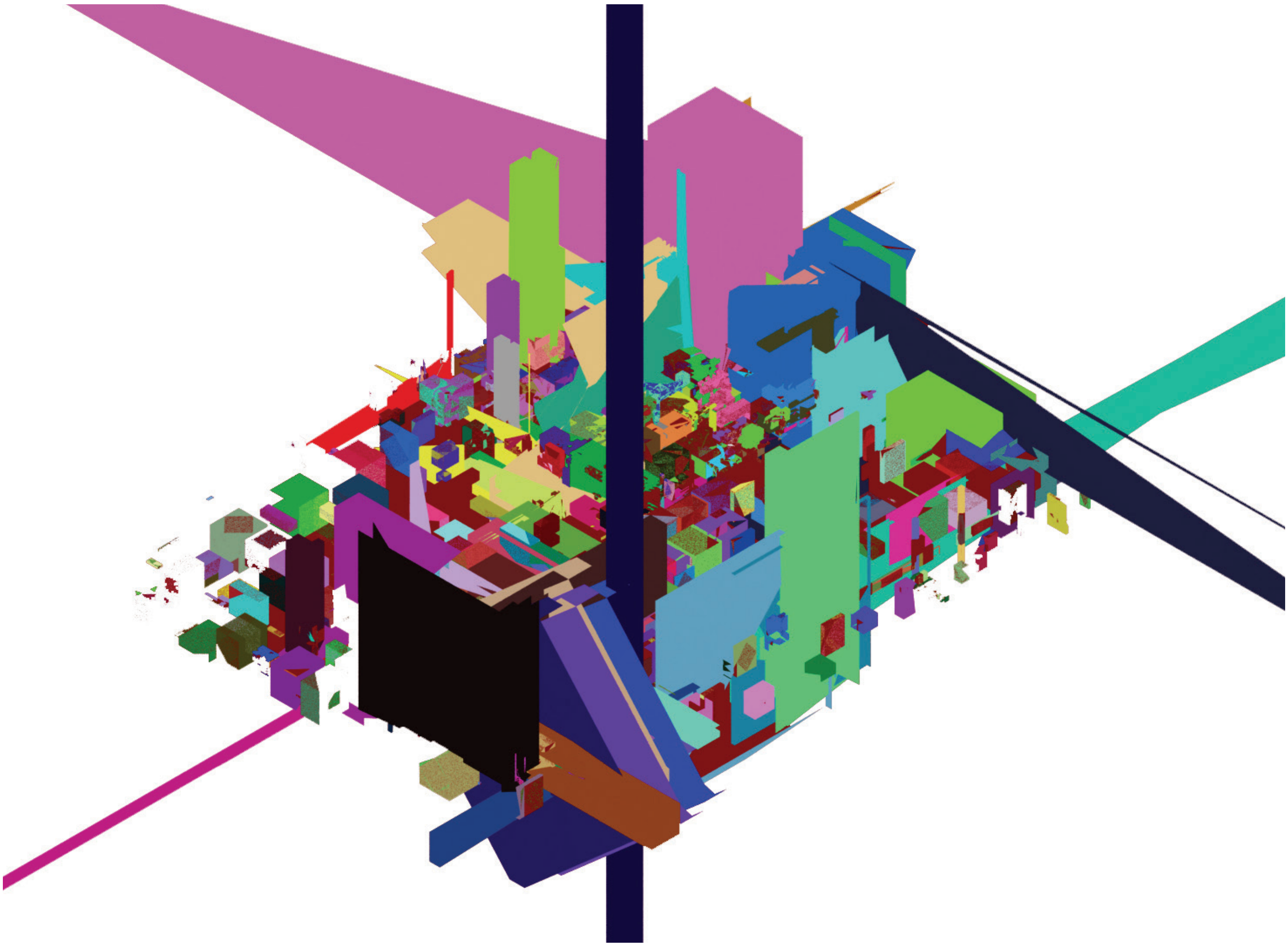
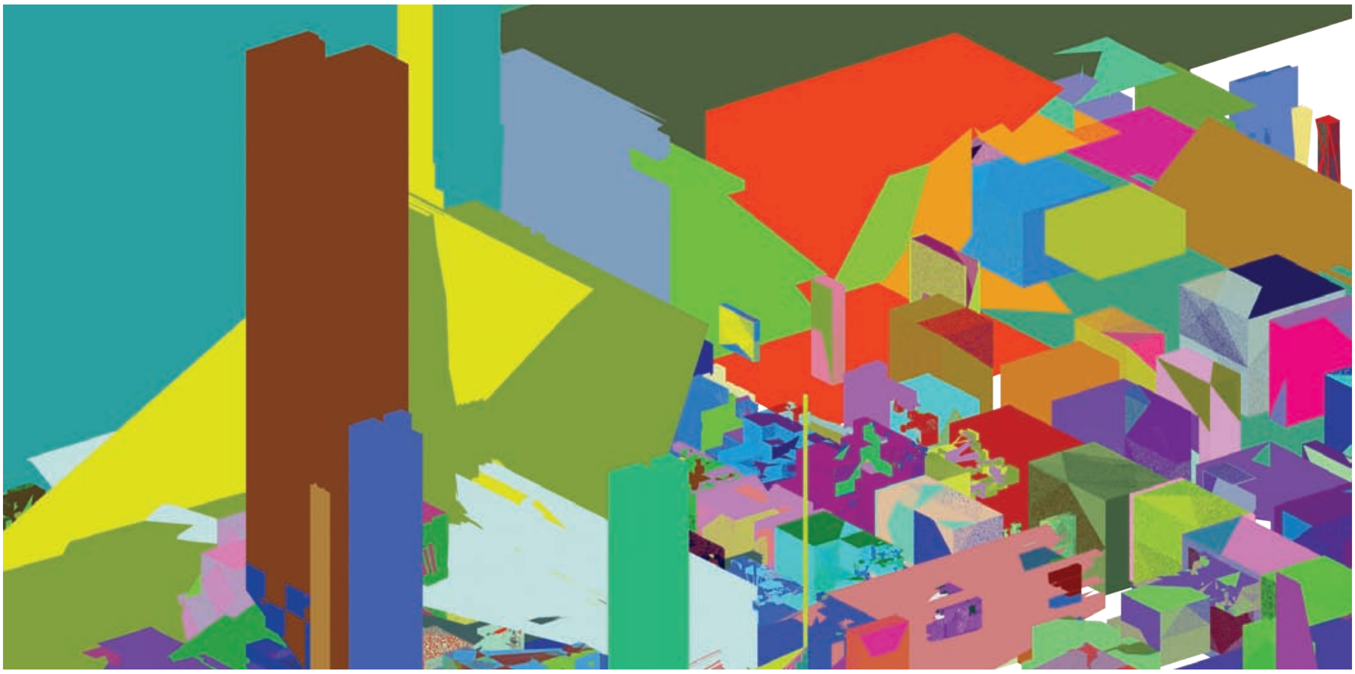


Figure 7.92 Visual relationship between naturally digitally decay glitch images and Material ID process for rendering the form created from these images in Vray

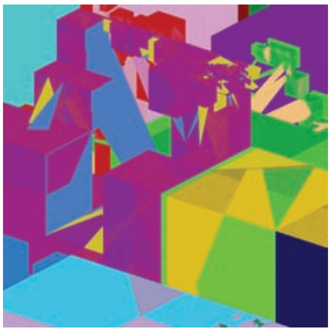


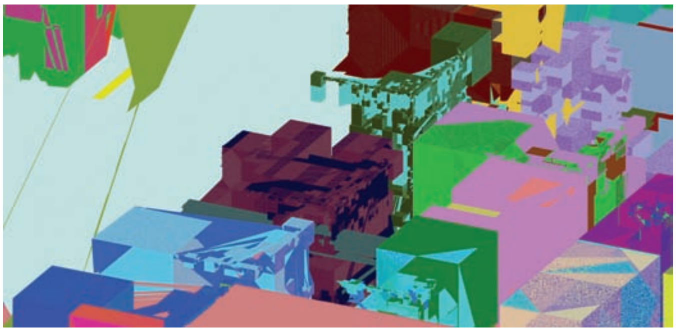
HUMANISING THE DIGITAL

In an unforeseen manner glitch is sincerely humanizing the digital. Metalab contributor Matthew Battles explains, “we’re learning to “wave at machines”—and that perhaps in their glitchy, buzzy, algorithmic ways, they’re beginning to wave back in earnest.” (Battles, 2012) Realistically technology was made by humans, on the surface they may appear foreign and mistakes may seem random however the further the investigation inquires the more human the machine becomes. New media artist Nick Briz explains that when you interact with your computer there are a number of assumptions made on your behalf by the programmers of the operating system and the software you choose to use. We may be generally unaware of this but it becomes extremely obvious when you go deeper into the build-up of digital files. Briz writes that technology is not neutral but in fact pregnant with politics and ideologies of the people who made them and by using the technologies we unconsciously subscribe to these politics. In a way glitch interpretations brings these hidden relationships to the fore. (Klee, 2015) Daniel Temkin writes, “glitch art underscores the computer as an apparatus indifferent to the readability or quality of the resulting image. The tension in the form does not come from risk of damage or failure, but from the surrender of the image to an unpredictable system, the collaboration with the machine.” (Temkin, 2014) The paper ‘Towards a Pedagogy of Glitch’ asks, “who is the author of the glitch as digital artifact? Is it the user of the proprietary device when producing the glitch? The programmer of the algorithm that the user intends to disrupt? Is it the device itself? All of the above?” (James, 2016) Perhaps it is a human computer semiosis. Regardless of the technology you use to harness a glitch, it ultimately still must run on human wetware. (Cloning, 2010)

Slippages in pixilation and errors are signs of digital decay but phenomenologically signs of vulnerability. Glitch breaks the fourth wall and shatters the “artifice of seamless technology” (Aima, 2012) Similarly to the over cited ‘Annie Hall’ (Allen, 1977) scene where Woody Allen suddenly turns and speaks to the camera, (repeated by Francis Underwood in ‘House of Cards’ (Willimon, 2013) but slightly more pedagogically) speaking straight to the camera results in the cinematic spell being broken and our relationship to the medium being laid bare. (Aima, 2012) In this way glitch invites the audience to question the medium and the blurred line between human and computer.

Computers do not have a consciousness in the same way humans do, (Goodwin, 2013) however within human interpretation glitch brings a sense of consciousness to the computer. Goodwin writes in his paper ‘Architecture and Consciousness - God in Reverse’, “as computers accumulate and deal with their own ‘mistakes’, a form of real consciousness emerges.” (Goodwin, 2014) Conciousness is something only humans posses and in this way the glitch somewhat humanises the computer.





REFLECTION

The here reached design outcome is a novel interpretation of digital decay through architectural form. The research contributes to the glitch research community by advancing glitch from its 2D representational expressions into 3D digital spatial interpretations. Computational architectural design methods allow for a responsive and adaptive re-representation that matches current technologies and under- standing of architecture. James writes that troubling of expected outcomes, disruption of programmed process as a result of incommensurable informational input does result in unique and educational products that are fundamental to understanding our digital humanity. He writes that these irregularity convey the “same learning potential that learning from mistakes and fortunate accidents do in arts, sciences, and within the broader context of lifelong learning.” (James, 2016) Glitch architecture questions the limitations of digital architectural modeling and deepens the appreciation for human agency within digital creative work-flows bringing authenticity to digital decay through contemporary interpretation of the glitched data. The here reached design outcome contributes to the realm of digital architecture but also has the potential to progress forwards in to the analogue. In email conversation with creator JPEGsnoop Calvin Hass writes, “given the recent explosion of 3D printing into the consumer domain, more and more of the content people store on vulnerable media (eg. Flash drives, hard drives) will represent 3D forms. It is highly likely that this will result in a new wave of “glitched models” that people will discover when trying to print their favorite item. People will encounter STL and OBJ files corrupted from glitches much in the same way that JPEG files are later discovered to be corrupted. If they continued to print these corrupted surfaces, we would see some unique forms emerge! The interesting thing about this is that we no longer need to take the extra steps of extrapolating a 3D visualization of the glitched 2D data -- the 3D source itself will be glitched.” (Calvin Hass, pers. Comm. 2016) Reflecting upon the design processes of this research, we believe glitch is not only a theoretical tool but also a hands on form of inquiry. Glitch not only should be considered and observed, but also provoked and performed. This research can continue to be extended upon to advance the understanding of digital decay within architectural work-flows both by delighting in the unknown (Price, 1984), the aesthetic of digital decay and as a tool of unique digital design processes.

CONCLUSION

This research extends the current material in the field of glitch from 2D representational images to 3D multidimensional architectural explorations. The research contributes toward the future of computational architectural design in the way it uses glitch specifically as a core starting point in a systematic design method. Inheritance of glitch as a means of input for digital design explorations is correspondent to a fourth dimension of the digital. This paper presents a methodology that interprets digital decay processes involved in architectural design, through a data driven process of experimental computational design, using glitch as an instrument in generating 3d architectural spaces. The research contributes to the glitch art community by advancing glitch from its 2d representational interpretations into 3d digital spatial explorations. The research contributes to the discipline of architecture by developing a unique design methodology employing glitch as a means of designing architectural form within the digital realm. The research is a positive discovery that addresses, embraces and delights in digital decay via a data driven process of generative computational design. Computational architectural design allows for a responsive and adaptive re-representation that matches current technologies and understanding of architecture. Glitch architecture deepens the appreciation for human agency within digital creative work-flows and brings authenticity to digital decay through contemporary design. The digital architectural form exists solely in the digital realm confidently standing as an architectural interpretation of digital decay through both its design process and spatial outcome.

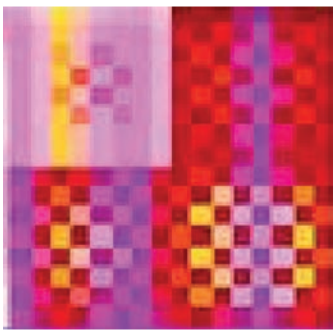
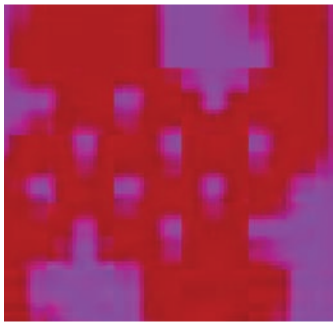
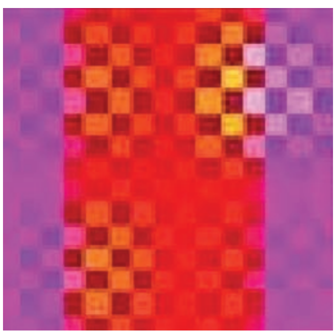


Figure 7.93 GAC sharing Glitch Architecture work via Tumblr link to Facebook. (GAC, 2016)

How can glitch as a result of digital decay be interpreted in three dimensional form?





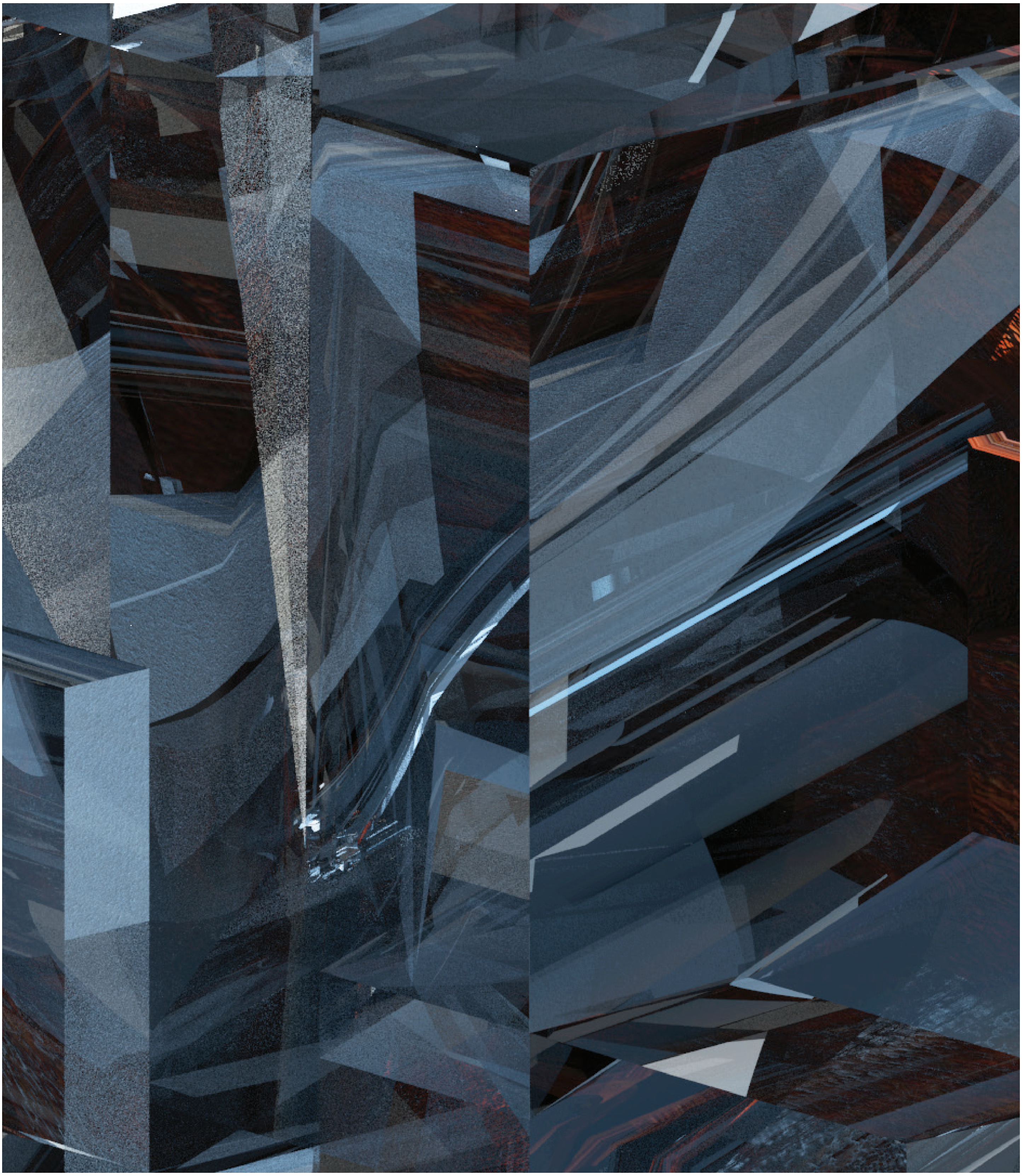
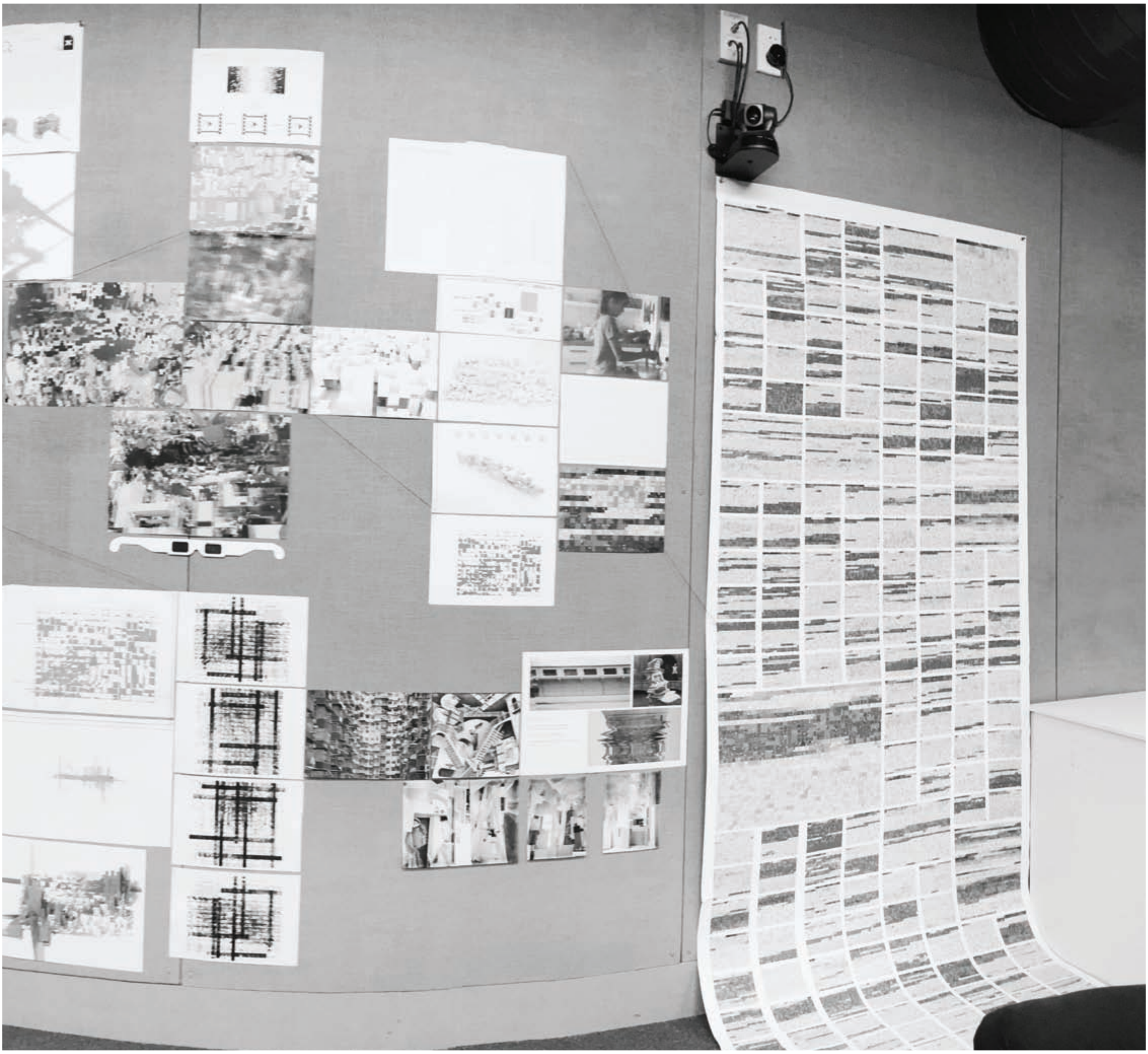


Figure 7.94 Glitch Architecture shift in perception

47 4A CA 76 67 B5 49 8A B0 D8 F2 31 DF 77 F4 A2 9B 59 98 34 B8 AB 41 68 D9 45 25 2A 74 A9
E9 A1 6A 4D 87 AF 61 45 15 D4 68 D7 20 F1 9F 63 5D D5 B8 8D C7 CC AA 73 EA 2B C9 6D 66
36 D2 89 01 C0 EF F8 57 A1 69 BA BC 37 AB 85 DA B2 46 3E 6C 74 3E F4 62 9A 6B 72 5B 4B
73 FF 00 2C C0 FA 56 25 D5 AA D6 FF 00 9B 09 8F 3E 6F CD E9 58 57 92 F5 C5 2E 0D 25 64
BE D4 3C F6 AA EF 3A 7A 54 53 C9 54 19 AA 3C 53 AA C3 CA BD 85 51 96 5A 63 C9 B6 A9 3C
99 A5 02 8A BD 1B C6 C3 0C 4A 37 F7 8F DD AE 9F 4F FB B1 60 E7 E5 AE 32 36 AE E7 C3 F0
99 E5 44 1F F3 C9 BA 7D 2A E4 15 13 D7 75 65 C6 92 A7 3B 77 3C 99 DC 9B D5 BE 63 D8 74
1C 7E 75 C5 EA AC 57 E7 4C 0C BF DF 89 F3 11 C9 FE E7 BF 5A EC F4 EC 8D 32 27 1E 67 DD
9B 2F 11 0E 07 CE DD 63 FA 73 C6 6B 89 D6 17 73 E7 F7 67 F7 80 79 B1 8D BC F5 C1 5F 7E
DF 5A 98 7D F6 A6 7A 57 FF D9

Figure 7.95 #glitchgirl



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