Investigating the "Blurry" Territory of Graphic Design

A Look at the Simultaneous Realities of Illusions within the Moiré Effect

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A THESIS SUBMITTED TO
THE FACULTY OF GRADUATE STUDIES IN
PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF DESIGN

Master of Design, York University, Ontario, Toronto

March 2016

ABSTRACT

This thesis examines how designed artifacts can present two simultaneous realities within static and motion typography through an investigation of motion and depth perceptual phenomena. The deceptive nature of optical illusions revolves around conflicting realities, inducing a sense of ambiguity. This thesis incorporates the ambiguous nature of illusions in the mediation of visual messages within graphic design practice. The research constitutes the employment of optical illusions in visual arts, specifically in Optical Art, and graphic design. Particular focus is placed on the moiré effect and its applications, which hugely inspires the visual investigation. Each of the projects establishes a parallel with the contradictory state of illusions, forming a visual rhetoric in the depiction of multiple realities within elusive truths. These "blurry" territories within graphic design present a self-reflexive tool for both designers and their audience in becoming observers of themselves and a conscious awareness of how they perceive the world.

ACKNOLWEDGEMENTS

I would like to express my thanks to Angela Norwood and Paul Sych for providing their expertise and guidance during our meetings, and understanding and patience for when I was struggling with my topic. I would like to thank my supervisory committee for advising the direction of my investigation and teaching me a valuable lesson on trusting my process as a graphic designer.

I'd like to thank my parents for always being there as a pillar of support, offering me encouragement and keeping me grounded throughout this period of time. Thanks mom and dad for your understanding and accommodating my schedule whenever it was necessary. 非常感謝你們當我的避風港!! I would also like to thank my brother, Joel, for giving me brief moments of reprieve, whether it was just listening to my problems or letting me vent.

Finally, I very much appreciate the wonderful and inspiring group of people I have met in the MDes program. Thank you Philippe Jean for always checking up on me and always offering help and words of encouragement! Emmie Tsumura, Krishna Balakrishnan, Nicole Beno, and Malaa Alamoudi, we were all in the same boat and I truly appreciate the amount of encouragement and support we give each other and how that has brought us closer together over these two years. I will always remember the all-nighters in the studio, the spontaneous dancing and drinks after hitting each milestone, and the laughs and inside jokes we had together. Last of all, thank you to Trevor Campbell and Arezoo Motavally for helping me set up for defense in those last moments where every single minute counted.

This has been a long and difficult journey, and this thesis wouldn't have been possible without all the people that were there to support me. Thank you!

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INTRODUCTION

The Simultaneous Realities of Optical Illusions

I have always had a certain fascination with sensory perception, specifically how people perceive the world around them. People are not always consciously aware of perception and sometimes they even take the things they perceive for granted. As a designer, I am interested in a deeper look at the logistics of perception. I would like to look into the way people regard, understand and interpret their world and observe how their experiences change as their perception is shifted or manipulated. What intrigues me the most are occurrences of a discrepancy between the perception of an image and the true essence of the image. When the perception of an image does not conform to the visual reality of the world, that image is an optical illusion.

Optical illusions are manipulative phenomena that cause the viewer to question what s/he is seeing. This deceptive perception of reality occurs even when the viewer is consciously aware of the mechanics behind the illusion that tricks visual perception. As a result, the viewer perceives two conflicting realities simultaneously.

Neuroscientist and artist Beau Lotto brings up an intriguing aspect of optical illusions. Lotto states that due to the deceptive nature of illusions, they allow the viewer to experience two opposite realities simultaneously (2012). First there is the "false reality" that the viewer perceives as s/he views the illusion. Then there is the viewer's understanding of what the illusion is actually showing, which can be considered as the "true reality". These two realities are perceived simultaneously, which results in an intriguing state of conflicting impressions of the object being perceived. Lotto uses a multi-coloured cube to explain the phenomena of simultaneous realities through people's perception of colour (see fig.1). On the cube the square in the middle of the top plane appears to be brown while the square in the middle of the side plane appears to be orange. However, the reality is that both of the squares are actually brown. The shadow on the side of the

cube has skewed the viewer's perception. Despite viewers being fully aware of this visual trick, those two squares will always be perceived to be different colours unless they are isolated.

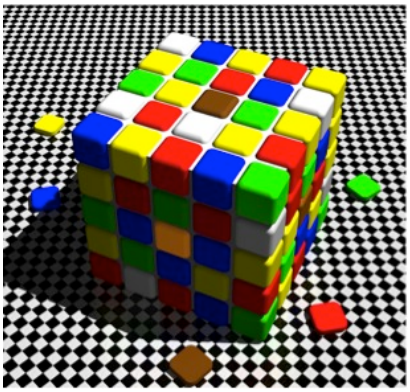


fig. 1. Beau Lotto, *Cube I*, Video, 2012.

Lotto proposes that this perception of two simultaneous realities can grant us the capacity to become observers of ourselves, or as he quotes, "see yourself see" (2012). He believes that this phenomenon serves as a principle act of consciousness and ultimately can transform the way people view the world and themselves (Lotto 2012). I have always found the deceptive and manipulative nature of optical illusions compelling, particularly the aspect of conflicting realities that induces a sense of ambiguity in the object in question. This ambiguity has potential in the mediation of visual messages. As content creators and mediators, graphic designers frame messages to be perceived a certain way by viewers. For example, advertising has always relied upon the potential of illusions.

Advertising employs illusions in two ways: 1) portraying a false reality to persuade consumers to buy a product/service, or 2) directly presenting an optical illusion to garner attention and compel viewers. In the former, advertisements present a false impression of reality, which creates desire in the viewer. In the latter, the viewer may be consciously aware of the optical illusions in the ads and s/he perceives multiple realities at once. The visual trickery of such advertisements not only adds a deeper level of meaning but can also allow viewers to be

consciously aware of how they perceive the world. One example is Honda's ad campaign called "An impossible made possible" for its fuel-efficient SUV (see fig.2 & 3). The commercial consists of a series of perspective-based optical illusions that give the impression of the car doing impossible things, such as rolling off a coffee table or floating in mid-air (Feloni 2013). An interesting aspect of the commercial is that it unveils the illusion after presenting the deception. By presenting the simultaneous realities of the illusions, the ad cleverly shows that a bigger car having greater mileage is just like a revealed illusion, proving the "impossible" can be made possible (Feloni 2013).

fig. 2 & 3. HondaVideo, *An Impossible Made Possible – New CR-V 1.6 Diesel Video*, Video, 2013.

While advertising is a common way of employing optical illusions in graphic design, I would like to clarify that advertising is not the focus in this thesis. I intend to incorporate illusions in a way so that the visuals only hint that what is presented is not all it seems. The multiple realities don't necessarily need to be presented in an obvious manner; perhaps they "blur" into one another and it's difficult to discern the two. In this thesis I investigate the "blurriness" of the lines that make it hard to distinguish one reality from another, and more specifically, explore this "blurry" territory within graphic design.

In addition to working with imagery in this investigation, I experiment with a major component of graphic design: typography. Typography comprises form and content and I believe that mixing these components with optical illusions can change the way viewers interpret

meaning. Hence, I am interested in studying how optical illusions can manipulate the perception of the various aspects of typography. This endeavour involves looking at how form and meaning of type is affected when it is incorporated into an illusion—looking at type as image, such as type becoming the illusion itself, or looking at what happens to the outcome of the illusion when type is incorporated. Since the main type of optical illusion that I am working with in this thesis, the moiré effect, involves motion and depth, I will be working with both static and motion typography.

The main research question is as follows: "How can designed artifacts present two simultaneous realities within static and motion typography through an investigation of motion and depth perceptual phenomena?" Some sub questions examined in this thesis are: a) "How can graphic design form a visual discourse on the simultaneous realities of the real world?," b) "How can meaning be conveyed and mediated through the incorporation of ambiguity in graphic design?" These sub questions are explored further in Project 1 and Project 2. Finally, the questions that I ask at the end of this investigation are: a) "How can the incorporation of simultaneous realities in graphic design provoke deeper thought and speculation from the viewer?" and b) "What can this exploration inform designers about the 'blurry' territories of graphic design?"

This investigation consists of three parts:

1) Preliminary Exploration of Moirés

2) Project 1: The 'Schizophrenic' Condition of Design

3) Project 2: The Multiple Levels of Ambiguity

The visual explorations in these projects are based on the perceptual phenomena around the moiré effect, particularly moiré patterns and technique known as "scanimation."

Moirés: Background Context

The moiré effect is an optical phenomenon that occurs when two overlapping geometric patterns are placed on top of one another. The two patterns moving in and out of alignment in various directions produces an "optical interference" which subsequently leads to the emergence of a distinct third pattern (Spillman 289). This third pattern can change depending on the change in position, size, and orientation of the overlapping patterns. Optical interference also creates an illusion of enhanced depth in the moiré pattern; this effect is known as "apparent depth." Apparent depth is reinforced when the viewer changes his/her viewing position and perceives a dynamic change in the expansion and contraction of the lines of the pattern (Spillman 301). For example, one perceives a greater depth in the lines of the pattern when viewing a large moiré pattern from afar than viewing a small one close-up.

Optical interference and apparent depth are essential characteristics in the emergence of the moiré effect, together creating the illusion of the third pattern. These concepts are also part of the inspiration for my projects as they serve the basis for my explorations. I will elaborate further in the project sections.

Moiré effects are often undesired problems in printing, such as when a halftone picture is screened on top of one another. The lines on the two halftone screens conflict with each other, and cause a series of lines and shades to emerge, affecting the presentation of the original image (Tai & Ng). The same issue is also prevalent on digital screens, such as in the case when fabric with an even horizontal pattern appears on a television screen. The interaction of the lines of the fabric clashes with the raster of the television, which causes a visual interference, resulting in the appearance of the distracting moiré effect (Tai & Ng).

APPLICATION OF OPTICAL ILLUSIONS

In Optical Art

Twentieth century optical illusions in the visual arts has always been one of my interests, such as Salvador Dali's surrealist paintings and Marcel Duchamp's kinetic sculptures. However the most notable artist who captures the true essence of illusions would be M.C. Escher. Even though he doesn't belong to any specific art movement, Escher's dreamscape paintings embrace his personal "inner visions" in which he "felt compelled to withdraw from the more or less direct and true-to-life illustration" of his surroundings (Poole 2015). In doing so, he entertains various levels of reality, such as in his "impossible objects" which are highly inspired by Gestalt psychology. One such example is the lithograph, "Waterfall" (1961), in which Escher seems to defy the laws of gravity by depicting a stream of water that flows downhill from the bottom of a waterfall only to arrive at the top of the same waterfall, achieving an impossible infinity loop (see fig.4). The linear perspective of this piece relies on the Gestalt principle, Law of Prägnanz, a tendency to "interpret ambiguous images as simple & complete" (Lidwell et al. 2003). The viewer perceives the corners and sides of the stream of water to be consistent and belonging to the same object. However, when s/he tries to integrate the pieces into a "coherent whole," the pieces do not fit, and thus leads to the aforementioned dilemma (Zimbardo & Gerrig 164).

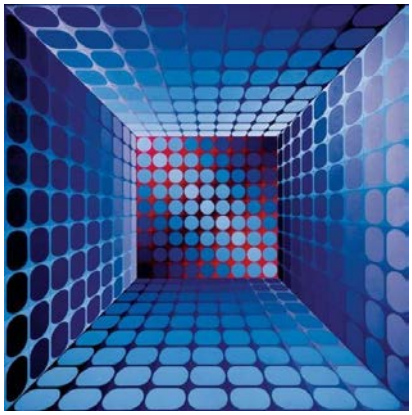
fig. 4. M.C. Escher, *Waterfall*, 1961.
Lithograph 15" x 12"

Following Escher's paintings came the emergence of the Optical and Kinetic Art movements. Optical art, also known as "Op Art," employs the use of visual phenomena witnessed in optical illusions to produce geometric abstractions. Kinetic art is defined as any sort of artwork that allows the viewer to perceive movement, whether that movement is actually occurring or is simulated by the piece (Wade 21, 1977). The terms "Op Art" and "kinetic art" often get confused. To clarify, Op Art is kinetic when it conveys an illusion of movement rather than involving actual movement.

The concept of Op Art originated from the 1965 exhibition, "The Responsive Eye," an exhibition that presented works that depicted illusion of movement and colour interactions (Parola 1996). Shortly after, the Op Art movement took off and spread out into the commercial world in advertising, print, fashion, and interior design. The exhibition also proved to be a significant milestone for artists such as Victor Vasarely, the leading pioneer of Op Art and Bridget Riley, a celebrity abstract painter.

Dubbed as the "Father of Op Art," Victor Vasarely is an abstract painter and graphic designer who experimented with optical effects in geometric shapes and patterns. His art has been said to give viewers "contradictory data" as they regard repetitive arrangements of simple forms

such as diagonals, circles and squares. (Morgan & Vasarely 2005). Whereas Op Art is commonly created with a high contrast of black and white abstract forms, the majority of Vasarely's works demonstrate his particular affinity with contrast and interaction of colours. He uses the gradients of colours to emulate a kinetic energy in his pieces as well as a sense of perspective and depth ("Victor Vasarely," *Op-Art*). For example, the piece "Caldor" (1976) (see fig.5) shows a simulation of movement and sense of depth, creating an illusion of a "receding frame or lattice set in space" (Morgan & Vasarely 2005). Even though Vasarely mainly worked with colour, his early black and white works have turned out to be an influence on his successor, Bridget Riley.



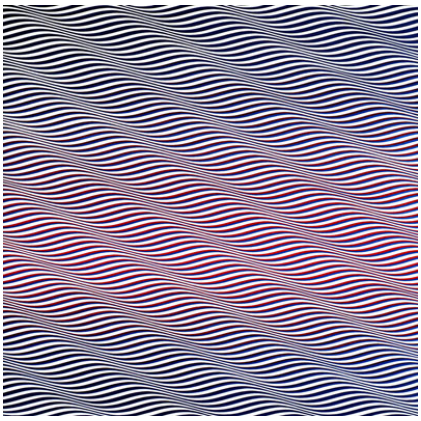


fig. 5. Victor Vasarely, *Caldor,* 1976. Acrylic on Canvas 70.87" x 71.26"
fig. 6. Bridget Riley, *Cataract 3*, 1967. PVA on Canvas 88.5" x 87.5"

In addition to receiving international recognition after "The Responsive Eye" exhibition along with Vasarely, Bridget Riley also gained the status of one of the leading figures in British contemporary painting. Riley is regarded as a celebrity artist, whose Op Art work was mass-produced in the commercial industry, influencing the integration of Op Art into commercialism following the Pop Art movement of the 1950s ("Bridget Riley," *visual-arts*). As mentioned above, Vasarely's early works influenced Riley's notable style of monochromatic line paintings. Riley's paintings specialize in inducing disorientation and dizziness to the viewer, which is achieved by the repetition of curved and wavy lines. This can be seen in the piece "Cataract 3"

(1967) (see fig.6), where the movement of the lines and the simulation of depth produce a sensation of seasickness, especially if the viewer states at it for a long period of time. Similar to Vasarely, Riley also applies colour in this piece to generate an illusion of movement to enhance the desired optical effect. Riley strives to "recreate the wonder of seeing" through implementing a particular awareness of optical perception, although she intentionally blurs the differentiation between the physiological and psychological responses of the eye in her graphic patterns ("Bridget Riley," *visual-arts*).

The works of Vasarely and Riley paved the way for the Op Art movement as they established the style of geometric abstraction, which is centred on evoking perceptual responses from its audience. Op Art places a high emphasis on perception, but it doesn't necessarily require any form of "understanding" (Parola 10). Rather, the viewer responds directly and immediately to the way s/he perceives the virtual movement and visceral effects of the work, without requiring any "literary impulse or illustrative intention" ("Bridget Riley," *Op-Art*). Op Art's lack of meaning comprises two main aspects: form and objectivity. Graphic design relies on form to convey meaning, but the subjectivity inherent in the visual presentation of the message puts it in opposition to Op Art. I will provide some examples of how designers have worked around these problems in the next section.

In Graphic Design

Graphic designers often rely upon Gestalt theory in their work. et was first practiced in the Berlin School of Experimental Psychology by Carl Stumpf and his fellow colleagues in the beginning of the twentieth century (Ash 203). These theorists developed a list of Gestalt principles that govern the laws of self-organizing tendencies in visual perception. The principles are as listed: proximity, similarity, closure, common fate, law of Prägnanz, uniform connectedness, good continuation, and figure-ground relationship (Lidwell et al. 2003). As visual communicators, designers make

use of the knowledge of visual perception informed by these principles to strengthen their work visually and conceptually.

Gestalt theory provides a means for designers to explore the potential of visual perception, which enables them to segue into the manipulation of perception in optical illusions. A noteworthy example would be twentieth century designer, Shigeo Fukuda's striking minimalist figure-ground posters, in which he provides social and political commentary through simple graphic illustrations with double meanings (Heller 2009). For example, Fukuda's most well-known poster, "Victory 1945" (1945) (see fig.7) demonstrates a satirical commentary on the senselessness of war through a visual pun of a black artillery shell aiming back at the cannon barrel from which it was shot (Heller 2009). Like Escher, Fukuda experiments with perspective and depth cues to generate impossible visual situations, such as in his exhibition poster for Keio Department Store, "Shigeo Fukuda Exhibition" (1975) (see fig.8). The poster demonstrates figure and ground interplay in a minimalist illustration depicting an impossible repetitive pattern of female and male legs. Fukuda was able to help the department store garner a response from both men and women, as well as depict a conjoined relationship between both genders (Burer 1994). This example showcases how an optical illusion can be used for effective graphic communication.

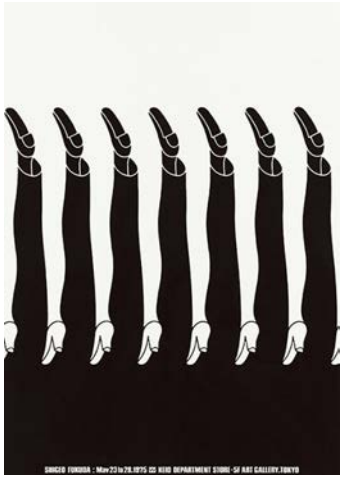
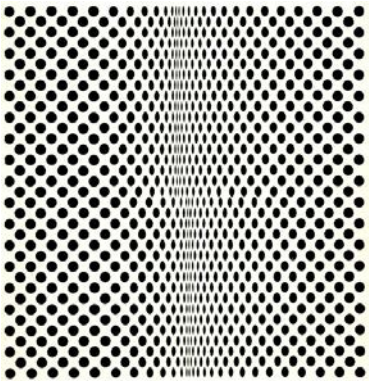


fig. 7. Shigeo Fukuda, *Victory*, 1975. Offset 67 x 96 cm.
fig. 8. Shigeo Fukuda. *Shigeo Fukuda Exhibition,* Keio Department Store,1975. Silkscreen 72.8 x 103cm.

In works such as Fukuda's, designers can produce very powerful imagery by taking advantage of their understanding of Gestalt principles to create illusionistic results. However, the application of Gestalt principles is only one way for designers to work with optical illusions. I would like to clarify at this point that my focus is not on Gestalt theory in this thesis. It was a starting point for me and was a source of inspiration in my preliminary explorations, but my focus is on motion and depth perception of the moiré effect. The discussion of Gestalt theory here is for the purpose of providing a background context on the use of optical illusions in graphic design and how that led to designers' experimentation with Op Art. When designers began incorporating Op Art into their practice, they encounter a problem with limits on conceptualization. Recall that the nature of Op Art is based on abstraction without a basis. Since there is no real content, these abstractions imbue no meaning.

Some designers rectify this problem by applying the Op Art style to typography. A modern example would be the works of Sergi Delgado, a graphic designer and illustrator based in Spain. Delgado combines his fascination of typography and calligraphy with the line patterns of Op Art. In works such as his poster, "Can You See Me?" (see fig.10), and the animated gif,

"Candy Numbers" (see fig.11). The poster, "Can You See Me?" bears a resemblance to Bridget Riley's monochromatic style except Delgado uses the element of simulated depth to form letterforms and hides them within the striped pattern. Similar to Riley's piece, "Fission" (1963) (see fig.9), the letters appear sunken, creating a compelling three-dimensional effect. The GIF, "Candy Numbers" shows animated numbers one to ten in a manner similar to candy canes. The discontinuous spiral patterns are arranged to overlap one another to form each number and are in constant rotation, creating a mesmerizing effect on the viewer.



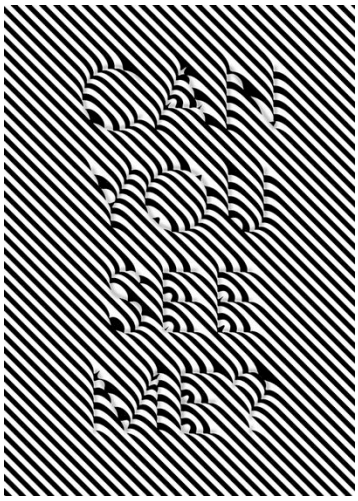


fig. 9. Bridget Riley, *Fission*, 1963. Tempera 35" x 34"
fig. 10. Sergi Delgado, *Can You See Me?*, Digital, 2015.
fig. 11. Sergi Delgado, *Candy Numbers*, Animated Gif, 2014.

Delgado has demonstrated a way to assimilate meaning while employing the aesthetic effects of Op Art, but that doesn't necessarily address the problem with the objectivity of Op Art when it is placed within the realm of graphic design. Lance Wyman addresses this problem in his Op Art inspired brand identity for the 1968 Mexico Summer Olympics. The most notable part of the design is the logotype (see fig.12), which reads, "Mexico 68" with lines that radiate outwards, resembling the style of 1960s Op Art, and the five rings of the Olympic logo infused with the numbers, "68." The radiating lines portray a complex representation of Mexico, which

includes motifs from the nation's culture, such as simulating "a living thing's communication with the deities" in the ancient spiritual practice of prayer mandalas (Byrne 2014). The lines also bear significance in historical context, as it visualizes the tensions and turbulence in the political movement surrounding the 1968 Tlatelolco Massacre, in which hundreds of people were killed in a student protest against the Mexican government just ten days before the opening of the Olympic Games (Byrne 2014). The visual language created by Wyman was then transformed into protest posters (see fig.13) and political messages during the student uprising as a challenge to the Mexican government's concern for the Olympics over its own citizens (Byrne 2014). To this day, Wyman's design has transcended being merely a representation of the Olympic games to becoming a significant cultural artifact for the nation. Wyman developed an objective and contextual visual language, which suggests new possibilities of Op Art within the context of graphic design.

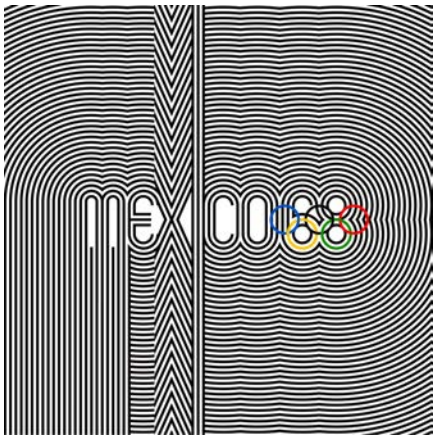


fig. 12. Lance Wyman, *Mexico '68 Logo*, 1968.
fig. 13. *Student Protest Graphics*, 1968.

APPLICATIONS OF MOIRÉS

In Optical Art

Despite the inconvenience moirés pose in printing, some individuals have exploited their nature to explore the limits of visual perception in artistic endeavours, such as Op Art. Recall that Op Art employs the use of visual phenomena witnessed in optical illusions to produce visually compelling work (Wade 21, 1977). The depth and spatial qualities of the moiré effect is one such anomaly explored by op artist, Ludwig Wilding.

Wilding, an artist and professor at Kunsthochschule in Hamburg, was interested in examining the visual perception of space and the illusion of depth in kinetic spatial art ("Kinetica Art Fair"). Kinetic art is defined as any sort of artwork that allows the viewer to perceive movement, whether that movement is actually occurring or is simulated by the piece. As a renowned representative of the Optical and Kinetic Art movements, Wilding makes use of superimposed networks of lines in moiré patterns to "produce effects of optical perturbation and vertigo" ("Whitford Fine Art"). In his piece, "Kinetic Structure" (1963) (see fig.14), Wilding generates the moiré effect by systematically tilting and changing the direction of a series of lines on top of a vertical pattern (Wade 23, 1977).

This large-scale piece exhibits a grid-like structure of curved lines and tunnel-like series of circles, which can possibly induce disorientation when viewed at a certain distance.

fig. 14. Ludwig Wilding, *Kinetic Structure*, 1963. 86 x 66 cm.
fig. 15. Ludwig Wilding, *Stereo-Objekt STI 80/15,* 1976. 80 x 80 x 15 cm.

Wilding also explores the limits of depth perception by making use of the disparities between moiré fringes (Wade 480, 2007). In "Stereo-Objeckt STI 80/15" (1976) (see fig. 15), a transparent vertical grating is placed on top of a vertical striped pattern printed underneath to create an optical interference. The interference generates a repetitive pattern of thin to thick lines on the image (Wade 480, 2007). Wilding makes use of "apparent depth" by encouraging viewers to observe how their perception of the piece changes as they move around it. The viewers' positions in relation to the piece allow them to experience various levels of perceived depth, as well as an illusion of movement as the lines appear to expand and contract in the moiré pattern.

In Scanimation

In addition to the production of moiré patterns in artwork, artists have also applied the nature of moirés to a form of animation called, "scanimation". Also referred to as "moiré animation," scanimation comprises a horizontally moving transparent vertical pattern superimposed on top of a series of fragmented vertical segments of an image to simulate a looping animation. For the sake of consistency I shall refer to the transparent pattern as the "scanimation grid". The idea originated from film maker Rufus Butler Seder, who patented the term "scanimation," as well as

the use of the scanimation grid printed on an acetate overlay to see the fragmented images as a whole and achieve an illusion of movement in these images (Seder). The logistics of scanimation centers on the idea of using bars or strips to obscure each key frame (phase of movement) while revealing another, a technique known as the "picket fence" effect. Picket-fence animation was applied long before Seder's 2006 patent of "scanimation." In fact, his inspiration lies in the Ombro Cinema toys that had their popularity in 1920s France. Ombro Cinema toys operate as interlaced two-frame animations, operated by a clockwork motor that moves the paper strip with the image fragments behind a transparent "picket fence" screen (Seder).

Most uses of scanimation offer visual stimulation for aesthetic purposes, such as in picture books for children, showing animations of running animals or rotating gears (see fig.16). A recent example that appeared during my thesis was the creative agency, The Workhouse's typography tarot cards, "Typocult" (see fig.17) ("Typocult"). The scanimations on the back of each card bring a tarot symbol to life, adding to the visual appeal of the presentation. Scanimation has been applied to business cards, posters, and book design with only a few of these cases experimenting with moving type. I took to opportunity to create moving type with scanimation in my second project, "The Multiple Layers of Ambiguity".

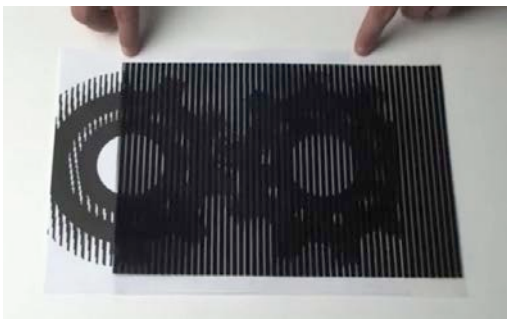


fig. 16. Brusspup, *Amazing Animated Optical Ilusions! #5,* Video, 2012.
fig. 17. The Workhouse. *Typocult*, Video, 2015.

The animating property of moiré patterns in the "picket fence" technique involves the incorporation of "apparent motion." "Apparent motion" is an illusory phenomenon of movement

that occurs when "two or more adjacent stimuli are briefly presented, one after the other" (Sperling 1966). This sequence of stimuli refers to visual cues that must be perceived as belonging to the same stream of movement (Gallace & Spence 544). The easiest way to comprehend how the sequencing works is through the "phi" phenomenon, which is often visualized as a series of lights flashing consecutively around a circle (see fig.18) (Seager 120). Instead of seeing multiple flashing lights, the viewer will perceive one single light travelling around a circle. The "phi" phenomenon is caused by persistence of vision, which is how the retina retains an image that it sees for a length of time (Merrill 2002). Ruth Hayes states that the "phi" phenomenon is a "result of human instinct…when we see different images close together, our brain quickly creates a relationship between them (Merrill 2002). Hence, this occurrence is the central explanation behind the achievement of moving images in animation and films (Merrill 2002). For example, in animation the viewer perceives multiple distinct images (or key frames) as one continuous image (Merrill 2002). Scanimation employs the same idea of successive images by stacking the key frames of the animation together and moves from one key frame to another with the use of the scanimation grid.

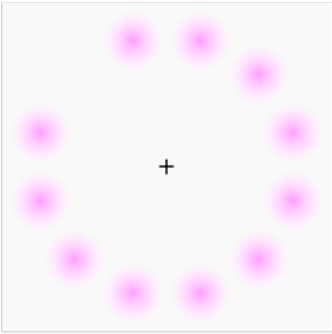


fig. 18. *Phi phenomenon*,
Animated Gif.

VISUAL INVESTIGATION

Preliminary Exploration of Moirés

Even though there are many types of optical illusions, I decided to focus specifically on moirés. My initial interest in moirés originated from my discovery of scanimation. I was intrigued by the unfamiliar concept of picket-fence animation, in which an on-and-off binary action can both reveal a hidden object as well as achieve an illusion of movement. I became curious to figure out how the looping animation is accomplished and this led me to the core of scanimation: moiré patterns. I was fascinated by the dynamic nature of moiré patterns since the presentation constantly changes depending on the viewer's perception. Scanimation revealed the possibility of manipulating the moiré pattern to convey meaning through motion and depth perception. This sparked my interest to look into the logistics of the moiré pattern for alternate ways to manipulate motion and depth perception and constituted my preliminary exploration of moirés, which comprises two parts: Part 1 and Part 2.

Part 1

The preliminary exploration is centered on studying the basics of moiré patterns and exploring their potential in generating new visual forms and patterns. Conducting research on the mechanics of moirés revealed the looping animation in scanimations is actually the third pattern that emerges from overlapping the transparent horizontal pattern on top of the fragmented image. I then explored the different ways to generate the third pattern and experimented with possible variations. This exploration involved testing various combinations of different types of patterns, orientations, and sizes as well as the overlapping patterns' direction of movement in relation to each other.

During this initial exploration, I thought it would be interesting to create a typeface generated from moiré patterns. My experiment was guided by the questions: "If the type itself is a moiré pattern, then how does the moiré affect its form and meaning?," and "Will the type still be recognized as type, or will it be perceived as an abstract image?" I was highly inspired by the ambiguous typography created by J. Abbott Miller in his book, *Dimensional Typography*. One of Miller's typefaces called the "Tapeworm" (see fig.19) depicts a "15th-century round gothic capital letter *s*" that is warped as if it is a sphere (32). The letter *s* is shown to be warped in various angles, sometimes even to the point where it is no longer recognizable. I employed a similar technique in the creation of my own moiré typeface.

fig. 19. J. Abbott Miller, *Tapeworm*, 1996.

I created a series of letterforms from horizontal line patterns that spell out the phrase, "moiré type". The result is a stylized typeface that is a mix of geometric and organic characteristics. However, I observed only varying levels of success in terms of establishing the emergence of a third pattern in these letterforms. To rectify this issue, I applied duplicates of the letterform, which delivered better results. Two layers show a partial emergence of the third pattern while some parts retain some of the original line pattern. It isn't until I've applied three overlapping layers that the letterform is able to be completely composed of distinct third patterns.

The partial outcome achieved from two layers produces an incomplete effect since it reveals the process of constructing the third pattern from the overlapping of layers. From this

progression, I developed various versions of moiré letters based on the number of layers applied and also developed both black-and-white and colour versions. Coloured layers produce a gradient effect that is reminiscent of colour halftoning. As described in the section, "Moirés: Background Context," colour halftoning is the undesired visual effect that results when multiple screens are applied at once in printing (Tai & Ng). In my project, I deliberately used these gradients to visually enhance the moiré type as I incorporated them in a poster series. On the posters I experimented with applying additional background layers of various patterns. The making of these posters has helped me determine that each additional layer will modify the third pattern in unpredictable ways but too many layers will actually diminish the moiré effect and most importantly, obscure the letterforms.

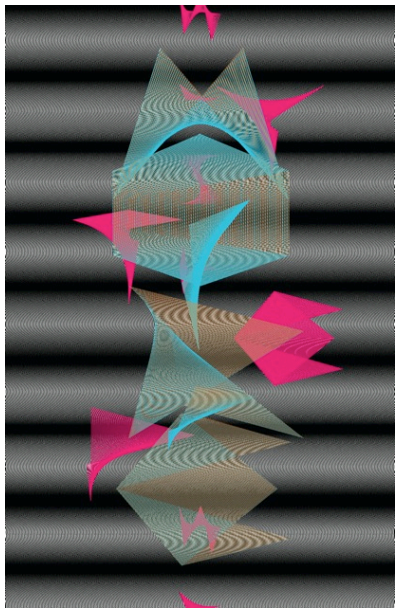


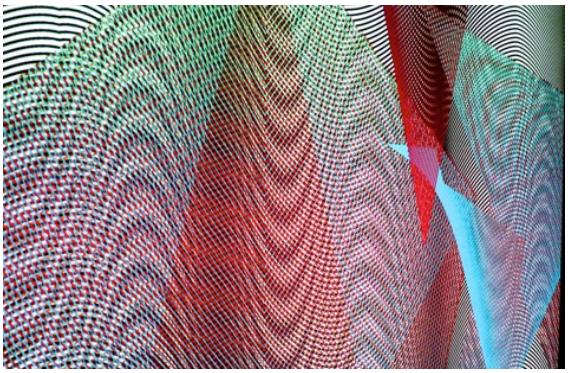
fig. 20 & 21. Christine Chiou, *Is this Moiré Type?*, 2015.

The outcome of the posters showcases the letterforms in the phrase "Is this moiré type?" (see fig.20 & 21). The creation of the moiré type depicts a speculation on the limitations of the third pattern in the moiré effect as well as the viewer's capability of recognizing the abstract shapes as letterforms. I have observed that many viewers actually cannot discern the letterforms in

the posters since they are more likely to be regarded as abstract forms. In response I have tried to change the size and positioning of these letterforms. The results reveal that the smaller the letterforms are, the more recognizable they are. Yet, when the letterforms become too obvious, they are a lot less compelling. Hence, I've tried to achieve a balance of abstract and literal representations of the letterforms by intentionally making certain letters recognizable and other letters unrecognizable, in an effort to draw viewers in through the added level of mystery.

Part 2

Recall that the apparent depth of moiré patterns can be perceived differently depending on the viewing position (Spillman 301). The lines of the pattern expand and contract in accordance with the changing size of the pattern. I utilized this characteristic of varying degrees of perceived depth in the next step of my exploration. I projected the moiré type posters on a wall, magnified the projection, and photographed the imagery from different angles (see fig.22 & 23). I wanted to see if the various angles would produce any changes in the perception of the third pattern. Unfortunately I observed not only insignificant difference in perception but the magnifications of the poster also caused the moiré effect to disappear. Despite this finding, I found that changing the aperture and shutter speed produces an unexpected effect where the colour temperature changes for every shot taken. This effect is caused by the camera's shutter response to the flickering of the projector's light. The combination of colour temperature changes and the magnifications of the posters results in an entirely separate series of abstract imagery that is no longer associated with the initial posters. This discovery provided me new opportunities to generate new visuals that diverge from the moiré type posters and also helped me advance my investigation in a different direction.



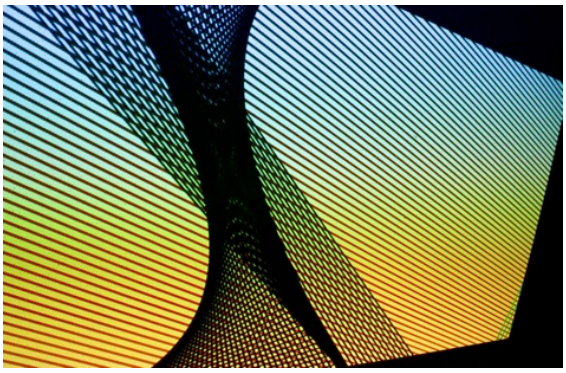


fig. 22 & 23. Christine Chiou, *"Is this Moiré Type?" Projections*, 2015.

After photographing the projections, I experimented with creating new visual forms out of the images. The result is a series of abstract objects made of various arrangements from the fragments of these images. The mismatched arrangement of parallel lines bear a resemblance to the high contrast geometric patterns of dazzle camouflage, a defense tactic used by warships in both World Wars to intentionally disrupt enemies' perception of their ships (see fig.24) (Scott-Samuel et al. 2011). Dazzle camouflage inspired the next stage of the investigation as I began working with motion.

fig. 24. Gloire, a light cruiser of the French Navy, 1935.

The fact that the divergent composition of the linear patterns presents a false sense of dimension led me to try composing a virtual environment with these abstract objects. The results are much more striking when the objects are in high contrast black and white. Since in my early explorations I identified one of the most crucial elements of moirés as the moving interaction

between layered patterns, I decided to animate the objects. The animated objects are programmed to randomly move within the boundaries of the video frame and change sizes and orientations periodically. Unlike static layers, the changing properties of the objects in the video demonstrate a greater variety of moiré effects as they overlap. This enhanced result is especially apparent when the objects rotate in opposite directions on top of one another. During the production of these motion pieces, I also considered the idea of inducing disorientation and vertigo, similar to the visceral effect achieved by Bridget Riley in her abstract paintings (see fig.6 & fig.9). I was interested in how the third pattern in the moiré effect can contribute to a disorienting experience for viewers, particularly if I magnified the pieces and projected them on a wall. I omitted sound because I believed it distracted the viewer but also interfered with his/her impression of the pieces. Sound tends to establish a preconceived context and may even skew audience expectation, which is not my intent.

These projections, as preliminary experiments, were part of exploring the moiré effect. They may have provided a new avenue for further research on the moiré's visceral effects on viewers. However, I decided not to venture further in this direction since it detracts from the goal of my thesis, which is to explore how graphic design can convey simultaneous realities in typography through the motion and depth perception of the moiré effect. The most important elements that are required in my goal is the incorporation of meaning and context, which are clearly missing in these projections.

Since the design of the motion pieces is reminiscent of dazzle camouflage in harbouring a disorienting effect, I have decided to name these pieces the "Dazzled" series (see fig.25). Although the motion pieces look nothing like the systematic and distinct arrangement of patterns seen in conventional Op Art, I would argue that the "Dazzled" series could be considered my own rendition of Op Art. In accordance with the definition of Op Art, the series does show geometric abstractions derived from visual effects of optical illusions, which in this case, are moirés (Wade

21, 1977). I suggest that the resulting visual effect is in fact a synthesis of three things: Op Art, moirés, and dazzle camouflage.

Many examples in Op Art depict radial properties—simulation of rotation or a tunnel effect achieved through receding shapes moving towards a focal point. "Dazzled" employs both rotating elements and a tunnel effect similar to Victor Vasarely's "Vonal-Stri" (1975) (see fig.26) from his "Vonal" series. In the "Vonal" series, Vasarely experimented with changing colours to create an illusion of movement and depth (Morgan & Vasarely 2005). Rather than simulating movement, I've applied actual movement in my visuals in order to enhance the moiré effect. With the incorporation of movement, I categorize the "Dazzled" series as kinetic Op Art. Finally, as mentioned before, the composition of the abstract objects in the motion pieces are inspired by the mismatched arrangements of linear patterns in dazzle camouflage.

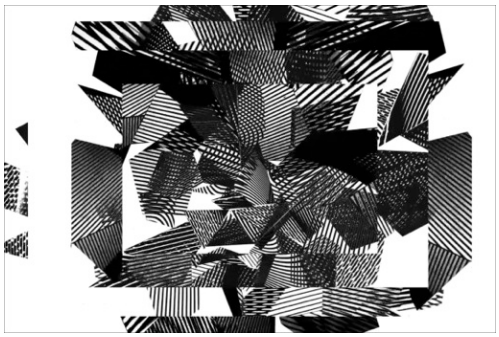


fig. 25. Christine Chiou, *Dazzled*, Video, 2015.
fig. 26. Victor Vasarely, *Vonal Stri,* 1975. Acrylic on Canvas 200 x 200 cm.

The nature of Op Art involves visual abstractions that merely demand an intuitive response from viewers, rather than require any conceptual understanding ("Bridget Riley," *visual-arts*). Upon completion of the "Dazzled" series, I noticed the same problem. The motion pieces have no underlying concept, and lack meaning. The abstractions in the pieces are thus unable to achieve the purpose of my thesis, which is to portray simultaneous realities through the use of typography. This also explains why I decided not to delve further into the effects of moirés on

viewers. To rectify this problem, I decided to follow Sergi Delgado's example and apply the abstract visuals to typography. I was inspired by Delgado's "Candy Numbers" animated gif (see fig.11) and aimed to generate letterforms from the abstract objects in the "Dazzled" series. I created these letterforms by applying a round mask on the motion pieces and finding hidden letters that appeared within certain compositions of the moving objects. I also experimented with applying colour and increasing the contrast to make the letters stand out more. The resulting GIF (see fig.27) displays a series of six round moving objects that pause and reveal individual letters that spell out the word "Dazzle". The idea behind the animated gif was the illusion that the objects seem like mere abstractions when in reality they are actually imbued with meaning. This endeavour was only partially successful due to the fact that the hidden letters are still too abstract and not as easy to interpret as I anticipated.

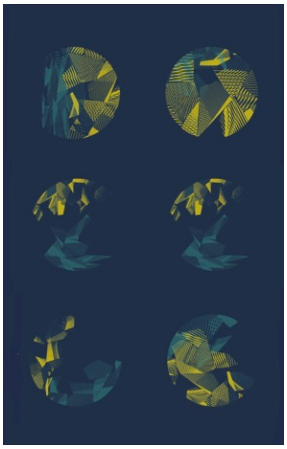


fig. 27. Christine Chiou,
Dazzle Type,
Animated Gif,
2015.

From these experimentations I established a number of trajectories from which I can investigate further. I have also built an image bank from my experiments, which I can use in future projects. I used the moiré type in an alternate way in my project, "The 'Schizophrenic' Condition of Design," which I discuss in the next section.

Project 1: The "Schizophrenic" Condition of Design

This project responds to the question:

> "How can graphic design form a visual discourse on the simultaneous realities of the real world?"

The spatial-frequency difference that causes the third pattern in moiré patterns to emerge is called "optical interference," a phenomenon that occurs when two overlapping patterns move in and out of alignment to each other (Spillman 289). In this project I developed a visual interpretation of these spatial disparities. I envision the idea of "optical interference" as something dynamic that influences the viewer's perception of an object or concept. I deconstructed the moiré letterforms made previously and animated their individual components so they can reveal and hide what is underneath. In doing so, I transformed the moiré letterforms into moving cascading forms that interact with type elements on a series of "motion posters." These "motion posters" consist of portrait-sized videos with animated elements, based off the idea of a poster "coming to life," and will be displayed as projections. The content of these posters establishes a parallel relationship between the contradictory nature of illusions explored in this investigation and Jan van Toorn's argument for the fictitious state of design practice in contemporary society in his book, *Design's Delight*.

According to Van Toorn, like every professional practice, communicative design operates in a state of schizophrenia in a situation full of "inescapable contradictions" (39). On the surface, communicative design appears to be serving the public interest. Yet in reality, it is also engaged in the private interests of clients and media at the same time. Thus Jan Van Toorn states that, "design has become imprisoned in a fiction which does not respond to factual reality beyond the

representations of the culture industry and its communicative monopoly" (39). The false representations fostered by the culture industry will in effect skew the perception of the "world image," which will then mislead any efforts to address the issues and conflicts within contemporary society.

The motion posters illustrate the challenges faced by designers as they strive to establish a neutral ground of expression within the conflicting interests between public and private interests. The cascading forms on the posters are intentionally made to interfere with the readability of the text beneath. The shapes appear to be alternating between states of deconstruction and reconstruction as the individual lines separate and congregate over a period of time. On one hand these shapes depict the changing forces of conflicting interests that interfere with the social role of graphic design. On the other hand, this obscuration partially reveals an inquiry underneath which addresses these conflicting interests. The level of awareness on these inquiries depends on the capacity of the designer to be actively conscious of their social position and their agency in critiquing the current state of design practice.

The text on the posters demonstrates my personal understanding of specific points of Van Toorn's argument that interest me. The posters serve as both a response to these selected points and my own questions on the meanings behind Van Toorn's words as I bring his argument back into the context of my project and my own experiences. Images of the posters can be found in Appendix A: Motion Poster Stills.

Poster 1 – Hyperreality

Jan van Toorn discusses the uncertainty regarding the confrontation between reality and the symbolic representation of reality (41). Jean Baudrillard describes this uncertainty as the experience of reality disappearing "behind the mediating hyperreality of the simulacrum" (Van Toorn 41). In order to understand Baudrillard's meaning, I need to clarify the definitions of the terms, "hyperreality" and "simulacrum". In his book, *Simulacra and Simulation*, Baudrillard defines the "hyperreal" as the "generation by models of a real without origin or reality" (1981). He believes consumer culture is composed of a simulation of the "real" that is no longer connected to the original; as the hyperreal takes its place, the original is no longer needed. Hyperreality results from the mediation of mass media and the cultural industry, particularly when copies of the original are mass-produced and distributed as commodities to be consumed (1981).

According to Baudrillard, hyperreality comprises two key relational parts: simulation and simulacrum (1981). Simulation is the process of replacing the original with a representational image while simulacrum is the product of simulation that deceives the viewer's perception of reality. Baudrillard outlines the process of the simulation of the image in four stages: 1) faithful image that reflects a profound reality, 2) a perversion of an image that masks and denatures a profound reality, 3) a pretense of an image that masks the absence of reality, and 4) a pure image that "bears no relation to any reality whatsoever"; the pure image is "its own pure simulacrum" (1981). As demonstrated in the process, the notion of reality gradually disappears with each subsequent phase and is replaced by the simulacrum. Since simulacrum is not a copy of the original, it becomes its very own "truth," or as coined by Baudrillard, the "hyperreal" (1981).

Van Toorn believes that the simulacrum of institutional culture causes the "destruction of direct experience" (41). I believe this comment refers to the mediation of representations in society, which interfere with the communication of messages facilitated by designers. Designers

frame the messages they communicate to their audience, and social and cultural forces simultaneously manipulate these messages. Hence, designers play the role of both mediating and mediated intellectuals. Mediating intellectuals such as designers situate themselves within an active position, which allows them to articulate and organize their positions in a world of simulacra (Van Toorn 41).

The poster showcases my own interpretation of the mediation that designers are subjected to by social-economic forces, namely in advertising. Many institutional interests affect the outcome of the visual look of advertisements, such as the demands of the target market, the budget of the project, and the expectations of society as a whole. The poster is a simulation of an advertisement by incorporating expected elements such as type and the suggestion of a product. To subvert the idea of advertising, the slogan, "Consume the hyperreal," makes the pseudo-ad into a "simulacrum." The forms that create the illusion of a bottle represent the idea that society is trapped in a state of hyperreality, in which the original versions are increasingly difficult to identify. The cascading forms obscure the product, which is a representation of the institutional forces that withhold the truths of their products as simulacra from their consumers.

Poster 2 – Meaningful Message

Van Toorn declares there's a worldwide phenomenon in communication design that all forms of interactive communication (any language or action) are made uniform and superficial (Van Toorn 52). This tendency for homogeneity occurs as a result of society's lack of critique on the way socio-cultural forces influence images and representations. Van Toorn expresses his concern about how the apathetic nature of society has caused a loss of opportunity to use language and "operational critique" to add multidimensionality and change to the world (52). Nowadays, consumers are too busy becoming distracted by their fascination with images presented by the cultural industry to fully understand the reality expressed in these images.

One example is Canada Goose Inc., a large Canadian manufacturer that specializes in extreme-weather outerwear whose jackets have become increasingly popular over the years. Canada Goose claims to operate "ethically and with authenticity" and when questioned about the coyote fur they use as decorative trim on their down parkas, the company claims the coyote fur is attained "humanely"(Palcit 2012). However, animal rights groups released photos of coyotes (see fig.29) captured by snare traps issued by Canada Goose that were left to die from dehydration or starvation or shot on sight (Palcit 2012). Canada Goose ads tend to portray a model situated within an arctic setting, showcasing the down jacket with its attractive coyote fur hood in the very environment it was made for (see fig.28). The image thus becomes superficial and is devoid of meaning when the hidden implications of animal cruelty are deliberately not communicated along with the image. The one-dimensional character of this form of communication design controls which parts of the truth is to be conveyed through visual culture, thus not revealing the "entire picture" behind the true meaning of the images. In response, Van Toorn suggests implementing an operational critique that allows the audience to actively engage in the interpretation of meaning as well as inspire critical thinking that may lead to some sort of action as a response (Purcell 2007).

fig. 28. Canada Goose Inc.,*Canada Goose Advertisement*, 2014.
fig. 29. Paris Palcit, *Do not support Canada Goose*, 2012.

This poster displays a self-reflective response to my own practice as well as incorporates a deeper line of thinking proposed by Van Toorn. My question in response to Van Toorn's critique is: "What constitutes a "meaningful" message?" How would one be able to visually present ideas so that they are successfully communicated to the audience? As a designer, these are some of the things I already question when reflecting on my own work. The poster depicts my personal struggle with how I incorporate meaning in the materialization of an idea. The materialization of an idea involves the challenge of achieving a "meaningful message," which is reflected in the obscuration of the text. The uniformity of the cascading forms represents the homogeneity of communication that interferes with the delivery of meaning. As they move they reveal small slits into the content beneath, revealing the inquiry that is often overlooked by the cultural industry.

Poster 3 – Interpassivity

Jan van Toorn challenges the deceptive impression that graphic design seems to facilitate genuine change in contemporary society. Other critics agree with Van Toorn's point, such as Kerry Purcell who states that graphic design has "often been the modus operandi of what the philosopher Slavoj Zizek once called 'interpassivity'"(2007). The term, "interpassivity" opposes the concept of "interactivity," in which the individual feels they are actively interacting when in actuality they are only passively consuming (Zizek 1997). The illusion of active participation is the consequence of vicariously experiencing the action through the substitution of an object (Zizek 1997). In the case of design, these objects are the images presented to the masses in visual culture. For example, messages or imagery depicted in television or billboard advertisements emulate an ideal reaction to the product; thus, these ads "enjoy" the product for the consumer. By merely relying on the images to communicate messages, designers relieve themselves of the duty to actively engage in "actual acts of social and political change" (Purcell 2007).

To respond to this issue, I examine the dichotomy between the concepts, "interactivity" and "interpassivity". One of the inspirations for the poster comes from Zizek's analogy of recording films on his VCR as a way to describe "interpassivity".

> "Although I do not actually watch films, the very awareness that the films I love are stored in my video library gives me the profound satisfaction and, occasionally, enables me to relax and indulge in the exquisite art of *far'niente* (doing nothing) — as if the VCR were in a way watching them for me, in my place" (112).

In response to this analogy, I used Zizek's example of the VCR in the phrase "Who is watching the film?" The poster showcases two simultaneous answers to that question. First is the word, "YOU" that is spelled out with the use of the cascading forms and is situated on the top layer. In exchange with "YOU" is "VCR" which is the "truth" hidden behind the optical interference. The answer, "YOU" represents the false sense of interactivity that characterizes many forms of graphic design nowadays, and the answer, "VCR" represents the interpassivity that is actually occurring in such cases.

Poster 4 – Stylistic Compulsiveness

Van Toorn claims that with the "patriarchal practice of reproduction," there is an "aesthetic compulsiveness" that prevails within official design (39). This compulsiveness stems from a universal demand for beautiful visuals that will successfully attract an audience and thus achieve its purpose within the context of commercial culture. However, these images are merely empty shells of representations that serve as illusions, which anesthetize and neuter ideas of social change (Van Toorn 62; Purcell 2007). Graphic design can be very manipulative. It employs the use of aesthetics to skew the visual perception, especially to a passive audience. The audience becomes so fascinated by these images as decoration that they never consider the images as

"subjective narratives or indexical mediums" (Van Toorn 62). Van Toorn believes this is a huge problem in design today because designers are not taking advantage of the full potential of images.

Van Toorn suggests that designers critically reformulate the image as a construction that includes both description and commentary, and to demonstrate the "interplay between representation and presentation" through these images (62). Revisiting the issue of meaning addressed in Poster 2, this interplay refers to the forces at work that affect how the image conveys meaning. These forces can be the negotiation of meaning between the communicator and receiver, or they may be the standardized themes and norms that control and limit the interpretation of meaning in visual culture (Van Toorn 61).

Van Toorn's concern on aesthetic compulsiveness inspired me to consider my own compulsiveness on decoration, which I refer to as "stylistic compulsiveness". To differentiate between "aesthetics" and "style," aesthetics revolves around conscious decisions based on a set of principles that guide the development of a design, while style revolves around merely gut-induced decisions to make something look "attractive". Sometimes the use of decoration can cover up the lack of connection between the representation and presentation, and that is one of the many personal struggles I had throughout my investigation. In this poster, I incorporate my own experiences of learning to overcome my own stylistic compulsiveness and to critically think about what the visuals represent and achieve. During my investigation I tend to stray towards abstraction in the midst of form making, and consequently, I lose the key purpose behind making the visuals in the first place. Therefore in this response I have included some of the abstract imagery from my project and formed a commentary on my compulsive need for decoration. This commentary addresses the questions of: "What can an image accomplish?" and "How to achieve a balance between the compulsive need for decoration and the communication of meaning?" The text of the poster questions what abstracted visuals can achieve and once imbued with meaning,

how the image can reveal itself as a construction that consists of many negotiations of meaning rather than a one-dimensional object.

Poster 5 – "Blind Freedom"

One of the biggest concerns in Van Toorn's argument is the social orientation of designers and the actions that characterize their responsibilities as mediators of information to the public. He states that the social orientation of the actions of designers is currently in a state of "blind freedom" (39-40). This "blind freedom" is referred as the concept of orientation towards social emancipation (34). Van Toorn believes that practical intellectuals such as designers are currently trapped within the entanglement of constituted meanings by the "profession, commerce and state" (34). In order to emancipate themselves from these authoritarian mentalities, designers must strive for a form of communication that allows an expression of individual opinion without the interference of political and cultural criteria.

Van Toorn addresses the ongoing conflict between tradition and innovation, as designers break away from the conventional content rooted in modernist tradition (27, 29). Within the profession of design, there is a constant urge to create something original or new. However, Van Toorn believes the interference of institutional interests leads to "vulgarization and simplification of our reflective and critical traditions" (40). These vulgarizations can be seen in the evidence of the conventional formulas used in advertising. One of Van Toorn's photos shows a number of passersby ignoring a series of ads for Diesel Jeans' 2001 publicity campaign carrying the message, "Stop crime now!" (see fig.30) (154). The purpose of a strong message falls short as the image of the two models fails to communicate anything to do with stopping crime. Therefore, the mass-produced ad is meaningless and doesn't draw the required attention. As with several examples in advertising, the socio-cultural and economic agenda of corporations may have played a part in

dampening the designers' efforts in striving for meaningful imagery during the production of ads like these.

fig. 30. Publicity Campaign Diesel Jeans, London, 2001.

According to Van Toorn, designers are so caught up in the false freedom involving the mediation of messages to the public that they are either only "superficially aware of their role in the staging of the cultural environment" or they choose to be "blind" to the socio-cultural conditions that influence their actions (29). In response to this critique, I decided to focus on the concept of "blind freedom" as a conflict between the emancipatory force of innovation and the public interests seeded in convention. In this endeavour, I would like to address my personal "blind freedom". As a designer situated within the demanding conditions of commercial and capitalist forces, how can I achieve a balance of convention and innovation in my professional practice? This balance pertains to the extent of creativity and individual thought within the simultaneous fulfilling of expectations on the demands of commercial entities.

The poster shows the text, "Are we content living in blind freedom?" in which the letter "I" in the word "blind" transforms from a recognizable letter and expands into an abstract form that breaks apart into a cascading shape and then shrinks back again to the letter "I". The expansion and contraction of the letter "I"" represents the changing tension between the states of

convention and innovation that I struggle with in my design process. This struggle includes the matter of comfort that I find in familiar territory and how I push myself to break way from that to try new ideas. This motion poster also serves as a personal critique to my "blindness" in my lack of acknowledgement of the commercial interests that influence decisions during my process. Ultimately, the poster symbolizes the superficial awareness of the ongoing conflict between corporate interests that push designers back to the "traditional" forms of representation and designers attempting to escape from these constraints. I portray this superficiality by incorporating the cascades into the words "Blind" and "Freedom," which infuses a second layer of meaning in its ambiguous presentation, hence visually rendering two simultaneous realities.

Project 2: The Multiple Layers of Ambiguity

This project responds to the question:

> "How can meaning be conveyed and mediated through the incorporation of ambiguity in graphic design?"

The foundation of this project stems from my initial curiosity with scanimation. After studying the mechanics of picket-fence animation, I wondered if I could replicate the technique but apply it to a graphic design context. I have observed that most of the scanimation examples tend to show animations of objects or living things. These examples showcase objects such as rotating gears, a running cat, or a dancing person. I noticed there are very few examples of typography in scanimations. I have always had a keen interest in kinetic typography, moving type often seen in animations, such as motion graphics (Bodine & Pignol 2003). It is used to convey certain ideas or information in a stylized fashion, whether that is an animated infographic or the credits shown in a television sequence. In an attempt to integrate these two interests, I created a series of typographic scanimations. Additional images can be found in Appendix B: Scanimation Images.

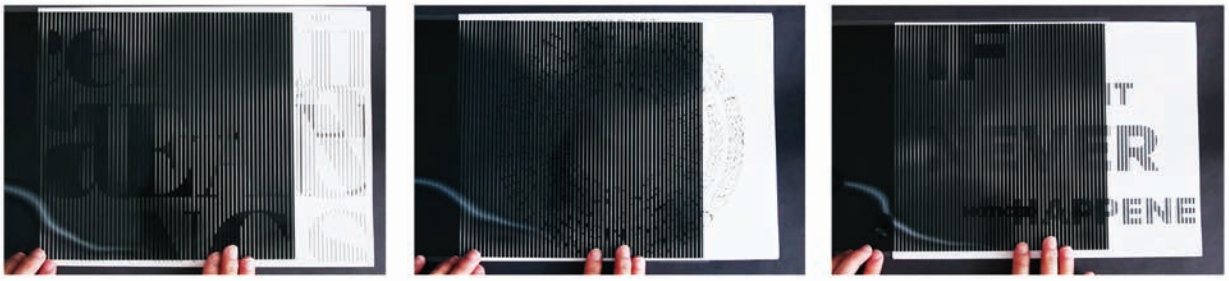


fig. 31. Christine Chiou, *"Reality was utterly coolheaded and lonely"* Video Stills, Scanimation, 2015.

To make the animation possible and have the image appear, a moveable scanimation grid must be superimposed on top of the fragmented image. In the process of making I had to

consider the limit of key frames that make up the looping animation. The ideal number is six key frames. Anything above six frames will result in necessary adjustments to the parameters of the scanimation grid that will be placed on top of the image, namely increasing the thickness of the vertical bars in the grid. If the bars in the grid are too thick, the resulting animation will be obscured and not as legible.

Factoring in the constraints described above, I had to make sure to simplify the moving type in the book. Simplification involved limiting myself to changing no more than two properties of the moving type in each key frame. The changing properties I experimented with were position, transparency, scale, and rotation. The results from these experimentations are varied. Legibility of the text proved the greatest challenge. Since I've decided to animate phrases with several words stringed together instead of individual words, the resulting animation is already complex. Incorporating the changing properties in the text complicates the animation further, and once the scanimation grid is superimposed, the legibility of the text is compromised even more.

I used a selection of quotes from the novels of Haruki Murakami as the source material for this project. Murakami's novels tend to explore themes involving reality and unreality, dreams and illusions, and surrealism (Seats 2006). The purpose of this project is to explore the ambiguity between reality and unreality as conveyed in these quotes, or what I have termed: "fictions in reality". "Fictions in reality" refers to the fabrications that Murakami inserts into reality to blur the line between reality and unreality.

I found that Murakami has an affinity for incorporating ambiguity into his writing. Much of the written imagery and dialogue in his stories allow for the reader to make multiple interpretations. One example is the quote, "Silence, I discover, is something you can actually hear," from *Kafka on the Shore* (Murakami, *Kafka* 100). In the story this line was merely a comment made by the main character, Kafka, on the silence of his bedroom. One may interpret

the quote literally, but on a deeper level it can be read as a myriad of things, such as a reference to the mental state of the main character or an effort by Murakami to bleed imagination into reality and prompt the reader to perceive the real world in another way.

I observed that while the text is most often interpreted literally when it is read within the context of the story, isolating the text can open up possibilities for alternate readings. An example would be a quote from *IQ84*, "There are certain meanings that are lost forever the moment they are explained in words" (Murakami, *IQ84* 455). The above line was said by a man known as "The Leader" to the main character, Aomame within an explanation that out of her own will, she has come to the world of "IQ84," an alternate reality to the year 1984. The quote was the man's way of telling Aomame that he is unable to explain the exact details of why she is currently in IQ84, but when the quote is isolated, readers feel confounded by the ambiguous nature of the text and in their desire for a clearer understanding, feel compelled to contemplate a deeper meaning based on his/her experience.

Murakami's stories also have a tendency to leak into the reality of the world. This merging of realities is demonstrated through analogies and allegories within the text, in which he inserts commentary and observations on real life and the workings of the human psyche (Anderson 2011). For example, at the beginning of *Kafka on the Shore*, Murakami makes an analogy of fate as a sandstorm. He refers to the sandstorm as an internal struggle that one must endure and walk through, and at the end: "When you come out of the storm, you won't be the same person who walked in. That's what this storm's all about" (Murakami, *Kafka* 3). This passage can be interpreted as Murakami poetically stating, "Pain is a necessary precursor to transformation," commenting on the obstacles and difficulties that people experience in life in order to move forward (Bates 2013).

I believe that the "fictions in reality" in Murakami's words that lead to multiple interpretations can be considered "layers" of reality. Following the initial typographic

scanimations, I wanted to portray these layers of realities within the content of each selected quote in a visual manner, particularly so that the artifact can be read in a number of ways. Since I encountered legibility problems when I animated several words in a phrase, I decided to break the quotes down into sections and "scanimate" a single key word. The rest of the quote is presented in physical transparent layers above the scanimation. The viewer can read the majority of the quote at first glance, but in order to read the keywords and understand the entire quote, they would need to remove the top layer and read the "hidden" text beneath with the help of a scanimation grid. The viewer must make an effort to decipher the key words, which references the idea of a necessity for a deeper reading. The dynamic nature of scanimation also reflects the ever-changing nature of the multiple realities in these quotes.

This endeavour turned out partially successful due to more legibility problems in the scanimated text and the overly complex visual system leading to the viewer's confusion in reading and understanding the quote. I have thus determined this is perhaps the very reason why typography is rarely employed in scanimations. Scanimation can only function well if it is used to depict simple, large, and solid moving objects. Whereas the complex elements of type, particularly in serif typefaces, can cause a problem in readability once the thick black bars of the scanimation grid obscure the text. The scanimation grid also proved to be a distraction in the reading of the text because of its dark and imposing nature.

However, I found a certain fascination in the fragmented images that make up the scanimation, especially if it shows hints of the original type. One example is when I scanimated the morphing between the words "fiction" and "memory" as part of the quote, "Memory is like fiction; or else it's fiction that's like memory" from *The Elephant Vanishes* (Murakami, *Elephant* 164). The resulting image appears to be a series of detached lines, but when looked at carefully one can see it shows traces of the word "memory". This ambiguous nature demonstrates the potential to imbue layers of meaning within type as an image through the process of scanimation.

The result may not be moving type but it certainly retains a kinetic energy in the lines within the fragmented image. I believe this process can ultimately serve as a visual portrayal of simultaneous realities through static typography, particularly paving a route for further investigation in the "blurring" of multiple realities.

CONCLUSION

Many graphic designers utilize Gestalt principles to manipulate visual perception, such as done by Shigeo Fukuda in his optical illusion-inspired posters. The incorporation of illusions in graphic design has expanded and deepened interpretation of meaning, but can also influence designers' way of working in their process. The fact that illusions comprise multiple layers of meaning requires a particular attentiveness to the visual perception of an artifact. This was reflected in my investigation process when I constantly remained attentive to how the artifacts will be perceived by the viewers, considering factors such as distance, scale, direction and angle of movement. This critical attention in the design process encourages designers to consider how their work will be experienced by their audience in the midst of negotiation of meaning and physical engagement with the artifacts. The manner in which the work is perceived ultimately affects the viewers' comprehension in the conveyed message and their response.

This investigation has revealed that the incorporation of motion and depth perception in illusions offers a physical experience in graphic design. The reception of the artifacts is not contingent on a single straightforward view, but rather it can be experienced differently depending on the angle and distance at which it was viewed from. This is particularly relevant in the element, "apparent depth" in the moiré effect, in which the lines of the pattern actively contract and expand as one moves towards and backwards from the object, as demonstrated in the motion posters. (Spillman 301).

While illusion-based design already prompts viewers to actively interpret multiple layers of meaning, the added elements of motion and depth can grant or in some cases, even necessitate a certain degree of control in viewers, providing an opportunity for active participation. This new dimension of experience can lead designers to think about a design artifact as something that is

physical, interactive, and unfixed. Each individual will have the capacity to experience the artifact in a unique fashion, based on the choices s/he makes during his/her interaction with the artifact.

In addition to critically reflecting on how the logistics of visual perception influence the reception of one's work, the idea of simultaneous realities presents an opportunity to use illusions to instill a level of awareness in viewers to be conscious of how they perceive the world. Perhaps illusions can be employed as a self-reflexive tool for designers to allow viewers to become observers of themselves, or as quoted by Beau Lotto, "see yourself see" (2012). In this investigation, I attempted to develop a way for viewers to harness certain awareness to elusive truths through visual communication. In the context of the projects, the elusive truths that I refer to would be: a) the conflicting realities of the impression on the current state of design practice and the institutional interests that interfere with designers' agency, and b) the introspective observations on the real world and human psyche ingrained within fictional realities. Whereas advertising exhibited examples of overtly utilizing optical illusions, I decided to opt for a less obvious approach in the revealing of these hidden truths, in which I "blurred" multiple realities together and generated more ambiguous results. The indefinite nature of these "blurry" territories within graphic design allow each viewer to read and interpret the artifacts differently based on their own level of awareness, the extent of their knowledge and their own experiences. Designers can utilize this approach not only to deliver a personalized experience to their audience but also surreptitiously form a visual discourse, such in a way that encourages a deeper reading and speculation of their work.

REFERENCES

Anderson, Sam. "The Fierce Imagination of Haruki Murakami." *New York Times Magazine* 21 Oct. 2011. Print.

Ash, Mitchell G. "Establishing the Berlin School." In *Gestalt Psychology in German Culture 1890–1967 : Holism and the Quest for Objectivity*, 1-528. New York, New York: Cambridge University Press, 1998.

Bates, Jordan. "Haruki Murakami on Subjectivity and Transformation." *Refine the Mind*. Refine the Mind, 2013. Web. 4 Feb. 2016. <http://www.refinethemind.com/haruki-murakami-on-subjectivity-and-transformation/>.

Baudrillard, Jean. *Simulacra and Simulation*. Ann Arbor: U of Michigan, 1981. Print.

Bodine, Kerry, and Mathilde Pignol. (2003). Carnegie Mellon University. Web. 15 Nov. 2015.

"Bridget Riley - Biography of British Op-Art Abstract Painter of Optical/Retinal Art." *Visual-arts-cork.com*. Visual-arts-cork.com. Web. 26 Oct. 2015. <http://www.visual-arts-cork.com/famous-artists/bridget-riley.htm>.

"Bridget Riley." *Op-art.co.uk*. Op-art.co.uk. Web. 26 Oct. 2015. <http://www.op-art.co.uk/bridget-riley/>.

Burer, Catherine. *Kirei: Posters from Japan, 1978-93*. London: Thames & Hudson, 1994. 1-192. Print.

Byrne, Emmet. "Radiant Discord: Lance Wyman on the '68 Olympic Design and the Tlatelolco Massacre." *Walker Art Center*. Walker Art Center, 20 Mar. 2014. Web. 27 Nov. 2015. <http://blogs.walkerart.org/design/2014/03/20/lance-wyman-mexico-68-olympics-tlatelolco-massacre>.

Carpenter, Siri. "Everyday fantasia: The world of synesthesia." *Monitor on Psychology*. 32.2 (2001): n. page. Web. 21 Apr. 2014. <http://www.apa.org/monitor/mar01/synesthesia.aspx>.

Feloni, Richard. "Honda Uses Unbelievable Optical Illusions To Sell Its Fuel-Efficient SUV." *Business Insider* 25 Oct. 2013. Web. 22 Nov. 2015.

Gallace, A., & Spence, C. (2011). To What Extent Do Gestalt Grouping Principles Influence Tactile Perception. *Psychological Bulletin, 137*(4), 538-561.

Heller, Steven. "Shigeo Fukuda, Graphic Designer, Dies at 76." *The New York Times* 19 Jan. 2009. The New York Times. Web. 24 Oct. 2015.

Jenny, Hans. *Cymatics: A Study of Wave Phenomena & Vibration*. 3rd ed. MACROmedia, 2001. Print.

Lidwell, W., Holden, K., & Butler, J. (2003). *Universal Principles of Design* (pp. 10-216). Gloucester, Massachusetts: Rockport.

Lotto, B. (2012, November 15). Optical Illusions Show How We See. *Huffington Post*. Retrieved May 25, 2015, from http://www.huffingtonpost.com/beau-lotto/optical illusions_b_2139341.html

Wilding, Ludwig. (2013). Retrieved June 14, 2015, from http://www.kinetica-artfair.com/?exhibitors/2013/ludwig-wilding

Wilding, Ludwig. (n.d.). Retrieved June 14, 2015, from http://www.whitfordfineart.com/artist/page/7927/ludwig_wilding

Merrill, Chris. "Integrated learning: zoetropes in the classroom: the zoetrope activity offers dynamic learning opportunities for students because it is more than a project." *The Technology Teacher* Feb. 2002: 7+. *Expanded Academic ASAP*. Web. 5 July. 2015.

Miller, J. Abbott. *Dimensional Typography*. Princeton Architectural, 1996. 1-57. Print.

Morgan, Robert C, and Victor Vasarely. *Vasarely*. New York City: George Braziller, 20015. 1-128. Print.

Murakami, Haruki. *Kafka on the Shore*. London: Vintage. 1-480. Print.

"Op Art History Part III: Origins and Influences on Op Art." *Op-art.co.uk*. Op-art.co.uk. Web. 26 Oct. 2015. <http://www.op-art.co.uk/history/op-art-history-part-iii/>.

Palcit, Paris. "Do Not Support Canada Goose." *Examiner.com*. Examiner.com, 28 Jan. 2012. Web. 24 Nov. 2015. <http://www.examiner.com/article/do-not-support-canada-goose>.

Poole, Steven. "The Impossible World of MC Escher." *The Guardian* 1 June 2015. Web. 27 Oct. 2015.

Purcell, Kerry William. "Delightful Precipice At The Edge Of Communicative Reality." *Eye Magazine* 2007. Print.

Parola, Rene. *Optical Art: Theory and Practice*. Toronto: General, 1996. 9-144. Print.

Richardson, Laura. "Seeing the Future Synesthetic-How do we design for people who hear textures, taste shapes, and remember the color of a person rather than a name?." *design mind*. design mind, 1 Jan. 2010. Web. 21 Apr. 2014. <http://designmind.frogdesign.com/articles/the-substance-of-things-not-seen/seeing-the-future-synesthetic.html>.

Sagiv, Noam, and Jamie Ward. "Crossmodal Interactions: Lessons from Synesthesia." Prog Brain Res. 155 (2006): 71-259. Print.

Seager, W. (1999). *Theories of Consciousness - An introduction and assessment*. London: Routledge.

Seats, Michael. *Murakami Haruki - The Simulacrum in Contemporary Japanese Culture*. 2009 ed. Plymouth: Lexington, 2006. 1-384. Print.

Scott-Samuel, Nicholas E., Roland Baddeley, Chloe E. Palmer, and Innes C. Cuthill. "Dazzle Camouflage Affects Speed Perception." *PLoS ONE* 6.6 (2011): 1-5. PLoS ONE. Web. 1 Nov. 2015.

Seder, R. (n.d.). The Optically Animated Artwork of Rufus Butler Seder. Retrieved July 5, 2015, from http://www.rufuslifetiles.com/TheOpticallyAnimatedArtworkofRufusButlerSeder.pdf

Sperling, G. (1966). Comparisons of real and apparent motion. *The Journal of the Optical Society of America, 56*, 1442-1442.

Spillmann, L. (1993). The perception of movement and depth in moiré patterns. *Perception, 22*, 287-308. Retrieved May 24, 2015, from http://www.perceptionweb.com.ezproxy.libary.yorku.ca/perception/fulltext/p22/p220287.pdf

Tai, Hwai Tzuu, and Yee S. Ng. Method and Apparatus for Printing Halftones with a Gray Level Printer with Contour Suppression And/or Minimization of Moiré Patterns. Eastman Kodak Company, assignee. Patent US 5313309 A. 17 May 1994. Print.

Toorn, Jan Van. *Design's Delight*. Rotterdam, Netherlands: 010, 2006. Print.

"Typocult." *The Workhouse*. The Workhouse, 2015. Web. 14 Aug. 2015. <http://www.theworkhouse.ca/typoccult/>.

"Victor Vasarely - Biography of Op-Art Painter, Kinetic Artist." *Visual-arts-cork.com*. Visual-arts-cork.com. Web. 26 Oct. 2015. <http://www.visual-arts-cork.com/famous-artists/victor-vasarely.htm>.

"Victor Vasarely." *Op-art.co.uk*. Op-art.co.uk. Web. 26 Oct. 2015. <http://www.op-art.co.uk/victor-vasarely/>.

Wade, N. (1977). Op art and visual perception. *Perception, 7*, 21-46.

Wade, N. (2007). The stereoscopic art of Ludwig Wilding. *Perception, 36*, 479-482. Retrieved June 14, 2015, from http://www.perceptionweb.com.ezproxy.library.yorku.ca/perception/editorials /p3604ed.pdf

Zimbardo, Philip G., and Richard J. Gerrig. "Perception." *Foundations of Cognitive Psychology: Core Readings*. By Daniel J. Levitin. Cambridge: MIT, 2002. N. pag. Print.

Zizek, Slavoj. *The Plague of Fantasies*. London: Verso, 1997. 1-254. Print.

APPENDIX A

Motion Poster Stills

fig. 32. Christine Chiou, *Hyperreality*, Motion Poster Stills, 2016.

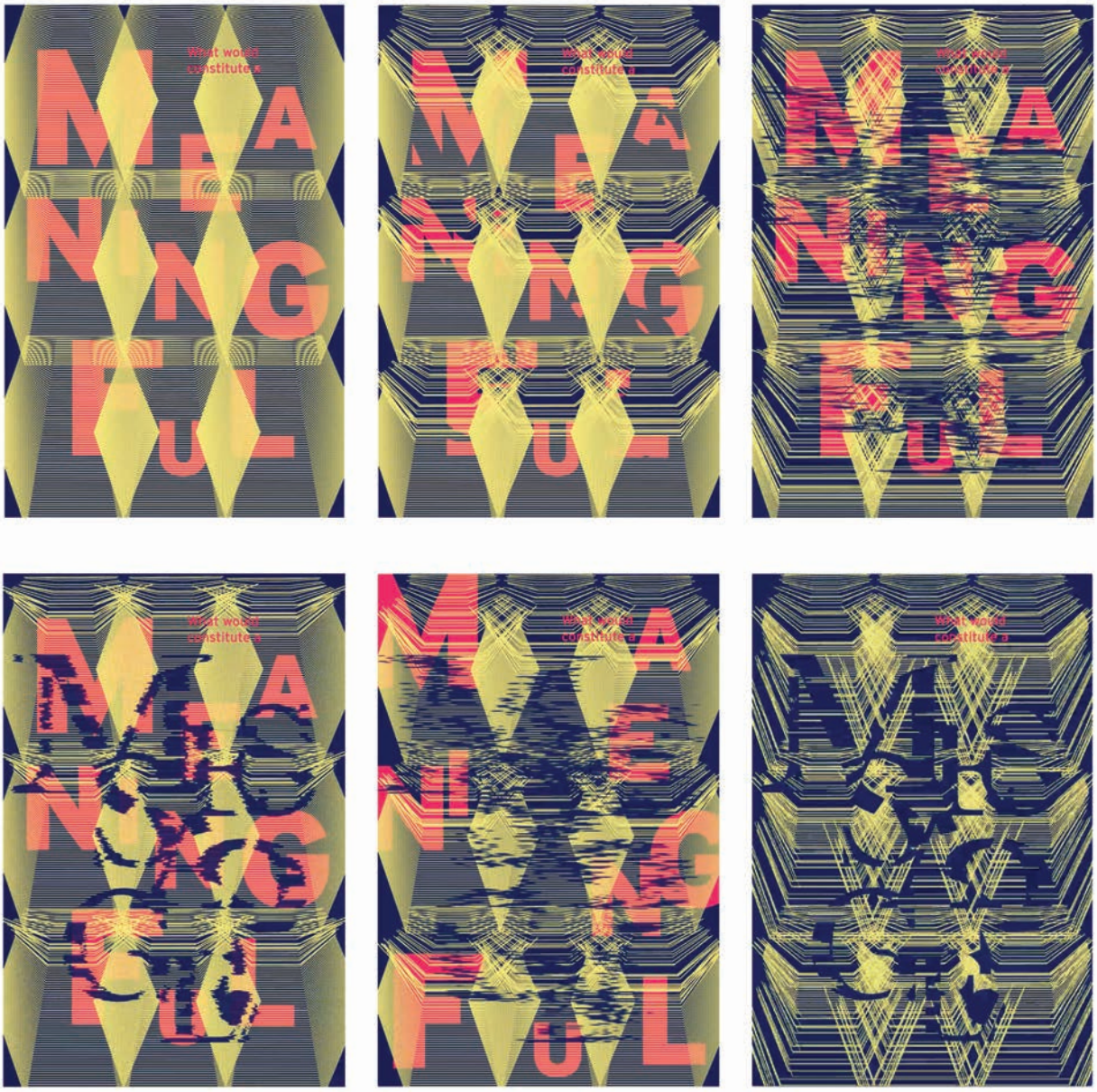


fig. 33. Christine Chiou, *Meaningful Message*, Motion Poster Stills, 2016.

fig. 34. Christine Chiou, *Interpassivity*, Motion Poster Stills, 2016.

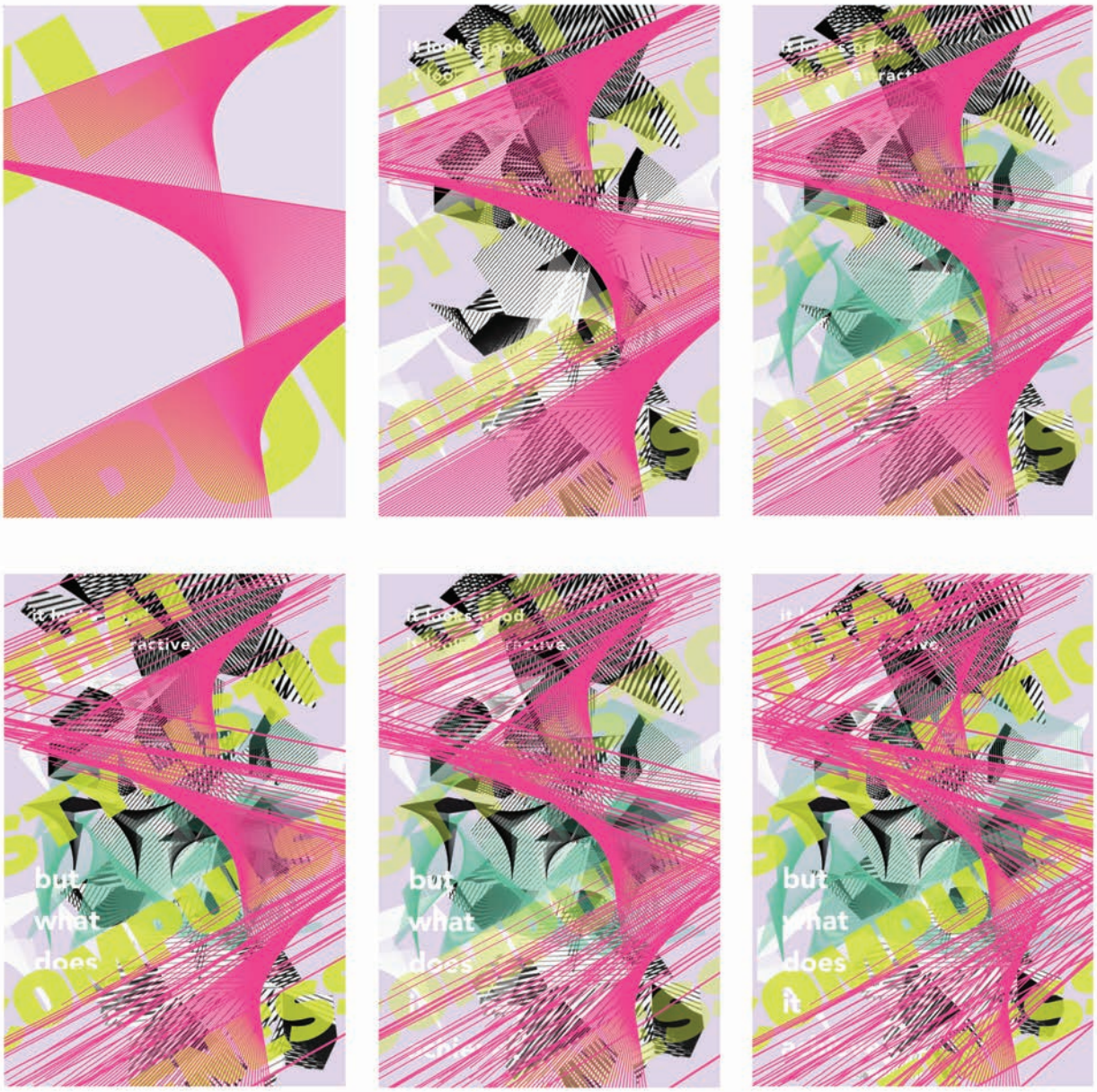


fig. 35. Christine Chiou, *Stylistic Compulsiveness*, Motion Poster Stills, 2016.

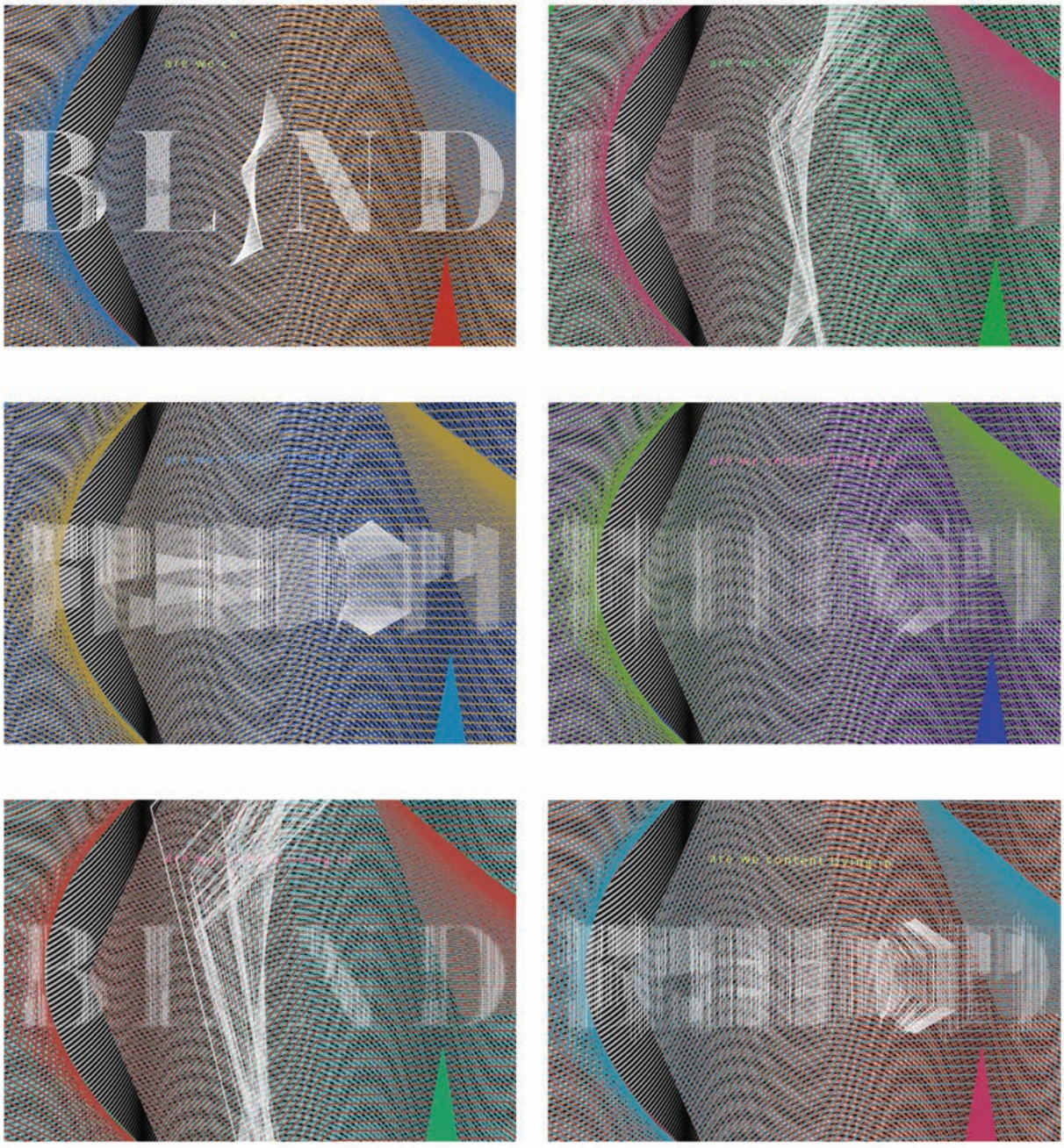


fig. 36. Christine Chiou, *"Blind Freedom"*, Motion Poster Stills, 2016.

APPENDIX B

Scanimation Images

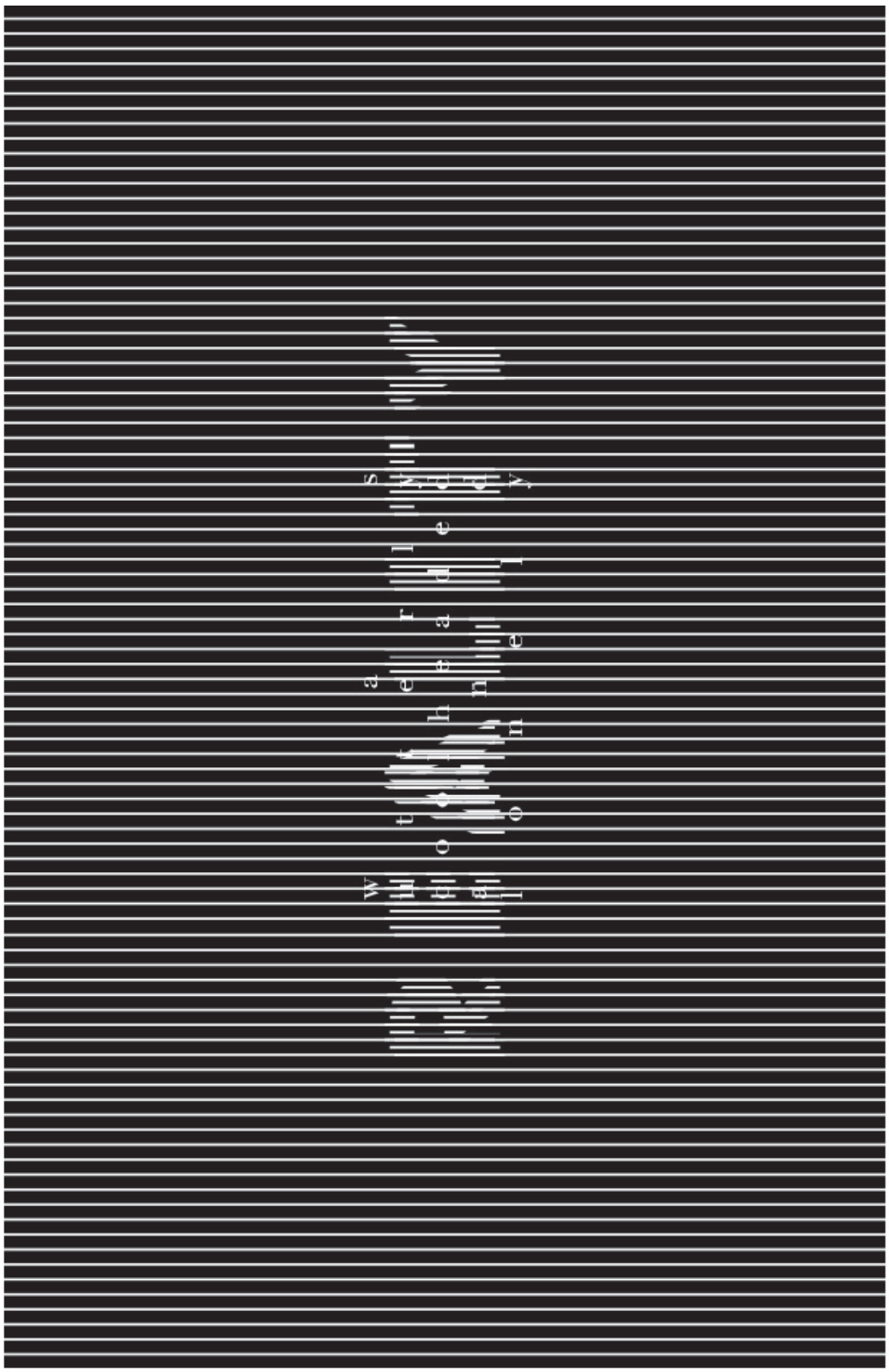


fig. 37. Christine Chiou, *"Reality was utterly coolheaded and lonely,"* Cover, Scanimation, 2015.

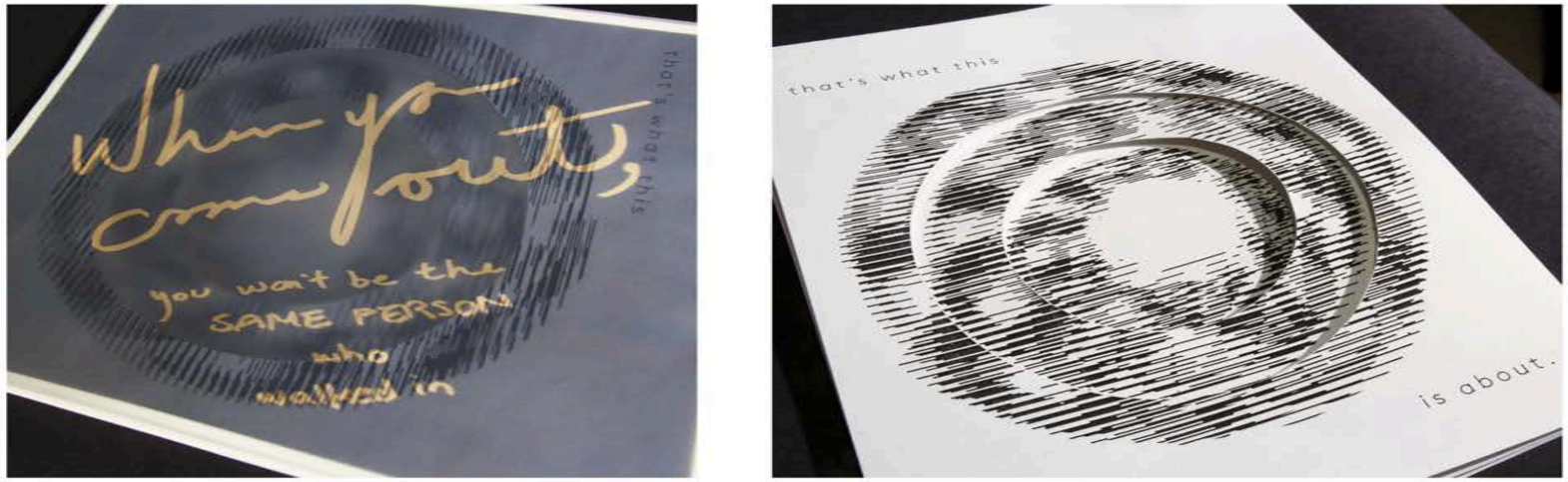


fig. 38. Christine Chiou, *"When you come out, you won't be the same person who walked in. That's what this storm is about,"* Scanimation, 2016.

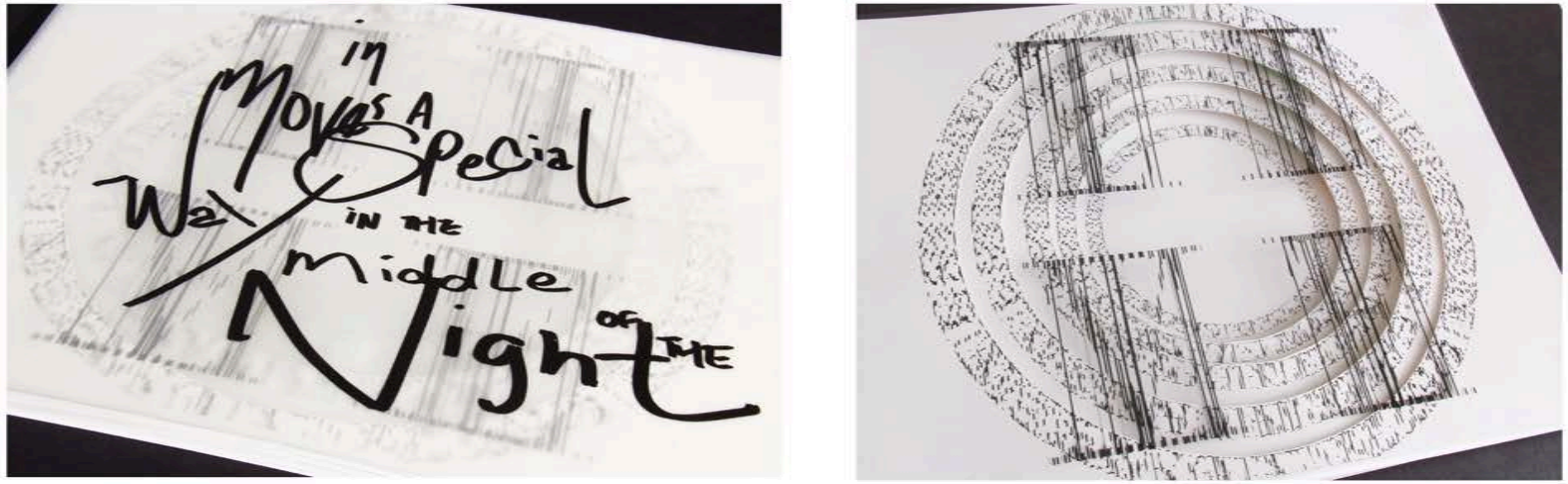


fig. 39. Christine Chiou, *"Times moves in a special way in the middle of the night,"* Scanimation, 2016.

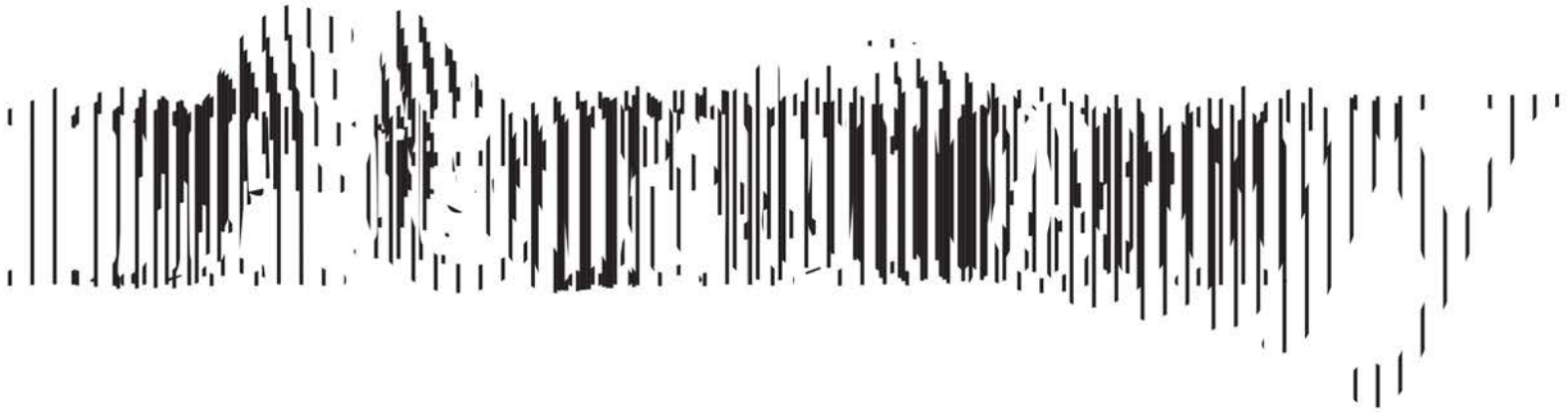


fig. 40. Christine Chiou, *Memory and Fiction,* Scanimation, 2016.

APPENDIX C

"Is this Moiré Type?" Documentation Book

fig. 41. Christine Chiou, *"Is this Moiré Type?"*, Book and Info Booklet, 2016.

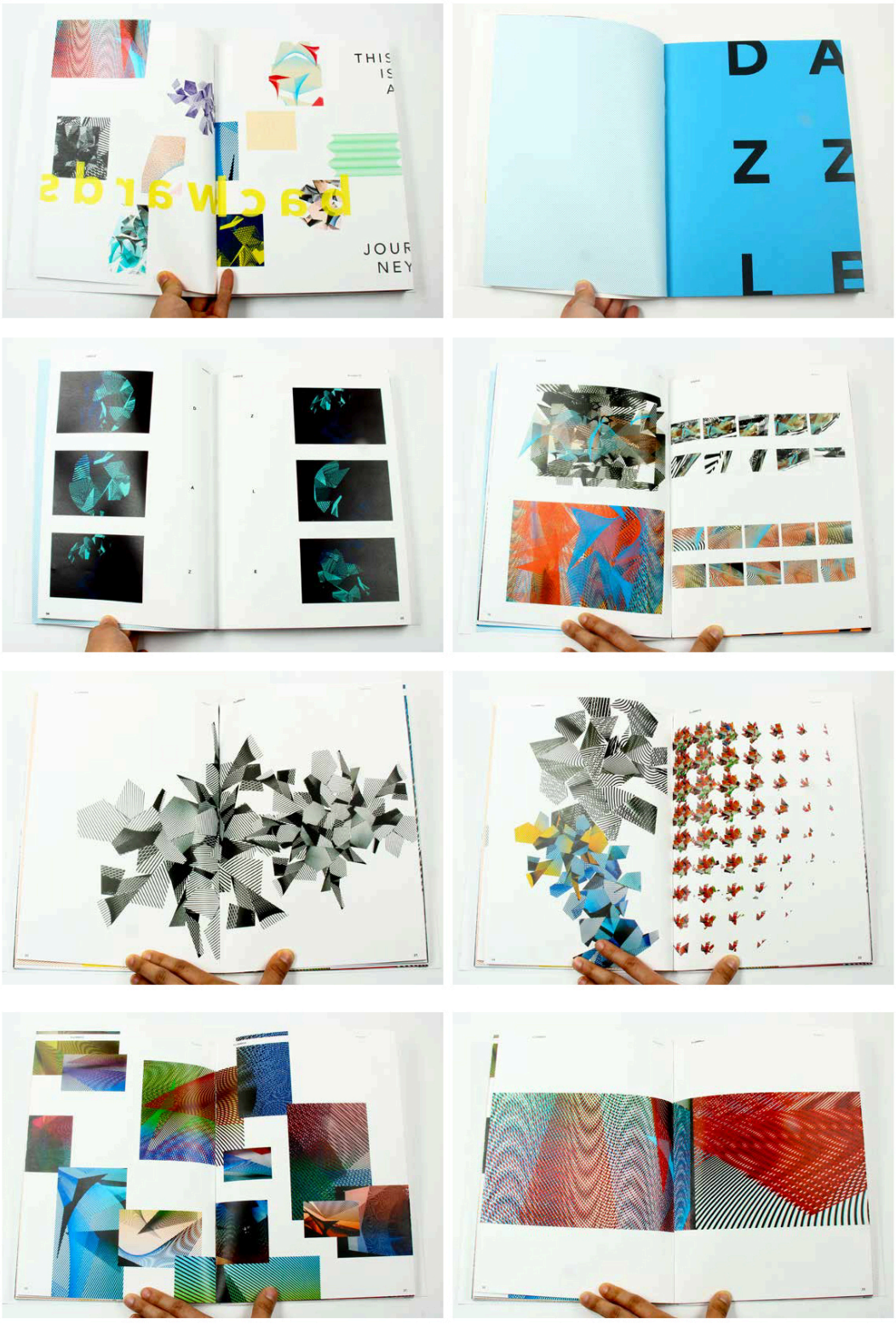


fig. 42. Christine Chiou, *"Is this Moiré Type?" Selected Spreads 1*, Book, 2016.

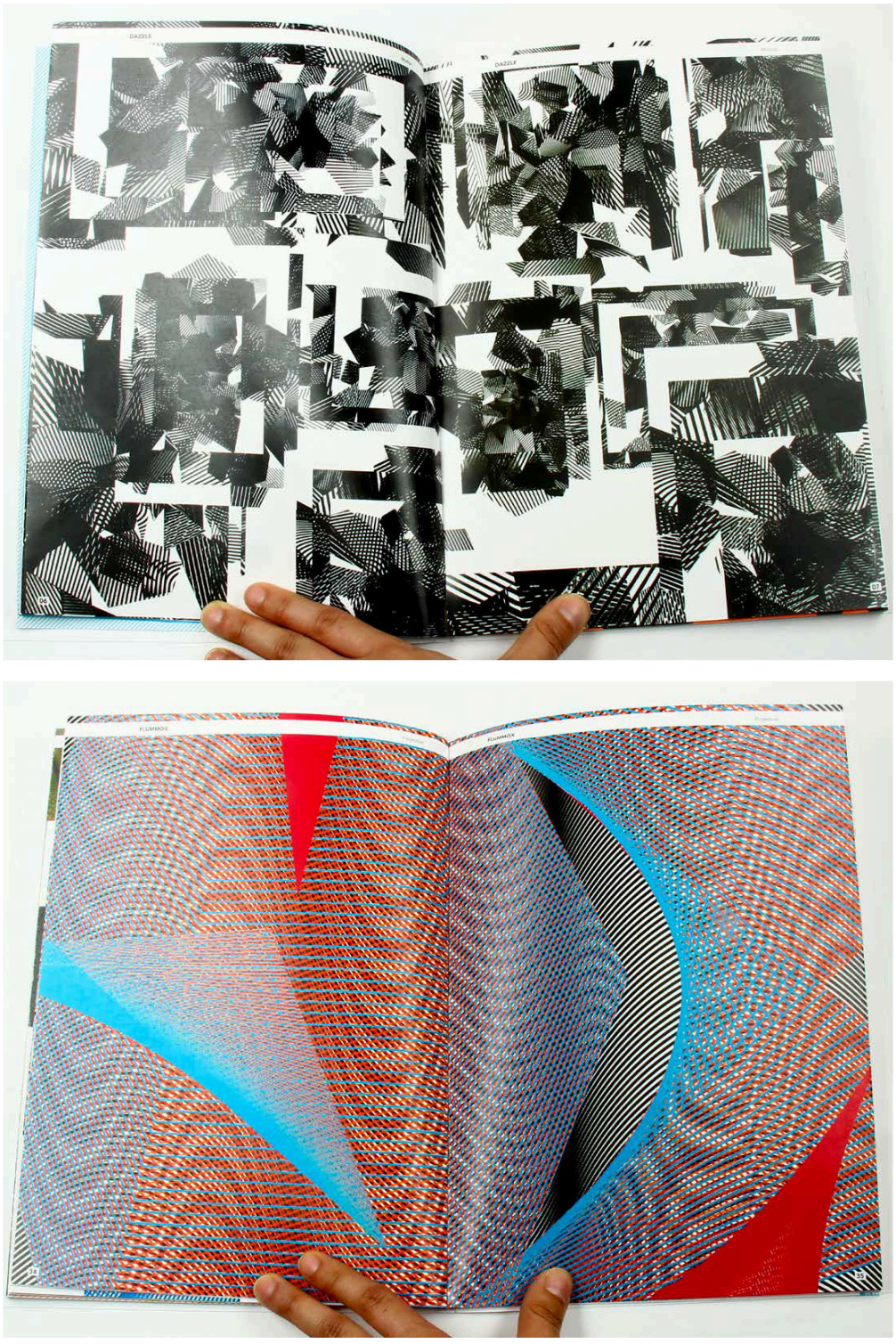


fig. 43. Christine Chiou, *"Is this Moiré Type?" Selected Spreads 2*, Book, 2016.

APPENDIX D

Thesis Exhibition Photos

fig. 44. Christine Chiou, *Thesis Exhibition - Process Work*, TEL 4023, York University, March 2016.
fig. 45. Christine Chiou, *Thesis Exhibition – Scanimation Risoprints,* TEL 4023, York University, March 2016.

fig. 46. Christine Chiou, *Thesis Exhibition – Scanimation Risoprints Detail Shots,* TEL 4023, York University, March 2016.

fig. 47. Christine Chiou, *Thesis Exhibition – Motion Poster Projections*, TEL 4023, York University, March 2016.

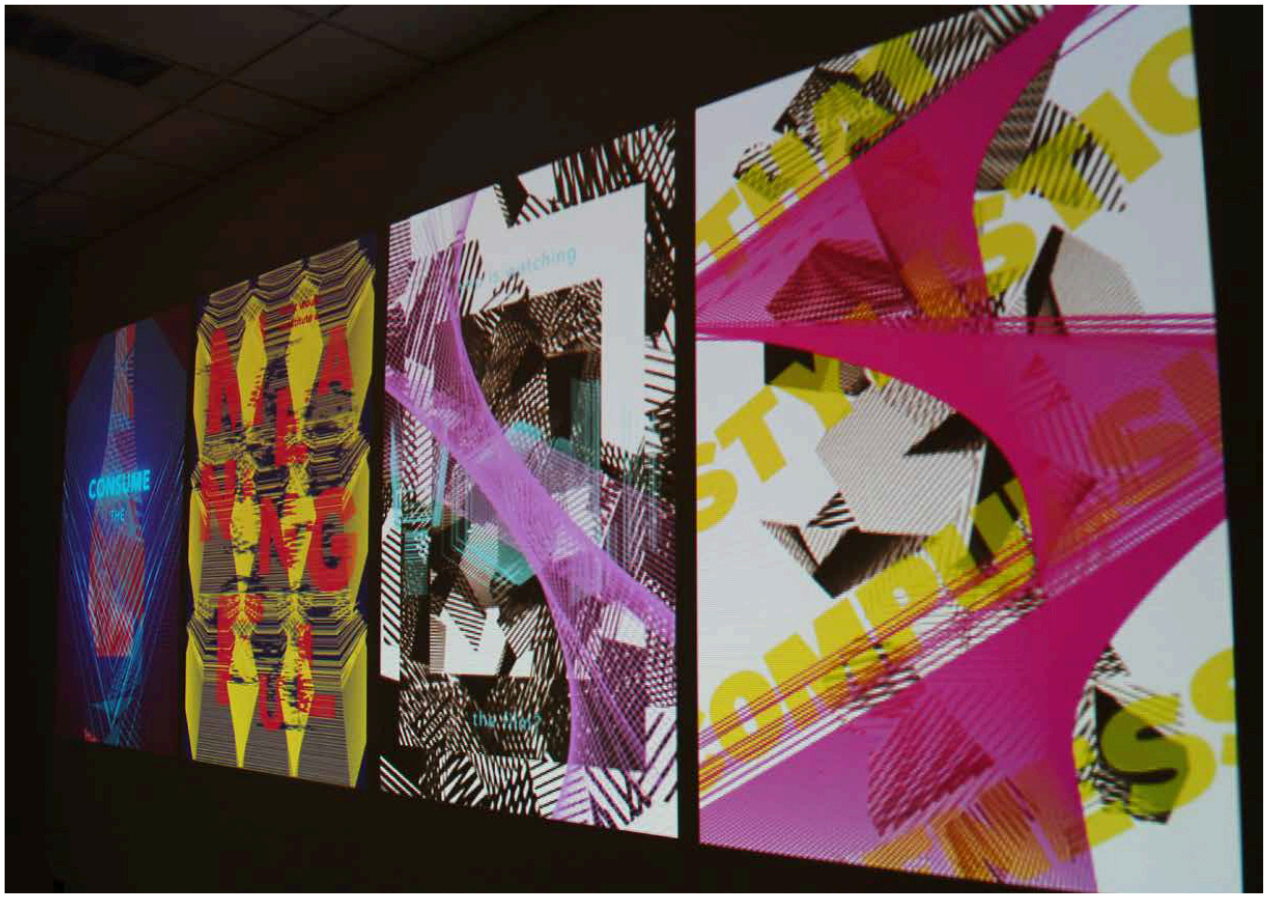


fig. 48. Christine Chiou, *Thesis Exhibition – Presentation Posters,* TEL 4023, York University, March 2016.

fig. 49. Christine Chiou, *Thesis Exhibition – Motion Poster Projections Detail Shot*, TEL 4023, York University, March 2016.

APPENDIX E

Cymatics Experiments

The initial inspiration for my thesis topic originated from my discovery of the neurological phenomenon, "synesthesia." Synesthesia is a neurological condition in which an individual can experience "joined senses," and the stimulation of one sense may trigger an involuntary stimulation of another sense (Richardson 2012). Those who have this condition associate the alphabet or numbers with certain colours, see the colours and/or shapes of sounds, or even taste the sound of words (Carpenter 2001, Richardson 2012).

Inspired by synesthesia, at the beginning stages of my thesis I decided to focus on "cross-modal perception," a phenomenon based on the interaction between two or more sensory modalities (Sagiv & Ward 2006). In my first project, I experimented with audio-visualization, particularly with "cymatics," a term coined by Swiss scientist Hans Jenny for the study of visible sound (2001). The visualization of sound in cymatics results in sonorous patterns formed by the vibrations of sound waves; these patterns may change along with differing frequencies (Jenny 2001). Cymatics comprises two main types: 1) Chladni plate—sand patterns formed on a metal plate, and 2) Liquid Cymatics—ripples and wave patterns formed on the surface of a liquid, such as water.

In my experiments, I focused on liquid cymatics, in which I generated intricate patterns with an apparatus consisting of a round plastic dish filled with water and cornstarch on top of a subwoofer (see fig.1-3). I filmed and photographed these patterns, capturing a variety of results. Then in my editing process I adjusted the colour and contrast, and isolated and combined these abstract visual forms to form an image data bank. I observed that the water patterns are very detailed with a gestural quality while the cornstarch patterns are more solid, almost resembling sculptural forms. However, I found there were more varied results in water than cornstarch, which led me to focus on working with water patterns in my cymatics-inspired projects.

Since the formation of the patterns relied on the bass of the audio, I experimented with visualizing the rhythm of certain songs with distinct beats in my project, "Beats" (see fig.4). I played well-known songs from various genres, including Michael Jackson's "Billie Jean," Georges Bizet's "L'Arlésienne Suite No.2 – Farandole," and even the Tetris game's theme song. Each song is visualized in a video depicting the dynamic patterns that appear in the water as the songs are played, so I can capture a visual transition of the distinct beats in the music. I juxtaposed the videos, creating a "visual ensemble" of a single musical piece, suggesting a possible method to create a visual musical composition.

In my second project, "Für Elise," I explored an alternate way to perceive a musical composition through the use of pitch (see fig.5). When I played a certain pitch with a tone generator, the sonorous patterns were constantly in motion. Hence there is no single pattern associated with a certain pitch. This discovery inspired me to create a flipbook that visualizes the first musical phrase of "Für Elise" in dynamic forms instead of static notation. The flipbook provides an alternate way to perceive and even manipulate the time of a musical piece through visual perception, such as changing the tempo based on the speed in which the book is flipped through.

In these experiments I explored a particular way of image-making with cross-modal perception via audio-visualization through natural phenomena. My investigation has since diverged from this trajectory and I have moved onto moiré patterns. However, these early experiments gave me a valuable starting point from which my initial interests have carried through to my resulting investigation in the simultaneous realities of illusions, particularly my interests in visual perception and phenomena.

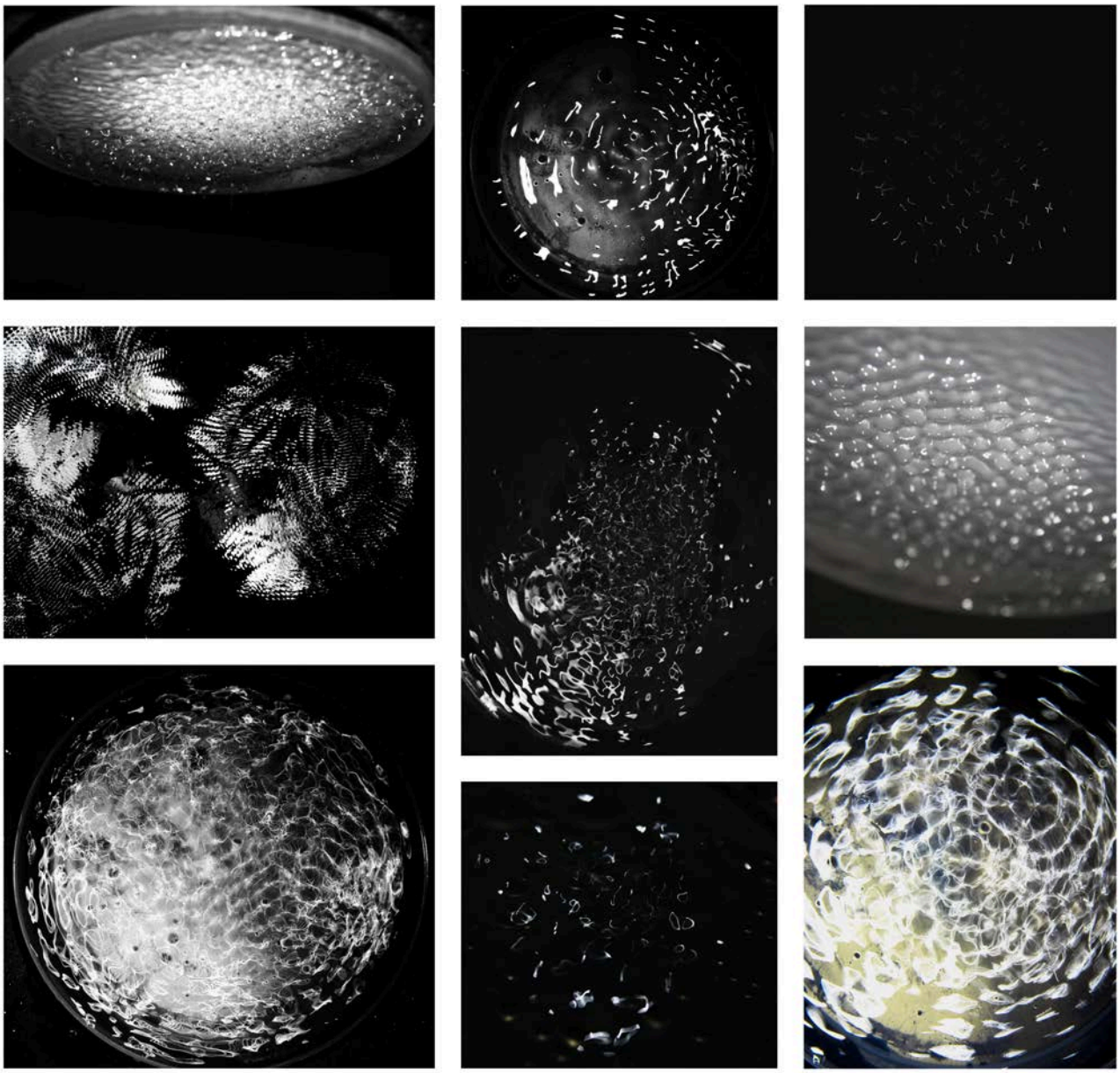


fig. 50. Christine Chiou, *Selected images from Cymatics Experiment – Water 1*, 2014.

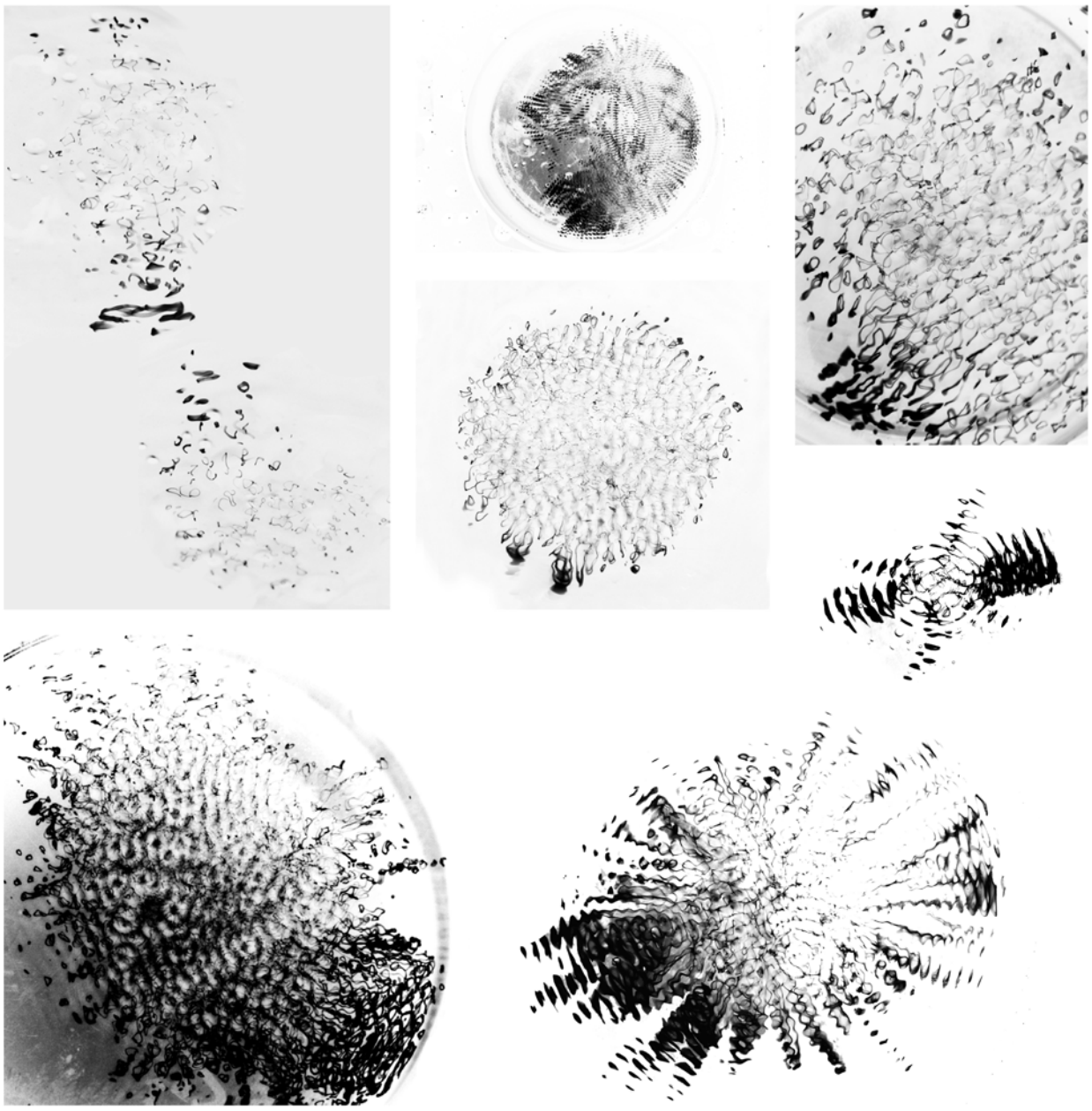


fig. 51. Christine Chiou, *Selected images from Cymatics Experiment – Water 2*, 2014.

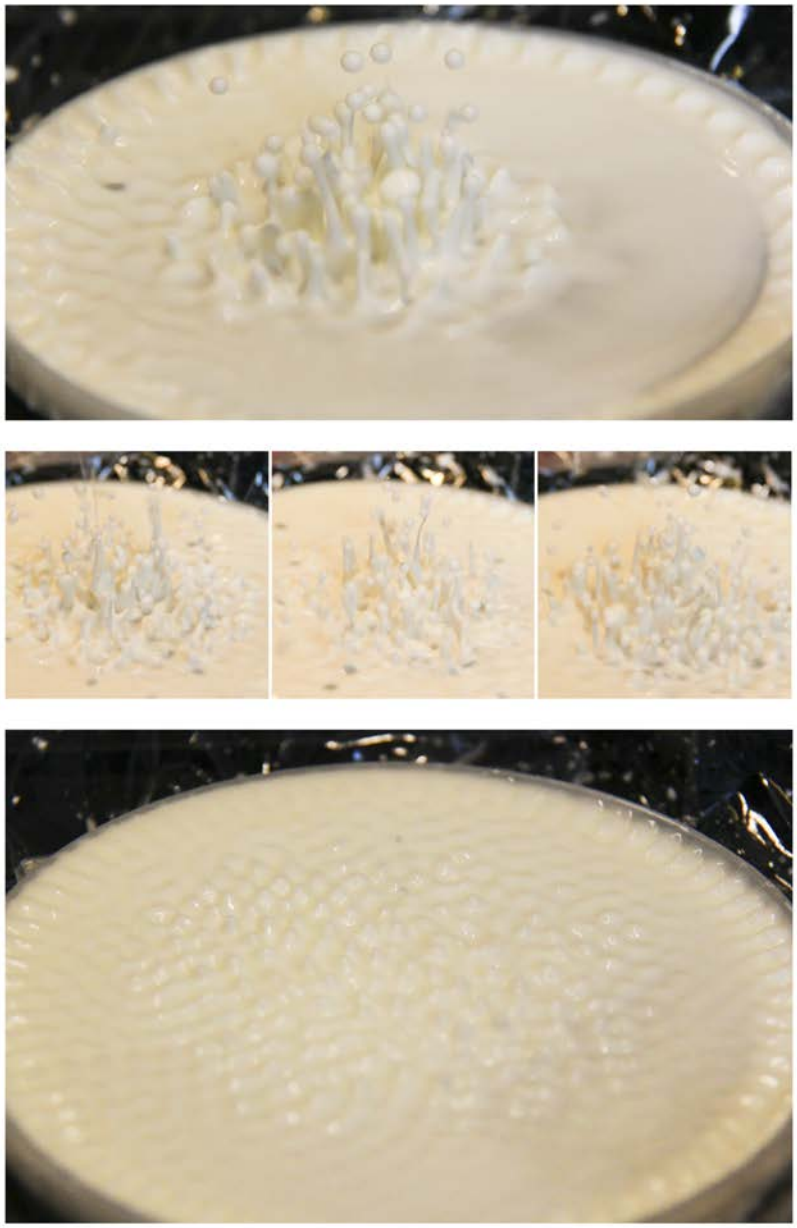


fig. 52. Christine Chiou, *Photographs from Cymatics Experiment – Cornstarch*, 2014.

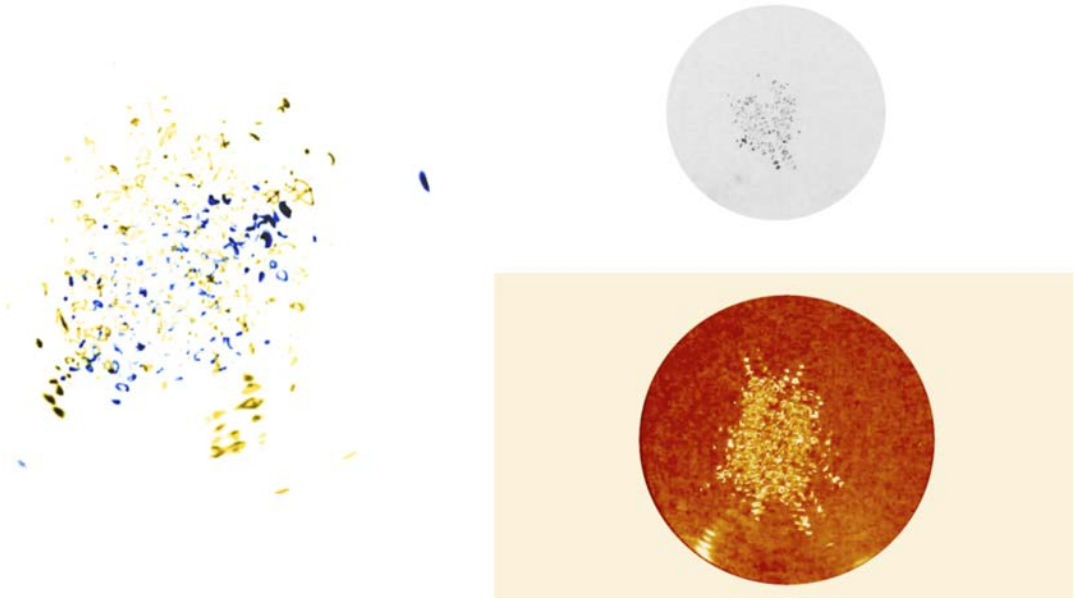


fig. 53. Christine Chiou, *Beats*, Video, 2014.

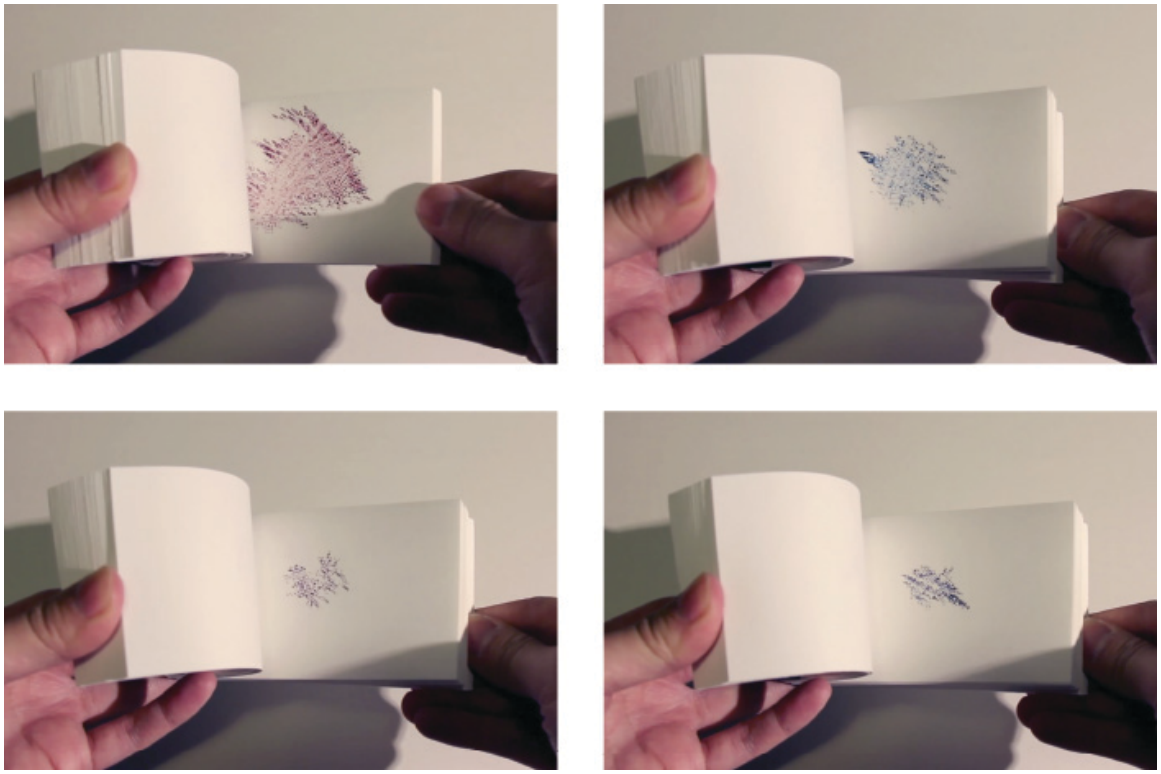


fig. 54. Christine Chiou, *Für Elise*, Flipbook, 2014.