systems of play

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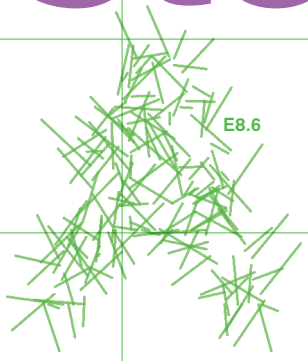
E9.1.3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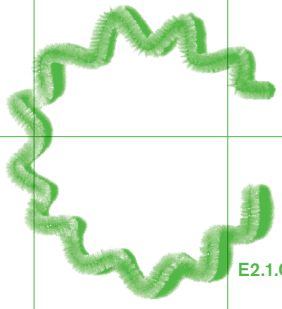
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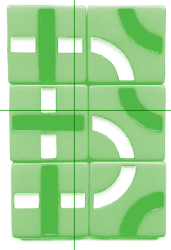
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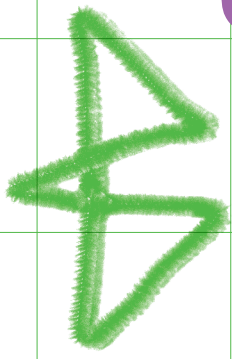
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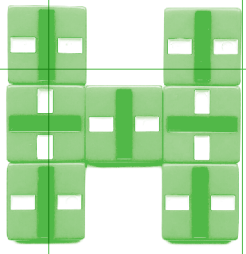

E4.8

E7.1.4

Activating creative play through generative systems

Michael Peters


E1.1.8

E10.2.3

E7.2.2

systems of play

Activating creative play through generative systems

Michael Peters

An exegesis presented in partial fulfilment of the requirements for the degree of Masters of Design.

Michael Peters, 2023
Massey University
College of Creative Arts
Wellington, New Zealand

How might generative systems [pg. 32] be utilised to activate creative play, [pg. 26] in order to enrich the divergent ideation [pg. 23] phase of the visual design process? [pg. 22]

Abstract

The visual design process can be exciting and challenging as designers strive to create innovative and impactful solutions. However, the challenge of producing original outputs within the time constraints of commercial context can lead to designers falling back on well-worn techniques, templated solutions, or imitating others' work. This fast-tracking of the divergent ideation phase of the design process reduces the possibility for experimentation and play, resulting in safe and expected outputs.

Research indicates that creative play has potential to enrich the creative process, improving divergent thinking and well-being. This project explores the potential of generative design systems to enable creative play through a series of visual design experiments using mixed methods inspired by practitioners in the generative art, music and design fields. Employing an auto-ethnographic perspective, these experiments are analysed through the lens of play theory and contextualised with insights drawn from a decade of experience working within the communication design industry.

The outcome of this research demonstrates that generative systems can help enrich the divergent ideation phase through enabling creative play. Experiment results indicate that these systems can encourage focused creativity, variety and quantity, creative risk-taking and novel outputs and have great potential for application in industry.

Acknowledgments

A heartfelt thank you to all the people who have helped me on this project and my journey so far. There are far too many to name but I would like to thank a few special individuals.

A huge thanks to my supervisors Tim Parkin and Anna Brown for their guidance not only throughout my post-grad but also during my under-grad many years ago. Loads of love to my partner Alex Barton. Thank you for holding my hand through this process and being the best playmate I could have ever wished for. A heartfelt thank you to my parents. You have been so encouraging, understanding and supportive of all of my creative endeavours from a young age. Thanks to all of my mentors, who have always been so generous with your time and knowledge. Lastly, a big thank you to my friends and colleagues. Your patience and interest have been seriously appreciated.

Introduction

Within daily design practice, designers are required to carry out two opposing processes. The divergent ideation phase, where novel ideas are generated and the convergent phase, where ideas are refined into visual solutions. However, the tight constraints of the commercial creative practice can make it difficult for designers to fully engage in both processes. This often results in the divergent phase being fast-tracked or skipped, which can have a detrimental effect on both the quality of the work and the designers themselves.

Research indicates that many of the characteristics of divergent thinking are activated when engaging in creative play. This project seeks to utilise creative play to enrich the divergent ideation phase of the visual design process through the use of generative systems. It aims to utilise these systems to increase novel and divergent outcomes and foster a more rewarding and sustainable relationship to the creative process.

The research is structured in three parts. Part one provides context for the research by examining my changing relationship with creativity and reflecting on my experiences to identify the pain point of divergent

ideation. Part two defines the design process and situates the research in the create phase of the Double Diamond design framework. It introduces the unique qualities of creative play and how these can productively contribute to divergent ideation. Part three introduces generative systems and their potential to facilitate creative play. This section includes a series of visual design experiments informed by methods of practitioners in the generative art, music and design fields that explore rules-based, modular, morphological and AI, generative systems.

The design experiments are analysed through criteria informed by key theoretical principles of play and a strengths, weaknesses and opportunities assessment. The research concludes with an outline of the connections between the mechanisms of generative systems with their correlated characteristics of creative play as well as their potential benefits for divergent ideation. Throughout this project, I utilise an autoethnographic approach and I hope that my experiences and learnings might offer valuable insight to other designers who are struggling with similar challenges.

"Creating—that is the great salvation from suffering, and life's alleviation. But for the creator to appear, suffering itself is needed, and much transformation." (Nietzsche)

Methodology

This research is divided into three parts, structured according to Frayling's Design Research Framework and is analysed and contextualised through a sustained auto-ethnographic lens (Ellis et al.).

Auto-ethnographic lens

An auto-ethnographic research method was used throughout, situating myself within the project and contextualising it with personal experiences and insights of working in the creative industry. This was an effective method for exploring the creative process, something which is inherently personal and subjectively experienced. It allowed me to extract valuable learnings and insights from the often turbulent and emotionally charged creative journey, aspects often omitted from design process diagrams. All observations presented are underpinned by literature and research in the fields of creativity and play.

Part 1: Research-for-design

Gathering of materials that inform and support design development.

In the initial phase of this project, I engaged in an analysis of past and current experiences of design practice using using Maslow's Hierarchy of Needs as a famework. This provided context and insights about my creative process and identified potentially productive areas for further investigation.

Part 1: Research-into-design

Research focused on the study of designers, design history and the design process.

The second phase consisted of an in-depth literature review into the nature of the creative process, play and how this relates to the design process. With this foundation, I was able to deduce how to apply the qualities of play to the creative process in a productive way.

Part 1: Research-through-design

Research through the act of designing itself.

A broad series of visual design experiments were tested to explore whether generative systems could be used to activate creative play. These were analysed through a simple reflection-in-action method (Schön), where the experiments were recorded against a set of principles of creative play, as well as reflection-on-action which helped shape the direction of the project.

Personal Reflection

Part 1:
Research-for-design

Reflecting on a changing relationship with creativity.

Early Experiences

Creativity has always been something that I have been drawn to. When I was a child, I loved spending hours drawing and painting. Time would disappear while I was lost in the process of making without a care in the world. As I grew older, my parents would despair as I spent more time working on the layout and design of my high school English and history projects than the content itself. Recognising that this is where my heart lay, they encouraged me to go to university to study visual communication design. In the first year of my undergraduate degree, we were encouraged to play and experiment in our creative process. I have fond memories of many late nights in the design workshops experimenting with things like wax and wool to create puppets for an animation project. I loved this way of thinking and making.

Industry Experience

After graduating, I was very lucky to land my first full-time role as a graphic designer relatively quickly. This was the beginning of a decade of working in the industry, predominantly in New Zealand and for several years overseas. Throughout this time, I enjoyed my work. The deep satisfaction of the work itself, working with interesting and passionate people, working on exciting and meaningful projects as well as the occasional award. However, I felt my relationship with my creative process start to change the more years I spent in the industry. I became experienced in knowing how to produce work quickly and push through creative blocks, but the repetitive and stressful process of producing creative outputs under high expectations, slim budgets and tight deadlines began to wear me down.

As I gained more experience and held more senior positions in design studios, the effects of this pressure only became worse as I felt external and personal expectations for my work increase. To miss a deadline or fail to answer a brief was not an option. This led me to hone my crafting skills constantly. However, if I was required to play or experiment to produce novel ideas, I was filled with panic. The 'open to all possibilities' mindset was against every instinct, which was to reach a polished outcome as quickly as possible. This was causing me to slowly lose my love of design and creativity. I could also see it was having detrimental effects on both the quality of work as well as my well-being.

My experience of the creative process had become very different from the creativity I enjoyed in my childhood and my design education. I wanted to find a way back to experiencing a state of playful creation in my daily design practice. So I set out to try and understand my practice better, not just where the problems lay but also the opportunities for developing a healthier relationship with my creative work.

Mapping My Career

I began mapping out my career journey so far in order to identify any patterns or potential pain points [Fig. 1]. This process involved charting all key work-related events on a timeline, what I was doing when and where I was. I then reflected on my mental state at the time, placing this on a continuum from Good to Poor. This helped me to see patterns over a long period and to consider my experiences in different, times, locations and workplaces.

The map highlighted that there were a myriad of different external factors that impacted my mental well-being, such as expectations, job security and workload. However, even when these external factors weren't present, the problems persisted. This suggested there may be a deeper cause related to the creative process itself.

Career Journey Map

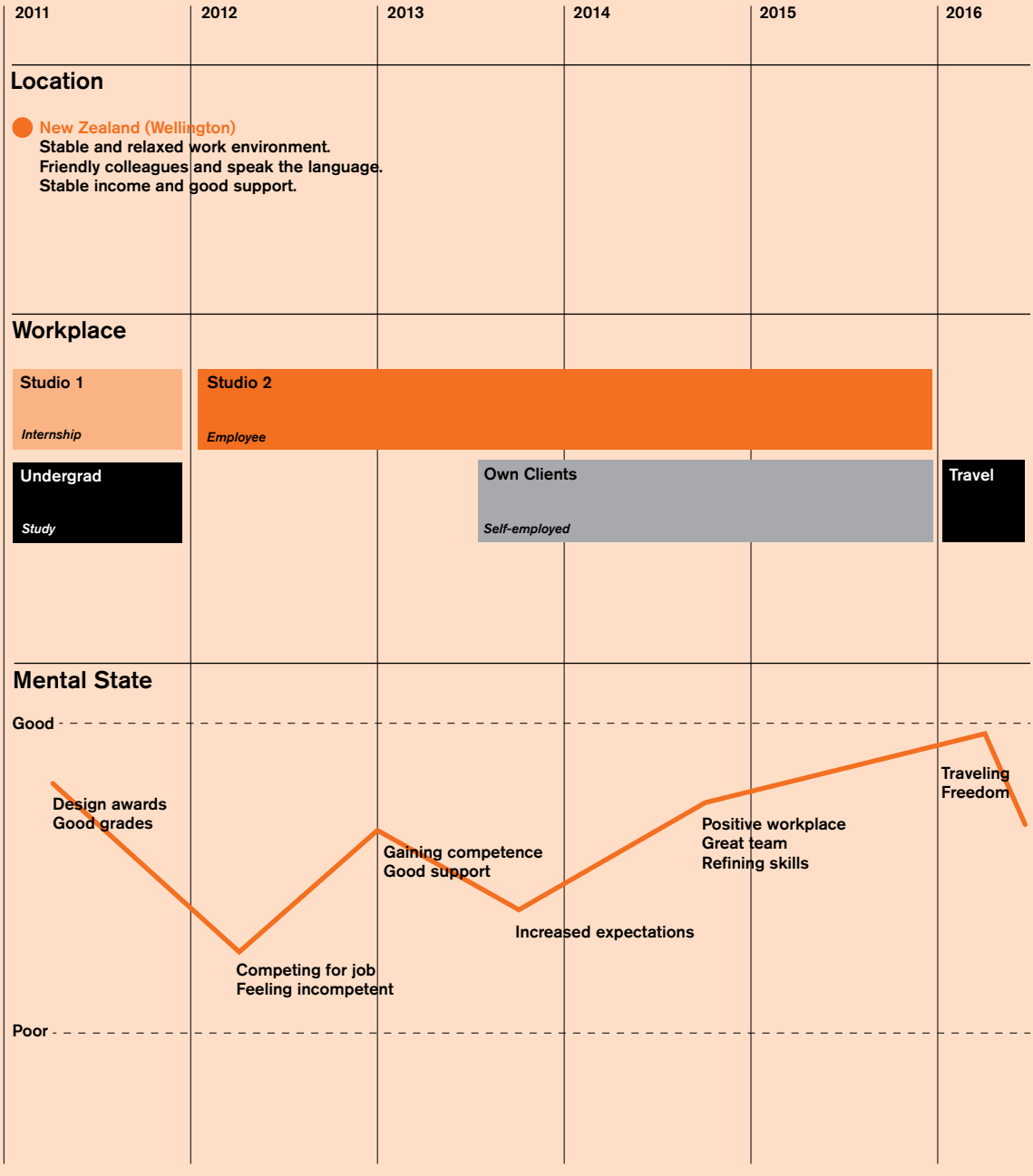
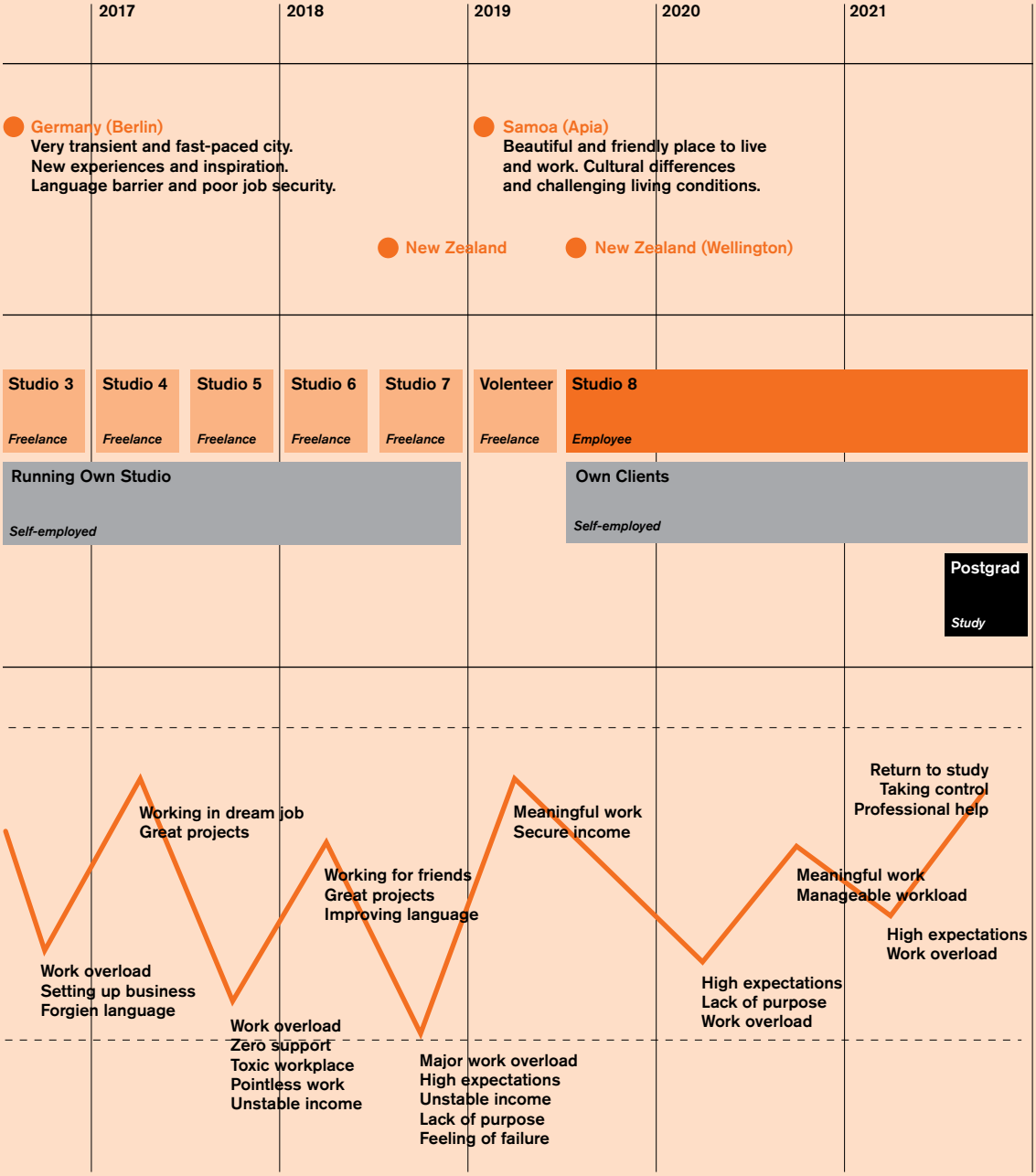
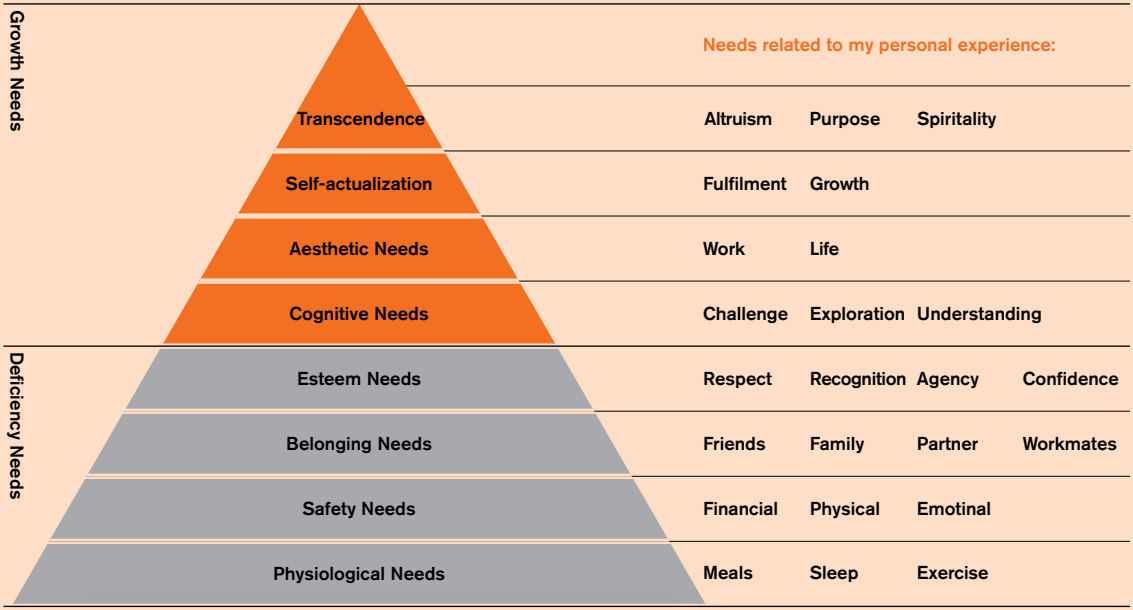
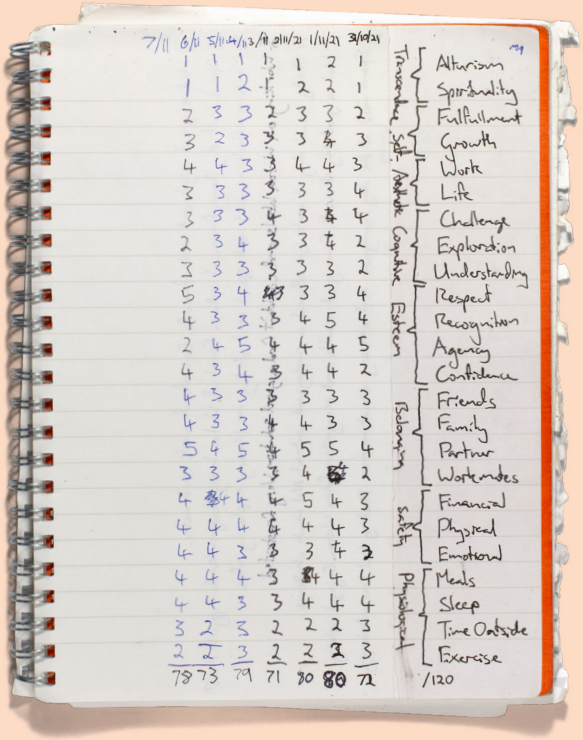


Figure 1: *Career Journey Map*, Image by author, 2022.


2017
2018
2019
2020
2021
Germany (Berlin)
Very transient and fast-paced city.
New experiences and inspiration.
Language barrier and poor job security.
Samoa (Apia)
Beautiful and friendly place to live
and work. Cultural differences
and challenging living conditions.
New Zealand
New Zealand (Wellington)
Studio 3
Freelance
Studio 4
Freelance
Studio 5
Freelance
Studio 6
Freelance
Studio 7
Freelance
Volenteer
Freelance
Studio 8
Employee
Running Own Studio
Self-employed
Own Clients
Self-employed
Postgrad
Study
Work overload
Setting up business
Forgien language
Working in dream job
Great projects
Work overload
Zero support
Toxic workplace
Pointless work
Unstable income
Working for friends
Great projects
Improving language
Major work overload
High expectations
Unstable income
Lack of purpose
Feeling of failure
Meaningful work
Secure income
High expectations
Lack of purpose
Work overload
Meaningful work
Manageable workload
High expectations
Work overload
Return to study
Taking control
Professional help

Daily Needs Diary





[Above] Figure 2: *Maslow's hierarchy of needs related to personal experience*, Image by author, 2022.

[Left] Figure 3: *Diary charting of Maslow's hierarchy of needs*, Image by author, 2022.

Charting My Daily Experience

To get a more granular understanding of these underlying factors, I started recording my day-to-day experience. As a framework, I used *Maslow's Hierarchy of Needs* which breaks the stages of human motivation and growth into eight categories. Maslow states that the base level "deficiency needs" must be met before the top four "growth needs" can be achieved. These needs are:

Transcendence needs: Experiences which go beyond the self towards a greater goal.

Self-actualization needs: Realizing potential, self-fulfillment and personal growth.

Aesthetic needs: Appreciation and search for beauty, balance, form and harmony.

Cognitive needs: Knowledge, understanding, curiosity, exploration and need for meaning.

Esteem needs: Achievement, independence mastery, dignity and being valued by others.

Belonging needs: Friendship, intimacy, trust, and acceptance as part of a group.

Safety needs: Protection from elements, security, order, law, stability, freedom from fear.

Physiological needs: Basic biological needs such as air, food, drink, shelter, warmth, sleep.

I adapted these for my research by breaking each needs category into subsections with points relating to my experience as a design practitioner working in industry [Fig. 2]. I then rated myself against each section on a daily basis giving myself a score for each needs category [Fig. 3] as well as an overall score.

Overall, my base deficiency needs scores were relatively high as I was working in a stable and supportive environment. On the days when I had high growth needs scores, I was able to explore and play (cognitive need), the work I was producing was visually pleasing (aesthetic need), I was growing my skills (self-actualization), and the work was having a positive impact (transcendence). On the days with low scores, the opposite was true, and my perception of my creative performance had a negative impact on all of these scores.

This reflective analysis of my career and daily experience revealed that although various external factors impacted the needs scores, it was my relationship with the creative process that had the largest influence. I needed to understand this process better and its ideal application in design practice to find a more sustainable way of working. In the project's next phase, I delve into an in-depth study of creativity, the design process and creative play.

Part 2:

Research-into-design

Creativity & Play

The creative process and it's application in design practice.

The Creative Process

According to the Cognitive Scientist and AI researcher Margaret Boden, "The creative process itself can be considered as a set of iterative behaviours that enable people to explore conceptual space, identify new opportunities and problems, and generate novel and appropriate solutions" (qtd. In *Defining Creativity*). As highlighted in this definition, creativity is a process rather than a moment in time. This is contrary to the common perception of creativity where outputs arrive fully formed through an eureka moment. Creativity is a highly involved process of building layers of knowledge and experiences known as Schema (Piaget) which are combined to contribute to an insight or creative synthesis (Kolko). Understanding the mechanics of creativity allows for the development of processes that utilise its potential.

The Design Process

There are many different models of the design process. In his book *How To Speak Machine*, technologist and designer John Maeda places these into three categories, classical design, design thinking and computational design. Classical design forms most post-industrial design processes with a strong focus on output. Design thinking moves the focus to the process itself, how to collaborate and ideate using thinking methods. While computational design, focuses on the interaction of systems, algorithms and networks. This project explores the use of computational design methods and practices to augment the creative process whilst using the Double Diamond design thinking framework to understand and analyse processes.

The Double Diamond framework [Fig. 4] is a holistic model of the entire design process popularised by the Design Council in 2005 and has been widely adopted within the design industry. The framework received an update in 2021 and was renamed the *Systemic Design Framework* to include more contextual elements as well as renaming the phases. Explained through their corresponding design tasks, the first diamond consists of the Explore Phase, where research and insights are gathered, followed by the Reframe Phase, where discoveries are synthesised into a strategy and creative brief. The second diamond consists of the Create Phase, where creative solutions are explored, followed by the Catalyse Phase, where these are developed into solutions. The focus of this project is in the Create Phase, which spans from the moment that a graphic designer is usually briefed to the point where explorations are developed and refined.

Divergence And Convergence

The Create phase and Catalyse phase in the Double Diamond Process can be understood as processes of divergence and convergence (Guilford). Divergence is where many distinctive ideas are generated. It is the opening up of a 'conceptual space' where the use of imagination is required to generate new and novel ideas. This is in stark contrast with convergence which is the process of applying logical thought and evaluating and refining ideas to produce an effective output (*Defining Creativity*).

The processes of divergence and convergence can also understood through the lens of cognitive science. It is generally accepted that thinking is split into two cognitive processes, System 1 and System 2, also known as The Dual Process Model (Smith and DeCoster). System 1 thinking can be equated with fast and intuitive divergent thinking processes, often relying on automatic associations and quick judgments. Whilst System 2 thinking aligns closely with convergent thinking, which is typically slower and more analytical, involving careful consideration and conscious decision-making. The process of creativity involves switching between these two systems in the brain (J.Kounios).

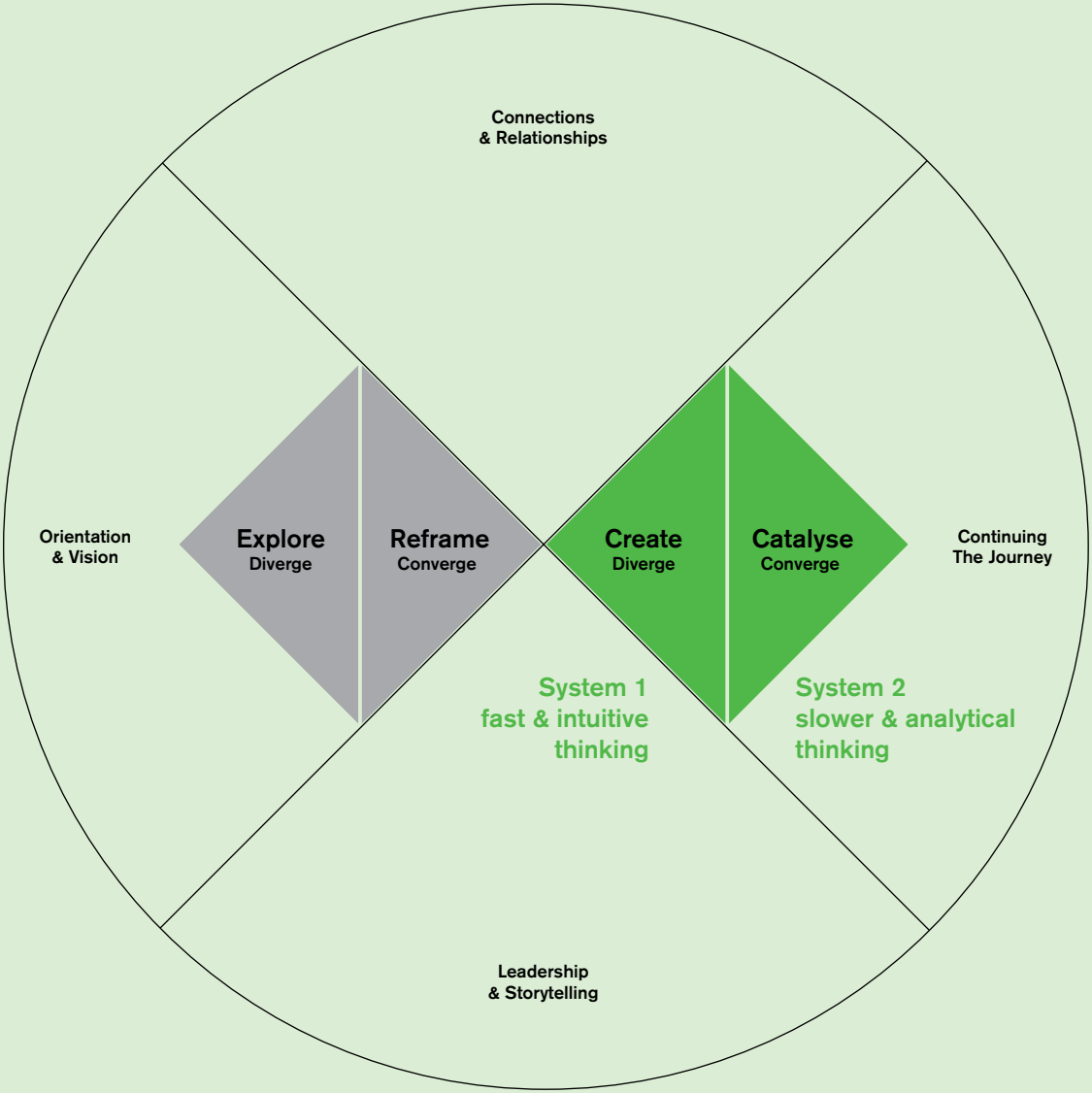


Figure 4: ***Systemic Design Framework (Double Diamond)***, Design Council, 2021.

Reflecting On Personal Process

When reflecting on my design practice, I noticed I am naturally drawn to projects where convergent thinking is the more dominant phase in the process. This includes systematic design challenges such as wayfinding, user interface design, and publication design. These all have elements of divergent thinking but are primarily convergent processes with an emphasis on the Catalyse Phase in the Double Diamond process.

There are elements of this preference for convergence that might be intrinsic to my personality. I am a naturally analytical person, which lends itself well to the converging process. My university years were spent focused on training my divergent thinking skills, a process that I enjoyed at the time. At this early stage, I didn't know the short-cuts to reach a solution, so had no choice but to explore. However, over the years in the design industry, I have become inclined to follow risk-averse rather than novelty seeking solutions as this is what is often required by clients and is a process that leads to reliable results.

Stuck In The Process

Frameworks within Personal Construct Psychology theory (PCP) supports the idea that individuals can become stuck in one mode of creativity. According to George Kelly the founder of PCP theory, the "Creativity Cycle" is a process of moving between loose and tight construing. Loose construing is where an individual is open to multiple interpretations and perspectives, while tight construing is a rigid and narrow interpretation of experiences. This can be compared to System 1 and System 2 thinking modes. Kelly states that individuals can become stuck in one mode of construing over the other known as "lock in" which makes it very difficult for them to be creative. This can result in them finding it anxiety-provoking switching between modes.

Task difficulty has also been found to have an effect on a person's divergent thinking abilities. Through a 2007 study, researchers found that when participants were presented with a task that they found challenging, they tended to revert to the slower and more analytical System 2 mode of thinking (Alter et al.), a mode that is much more conducive to analytical convergent rather than divergent thinking.

Finding a way to enable designers to stay in a System 1 mode of loose construing would be highly beneficial for divergent thinking whilst also reducing anxiety and creating a more enjoyable creative process.

Creative play and its potential to enrich the design process.

The Power Of Play

Play has been cited by many creative practitioners as an important part of creative practice, encompassing letting go of inhibitions and being free to improvise with ideas and form. Designers such as Charles and Ray Eams, Sister Corita Kent and Tibor Kalman, have all incorporated elements of play into their practice. This belief in the potential of play is highlighted in the famous Eams quote: "Toys are not as innocent as they look. Toys and games are preludes to serious ideas."(Demetrios 51). However, the specifics of how to use play in creative practice are much less clear.

The unique characteristics of play and their correlation with creativity, specifically the divergent ideation phase, are summarised in the British Council's literature review *Defining Creative Play*. In this review, leading play theorist Patrick Bateson argues that "Essential elements of the creative process, such as risk-taking, re-imagining and exploring possibilities are rep-

licated during creative play, facilitating divergent thinking processes" (qtd. In. *Defining Creative Play*). Creative play is described as being able to provide the experience required to come up with new ideas and problem-solving techniques. This description of an 'experience' also helps explain how creative play is tied to a specific mindset, and not only one that is beneficial for divergent thinking but also with positive well-being outcomes such as enhanced stress coping (Koh 139).

Defining Creative Play

In his seminal book Homo Ludens: *A Study of the Play Element in Culture*, cultural theorist and philosopher Johan Huizinga highlights the five key characteristics of play, which are summarised as, voluntary, rule-ordered, boundried, different and non-purposeful. These characteristics were later elaborated on by anthropologist Gregory Bateson who added five characteristics, fun, non-serious, generator of novelty, looks different and an indicator of well-being. [Fig. 5].

Creative Play bears a lot of the same characteristics as regular play but differs due to its focus on creative outputs. Historically, Creative Play has been defined based on the age of the participants, usually children, and the types of materials used (art supplies such as paint) to express themselves. However, the British Council Literature Review *Defining Creative Play* emphasises that "As more learners of all ages engage in creative play to develop their abilities as creative thinkers, there is a need to reconsider the nature and benefits of creative play in much broader contexts." The review also highlights several defining features of creative play that are common with other kinds of play with similar outcomes, such as pretend play. These are; divergent thinking, broad associations, cognitive flexibility, problem-solving, imagination, improvisation, pleasure, and absorption (Vygotsky). These features could also describe an ideal ideation phase, where diverse ideas are generated through a pleasurable process of cognitive flexibility, problem-solving, imagination, and improvisation.

Creative play should be considered as a mindset or behaviour, not an aesthetic style or visual characteristic (Koh 139). Although a work that looks playful may indicate the creators' playful mindset, it is equally possible for a playful design process to result in a more serious or aesthetically restrained outcome. This means that a work that is on the surface, devoid of what would be considered playful visual cues, could have been produced through a process of play. This makes play difficult to identify from just the output.

To solve this problem of identification, I developed a hybrid set of creative play principles based on the definitions outlined above. These are; enjoyment, novelty, absorption, and improvisation (Bateson, Huizinga & Vygotsky). These principles are used in the third part of the project as principles to score the experiment's effectiveness in activating creative play.

Play is Voluntary (Huizinga)	Participation in play is a conscious and willing choice. It is not forced or obligatory.
Play is Rule-Ordered (Huizinga)	Play follows specific rules that determine what is allowed and what is not. These rules create a framework within which the activity takes place.
Play Happens within Fixed Boundaries (Huizinga)	Play is typically confined to a specific space and time, creating a separate realm distinct from ordinary life.
Play is Different from Ordinary Life (Huizinga)	Play involves a departure from everyday reality, often incorporating imaginative or fictional elements.
Play is Non-Purposeful (Huizinga)	The primary purpose of play is the experience itself, not achieving any practical outcome. It is undertaken for its own sake, not external goals.
Play is Fun (Bateson)	Play is inherently enjoyable and engaging. It's an activity that brings pleasure and satisfaction to the participants.
Play is the Antithesis of Serious Behavior (Bateson)	Play is a departure from serious or routine behaviour. It involves a shift away from the normal, practical, or serious aspects of life.
Play is a Generator of Novelty (Bateson)	Play often involves experimentation, improvisation, and trying out new things. It can lead to the creation of novel ideas, behaviours, and solutions.
Play Looks Different (Bateson)	Play can be visually and behaviourally distinct from other activities. Participants often exhibit behaviours and expressions that are different from their regular demeanour.
Play is an Indicator of Well-Being (Bateson)	The presence of play can suggest a positive psychological and social state.

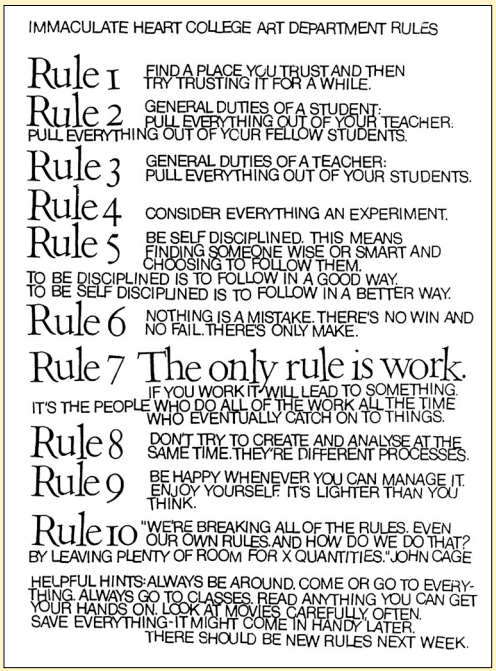
Figure 5: ***Huizinga & Bateson's characteristics of play***, Image by author, 2023.

Korita Kent

Plork

An example of the synergy between play and work can be found in Graphic Designer and Artist Corita Kent's work. In 1992 she famously coined the term Plork which is a portmanteau of the words Play and Work and was meant as a summary of her approach to life and practice. She believed that we should seek to find a balance where playing becomes a way of working, and working becomes a way of playing. Straddling the line between creating for enjoyment and creating to be productive.

In her role as a design educator from 1947–1968 Kent created a set of ten rules [Fig. 6] which she instructed her student to follow. It seems surprising that someone whose work is celebrated as being playful and free would encourage her students to work in such a structured way. In her book *Learning by Heart: Teachings to Free the Creative Spirit*, she offers more insight, "What you can build within structures and restraints is almost limitless… You will be forced by them to open up and see things you might not have noticed if you had been 'free' to wander the world." (Kent, 52) In the last line of her rules she writes that "There should be new rules each week". This could be interpreted as Kent saying that we should experiment with the potential of constraints ourselves rather than following hers as a doctrine.


IMMACULATE HEART COLLEGE ART DEPARTMENT RULES

Rule 1 FIND A PLACE YOU TRUST AND THEN TRY TRUSTING IT FOR A WHILE.

Rule 2 GENERAL DUTIES OF A STUDENT: PULL EVERYTHING OUT OF YOUR TEACHER. PULL EVERYTHING OUT OF YOUR FELLOW STUDENTS.

Rule 3 GENERAL DUTIES OF A TEACHER: PULL EVERYTHING OUT OF YOUR STUDENTS.

Rule 4 CONSIDER EVERYTHING AN EXPERIMENT.

Rule 5 BE SELF DISCIPLINED. THIS MEANS FINDING SOMEONE WISE OR SMART AND CHOOSING TO FOLLOW THEM. TO BE DISCIPLINED IS TO FOLLOW IN A GOOD WAY. TO BE SELF DISCIPLINED IS TO FOLLOW IN A BETTER WAY.

Rule 6 NOTHING IS A MISTAKE. THERE'S NO WIN AND NO FAIL. THERE'S ONLY MAKE.

Rule 7 The only rule is work. IF YOU WORK IT WILL LEAD TO SOMETHING. IT'S THE PEOPLE WHO DO ALL OF THE WORK ALL THE TIME WHO EVENTUALLY CATCH ON TO THINGS.

Rule 8 DON'T TRY TO CREATE AND ANALYSE AT THE SAME TIME. THEY'RE DIFFERENT PROCESSES.

Rule 9 BE HAPPY WHENEVER YOU CAN MANAGE IT. ENJOY YOURSELF. IT'S LIGHTER THAN YOU THINK.

Rule 10 "WE'RE BREAKING ALL OF THE RULES. EVEN OUR OWN RULES. AND HOW DO WE DO THAT? BY LEAVING PLENTY OF ROOM FOR X QUANTITIES." JOHN CAGE

HELPFUL HINTS: ALWAYS BE AROUND. COME OR GO TO EVERYTHING. ALWAYS GO TO CLASSES. READ ANYTHING YOU CAN GET YOUR HANDS ON. LOOK AT MOVIES CAREFULLY. OFTEN. SAVE EVERYTHING - IT MIGHT COME IN HANDY LATER. THERE SHOULD BE NEW RULES NEXT WEEK.

Figure 6: *Immaculate Heart College Art Department Rules*, Corita Kent, 1965.

Creative Play In Practice

Creative play can be difficult to achieve within a commercial design context where clients, timelines and budgets tend to underpin every decision. If we consider Bateson's characteristics of play, this makes sense. As he states, "Play is the antithesis of 'work' or 'serious behaviour'" (Bateson 100). A more playful design process involves more unknowns and commercial risks as designers "go wide" exploring divergent possibilities but at the same time using up time and budget. Play's strong association with children has also meant that play can easily be dismissed as unproductive activity, which may be part of the reason that we don't see a lot of research connected to adult play (Koh 140).

There is a paradox inherent within creative play that makes it difficult to apply in a goal-oriented studio environment. Play theorist Burghart states that "When play is framed as work that needs to be completed mandatorily and an external objective has to be met, it does not constitute play." (Koh 141). This means that a designer must voluntarily embrace a process of play for it to be effective rather than having it imposed on them. However, without the tight goals and constraints of a brief, creative play can be hard to achieve. A brief that is too open can have a negative impact on creativity as there are too many options to consider, reducing originality and creativity and causing the potential for decision paralysis, also known as a 'paradox of choice' (Schwartz). "Although some degree of choice has repeatedly been shown to be essential to creativity, the 'freedom' of the blank page can actually stifle creativity" (Joyce 8). Educator Michael Bahr believes that the best way to get people to be creative is to provide them with clear parameters to play within. He points out that we often fail to clarify the rules that we are meant to be bending or breaking, "You can't think outside of the box unless you have a box" (Bahr 2:00). Huzinga's characteristics of play support this notion that play needs constraint. As he states, play is rule-ordered and happens within fixed boundaries, yet these constraints need to allow space for improvisation (Vygotsky).

In order for creative play to be utilised in everyday design practice, a systematic and repeatable approach that can be voluntarily adopted would be hugely beneficial. In the next phase, I explore the use of a series of generative systems with the aim of activating creative play. To be effective, these needed to take into consideration all of the relevant characteristics of play outlined in this chapter.

Generative Systems

Part 3:

Research-through-design

Generative systems and their relationship with creative play.

Defining Generative Systems

Generative systems use rules to create output that is not predetermined but rather emerges or evolves from the system itself. As generative art theorist Philip Galanter explains, “The key is that generative art happens when an artist chooses to cede some degree of control to an external system, and the artwork thus results from more than just the moment-to-moment intuitive decisions of the artist.” (Galanter 1). Generative design could be perceived as a systematic or codified version of the standard design process with the addition of autonomous elements. However, where the practice of generative design differs from the traditional creative process is that the focus is shifted from the creation of outputs to the creation of a system that creates the outputs.

The popularised image of generative art and design is a technical aesthetic that is generated with the use of algorithms and artificial systems. However, generative design is not a visual style or a specific technology. It is a process and methodology. There is a long history of artists and designers using analog generative systems, such as The Surrealists and John Cage, that span back much further than the popularised computer aesthetics. Galanter proposes that artists have been using simple generative systems to create artworks for centuries. In his seminal text *What Is Generative Art?*, he boldly states that "generative art is as old as art itself" (Galanter 12).

Generative Systems & Creative Play

Although the highly structured nature of generative systems seems contradictory to what we associate with play, generative systems have the potential to enable and enhance creative play. As Huizinga states, play is boundried, rule-ordered and non-purposeful. These are all characteristics that are inherent to generative systems. This unique blend of structure and constraints combined with human spontaneity and intuition has the potential to activate playful and uninhibited creative exploration, leading to the generation of divergent outputs. This beneficial relationship between systems and play is discussed in more detail in the Experiments Summary [Pg. 102].

Elements Of A Generative System

The inner workings of a generative system can be quite mysterious and hard to define, as most processes aren't visible. AI researcher Alan Dorin offers a useful framework for understanding and identifying the different parts of what constitutes a generative system.

Entities: These refer to the elements, objects, or components that make up the generative system. These can be conceptual, simulated, physical, biological or mechanical and are the building blocks used in the creation of the work.

Processes: These are the rules, algorithms or instructions that dictate the operation of the system. They are applied to entities and can be either physical, mechanical, computational or human-controlled.

Environmental Interaction: This is how the system interacts with or is shaped by the wider context of where it is situated. It describes how the surroundings or external elements influence the behaviour or appearance of the artwork.

Sensory Outcomes: These are the final outputs that are experienced and are the result of the system. They can be visual, sonic, musical, literary, sculptural, etc.

Experimenting with generative systems

The experiments in this phase explore the relationship between generative systems and creative play. The goal was to design a series of systems that can be applied at the beginning of the divergent visual ideation stage, where designers jump from the world of words and ideas into the world of visuals.

Experiments Index

Experiments Process

All of the experiments feature a combination of systematic processes, constraints and random inputs to generate and manipulate visual form. They are not concerned with finding a definitive answer of which is the best technique. Instead, they propose a range of ways to incorporate generative systems into the design process. The systems are structured according to Alan Dorin's features of a Generative System and are categorised by system type following my exploration from simple rules-based systems dealing with simple tasks to complex systems dealing with more complex design problems.

Recording Experiments

To analyse the experiments, a combination of methods were used. Firstly, reflection-in-action (Schön) was used to during the activity to score the experiment against a set of creative play principles [Fig. 7]. These principles were developed from leading play theorists' and used to assess the effectiveness of each system's ability to activate creative play. After completing the experiment, I used reflection-on-action analysis in a Strengths, Weaknesses, and Opportunities format. These helped offer a guide for what was and wasn't working and highlighted the potential of the experiments for further development.

Principles Of Play Chart

Novelty: /5
How effective is it at aiding the generation of novel outcomes?

Enjoyment: /5
How enjoyable is the experience?

Absorption: /5
How engaging is the process?

Improvisation: /5
How much does it allow for unplanned decision making?

Figure 7: *Principles Of Play Chart*, Image by author, 2023.

“The ego has the capacity to cut itself off from the mind or to flow with it. It does this by developing likes and dislikes, taste and memory and if you want to get rid of these then you have to discipline yourself. My response was to shift responsibility to chance operations. From making choices to asking questions.” (John Cage)

John Cage

Chance Operations

Experimental musician John Cage is one of the most famous proponents of the use of rules and randomness (also known as aleatory techniques) in creative practice. Cage was interested in removing himself from the making process through the development of a music-making system. He pioneered a technique he called "chance operations" to dictate his creative process through the combination of randomness and consultation of the I Ching, an ancient Chinese divination text. His music-making systems were, in essence, choice-free, where he would give control to an external system to break outside of his ingrained patterns of practice and judgement. As he states, "The ideas outside the head open the head better than the ones inside the head." (*A Year With John Cage* 6:40).

Although most well-known for his musical works, Cage also produced visual artwork later in his career. In a 1988 documentary John Cage: The Sight of Silence, he discusses his series of river stone paintings where he uses "chance operations" to produce a large series of paintings [Fig. 8]. In this work, he re-introduces an element of human creative control back into the process through the handling of the paintbrush, exploring the tension between human intuition and systematic processes.

Figure 8: *New River Watercolor, Series I, No. 3*, John Cage, 1988.

Rules-based systems

In generative practice, rules-based systems are an approach for creating outputs using predefined sets of instructions. These rules dictate how the elements of the design should be created, arranged, and manipulated. I was interested in what it would feel like to have some of the decisions usually made by the designer, outsourced to an automated system of chance. Would this create more divergent and novel outputs? Each experiment was designed to test which combination of chance, rules and parameters made for a more playful experience.

Experiment 1
Chance Typography

These experiments were directly inspired by John Cage's chance operations. I ran three variations with the same constraints and format each time but with a different variable being manipulated by chance. The first manipulated typographic form, the second manipulated colour and the third, typographic composition (only two are featured in this document). This allowed me to isolate and understand how randomness could be used within a controlled system.

E1.1 System

Task:
Manipulate a character.

Entities:
- Random dice input
- 1 glyph, 6 fonts, 1 colour
- 3 slices

Processes:
1. Roll the dice to select a font.
   1: Futura
   2: DIN
   3: Helvetica
   4: Gill Sans
   5: Garamond
   6: Didot
2. Position the letter in the top slice.
3. Repeat until all slices have a letter.
4. Duplicate and repeat all steps above.
5. Do not look at or edit previous versions.

Interaction:
Human manipulation of letter position.

Outcome:
Pg. 43 →

[Right] Figure 9: *E1.1 Chance Typography Series*, Image by author, 2023.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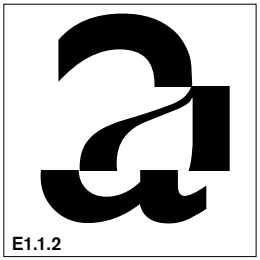
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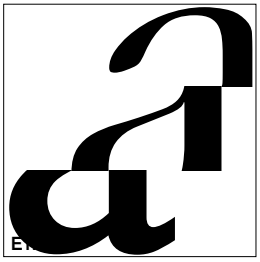
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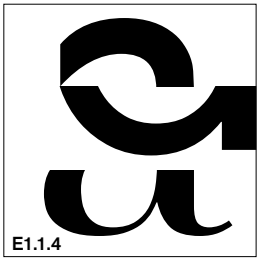
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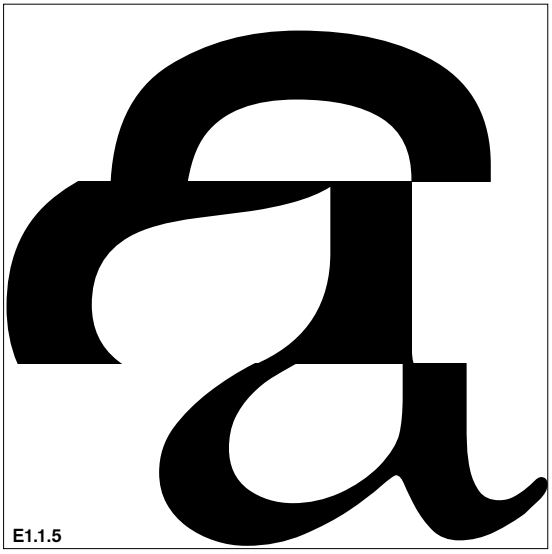
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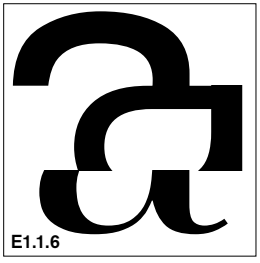
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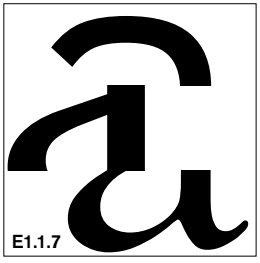
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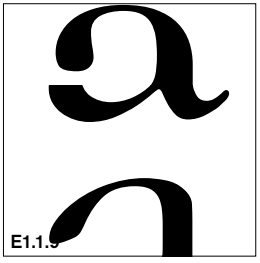
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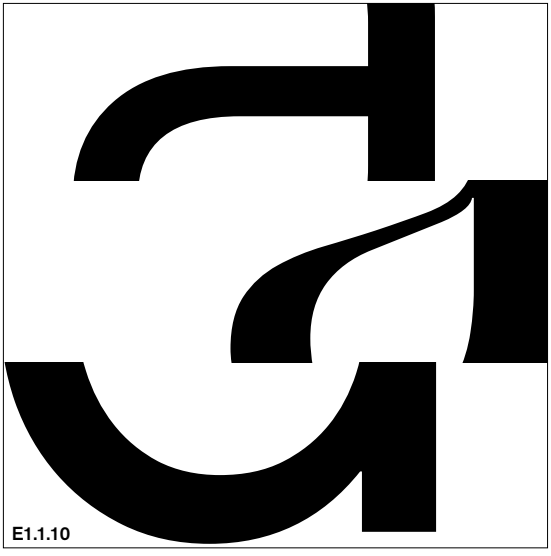
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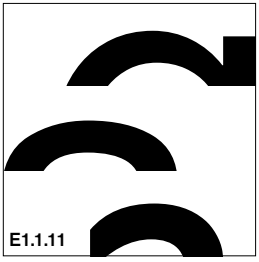
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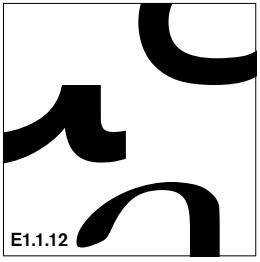
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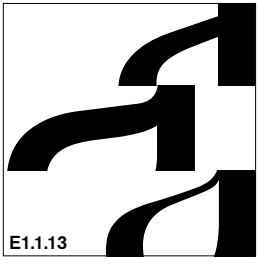
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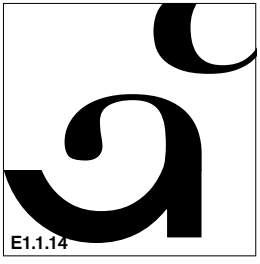
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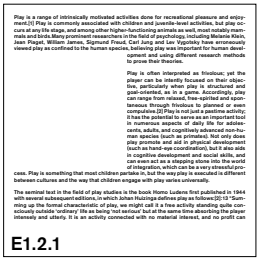

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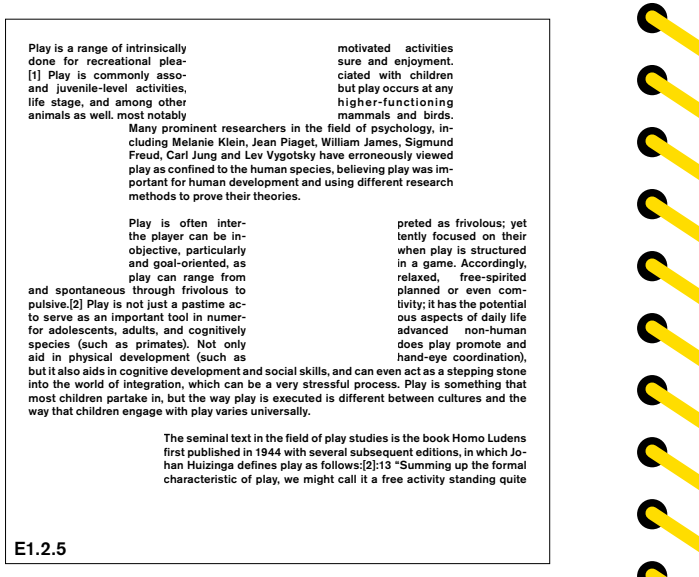

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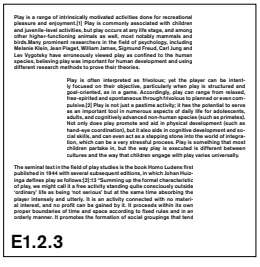

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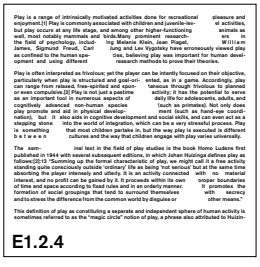

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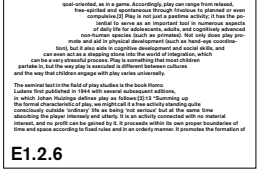

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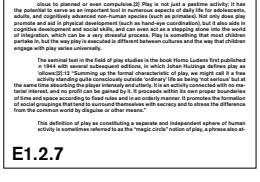

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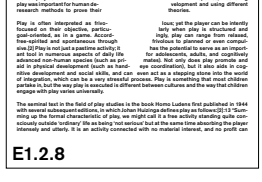

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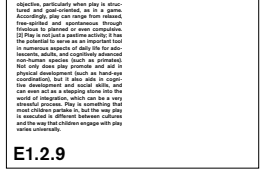

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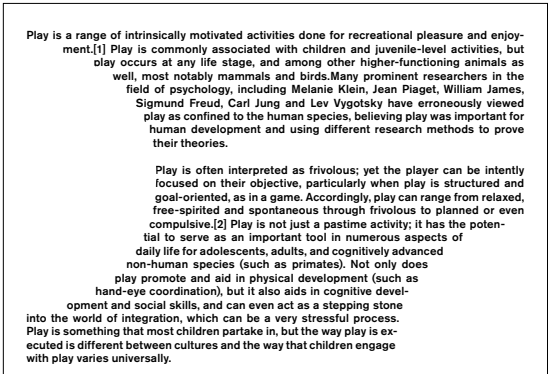

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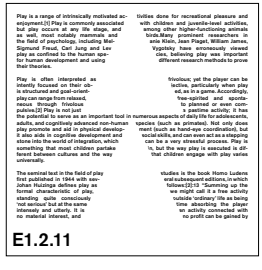

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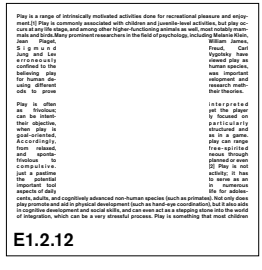

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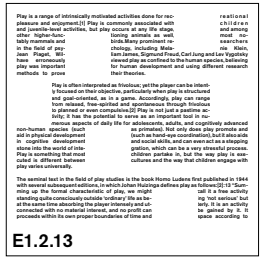

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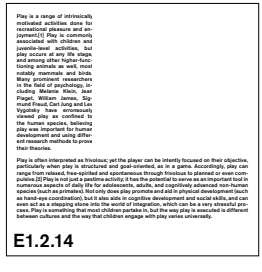


E1.2.14

E1.2 System

Task:
Manipulate type composition.

Entities:
- Random dice input
- 3 shapes, text block
- 20 variations

Processes:
1. Roll dice to select a shape.
   1–2: Circle
   3–4: Square
   5–6: Triangle
2. Roll dice to select quantity of shape.
3. Place the shapes into the text.
4. Adjust the shapes to any scale.
5. Take no longer than a minute.
6. Do not look at what you did or edit.

Interaction:
Human placement of shapes.

Outcome:
← Pg. 44

E1 Reflections

Strengths: The use of randomness to prescribe decisions created serendipitous combinations and was successful in generating a large number of iterations. The act of creating and interacting with the task helped stimulate ideas about possible project developments.

Weaknesses: I found these systems were too constrained, not allowing for improvisation, and I became bored with the repetitive task. This resulted in me trying to bend or break the rules of the system, which actually produced the most interesting results. The underlying frustration of the task was its meaninglessness and lack of goal.

Creative Play Score:

Novelty	3/5
Enjoyment	3/5
Absorption	2/5
Improvisation	2/5
Total	10/20

[Left] Figure 10: ***E1.2 Chance Typography Series***, Image by author, 2023.

Experiment 2
Tactile Typography

This aim of these experiments was to introduce a less strict set of rules and variables that would allow for more improvisation. I used a combination of chance through dice rolling and a simple set of tangible elements. For the system, I moved away from the computer to using tangible materials. Pipe Cleaners and straws were chosen for their playful connotations. I hoped that using materials might help create a feeling of play through the embodied experience of interacting with the objects.

E2.1 System

Task:
Create a character.

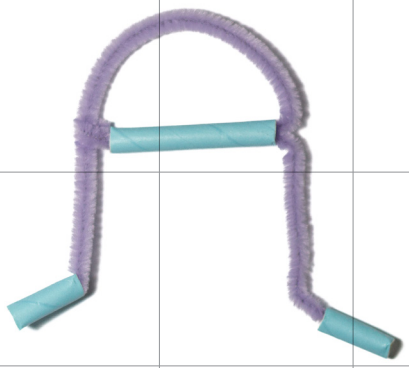
Entities:
- Random dice input
- Coloured Pipe Cleaners and Straws

Processes:
1. Roll dice to select pipe-cleaner colour:
   1-2: Pink
   3-4: Blue
   5-6: Purple
2. Roll dice to select straw colour:
   1-2: Green
   3-4: Blue
   5-6: Yellow
3. Roll for how many pieces of straw.
4. Make a letter using only those elements.
5. Start with “a” and repeat for each.
6. 60 seconds for each letter.

Interaction:
Human manipulation of materials.

Outcome:
Pg. 47 →

[Right] Figure 11: ***E2.1 Tactile Typography Series***, Image by author, 2023.



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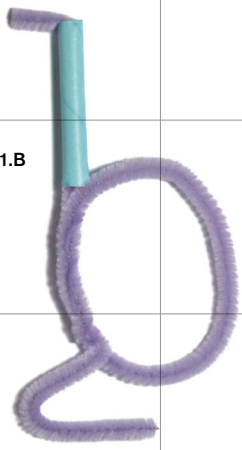

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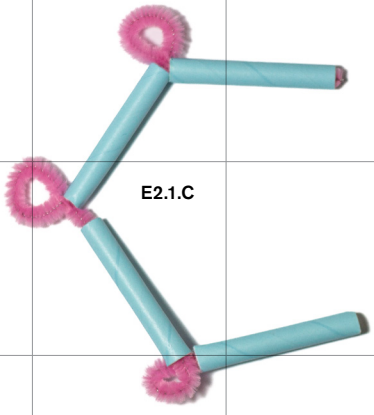

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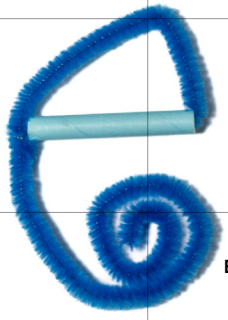

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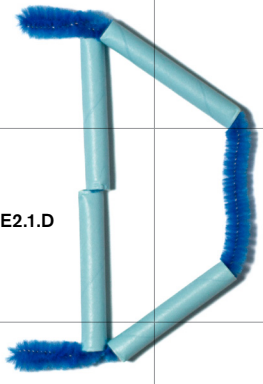

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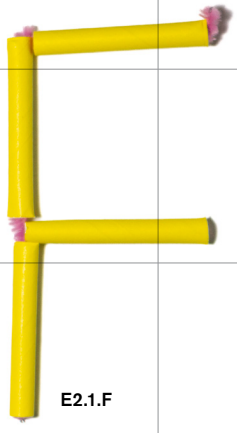

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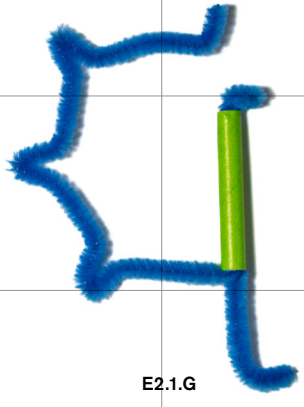

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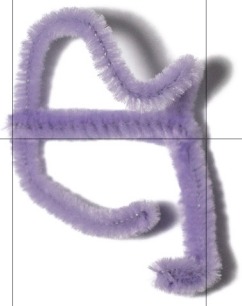
E2.1.H



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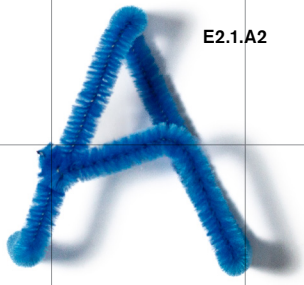

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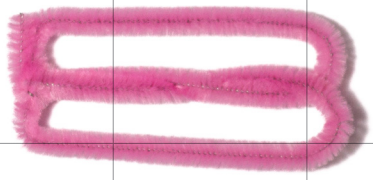

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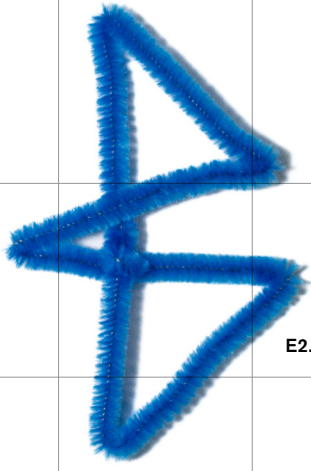
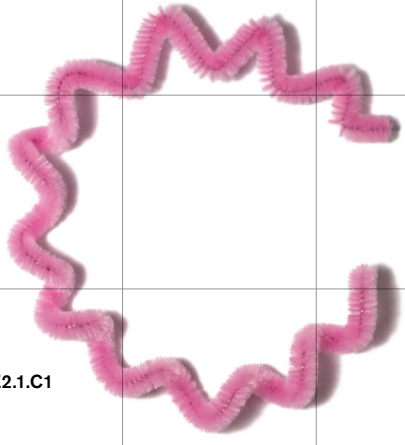
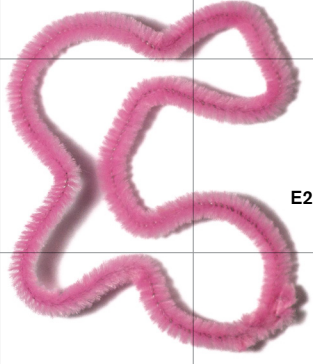


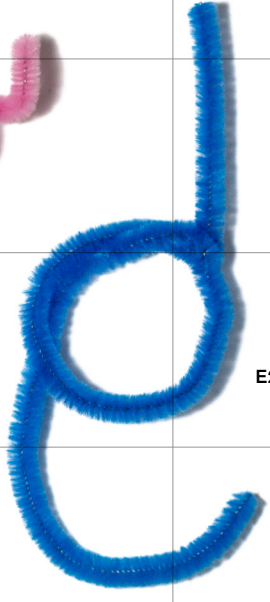
E2.1.B2



E2.1.C1



E2.1.C2



E2.1.G

E2.1.F

E2.2 System

Task:
Create a character.

Entities:
- Random dice input
- Coloured Pipe Cleaners
- 20 Adjective Cards

Processes:
1. Draw a card with an adjective on it.
2. Roll dice to select pipe cleaner colour:
   1-2: Pink
   3-4: Blue
   5-6: Purple
3. 1min to make a letter that represents the adjective.
4. Start with “a” and repeat for each.

Interaction:
Human manipulation of materials.

Outcome:
← Pg. 48

E2 Reflections

Strengths: This experiment was successful in producing novel and playful-looking outputs. The second iteration was the more successful of the two, allowing for more improvisation within the constraints. Using randomly drawn adjectives as inspiration was an effective method for providing a goal for the task beyond just manipulating form.

Weaknesses: Although the results from this experiment look fun and playful, the process of creating them was anything but. The irreverent nature of the task and materials, as well as the childish appearance of the final output, put me in a negative mindset and negated any chance of play. The novel results were not enough to give the task purpose by themselves.

Creative Play Score:

Novelty	4/5
Enjoyment	2/5
Absorption	2/5
Improvisation	3/5
Total	11/20

[Left] Figure 12: ***E2.2 Tactile Typography Series***, Image by author, 2023.

Experiment 3
Exquisite Typography

Modelled on the surrealist drawing game of exquisite corpse, this experiment explored the idea of working in "semi-darkness" in combination with the manipulation of materials which I did not have much mastery over. The materials were collected together from anything I found around the research studio. Letters of the alphabet were divided into three slices and then shuffled and drawn with a random selection of materials. Finally, they were reassembled as complete letters.

E3 System

Task:
Create a character.

Entities:
- A selection of unusual materials
- 24 characters cut into three horizontal slices
- Box to hide materials

Processes:
1. Select one slice of a character.
2. Randomly select a couple of materials.
3. Draw that part of the letter using only those materials.
4. Do not edit or correct what you have done.
5. Reassemble the slices together to form a new character.

Interaction:
Human manipulation of materials.

Outcome:
Pg. 53–59 →

[Right] Figure 13: *E3 Exquisite Typography Series*, Image by author, 2023.

The Surrealists

Exquisite Corpse

The Surrealists were pioneers in using rules-based games and techniques to explore the world of dreams by breaking free of the rational mind. These techniques were said to free the imagination by producing a creative process free of conscious control, allowing them to go beyond their own perceived notions of taste and tap into their subconscious. These were systematic methods that utilised elements of chance and randomness.

One of the most well-known techniques is Cadavre Exquis or Exquisite Corpse [Fig. 14]. It works by each participant taking turns to draw a section of the same artwork without being able to see what other participants have done until it is revealed at the end. Salvador Dalí referred to this as working in "semi-darkness". The game utilises the randomness of participants' imagination, which is juxtaposed with other players and combined to generate serendipitous and playful results. This is a perfect example of a structured system enabling creative play.

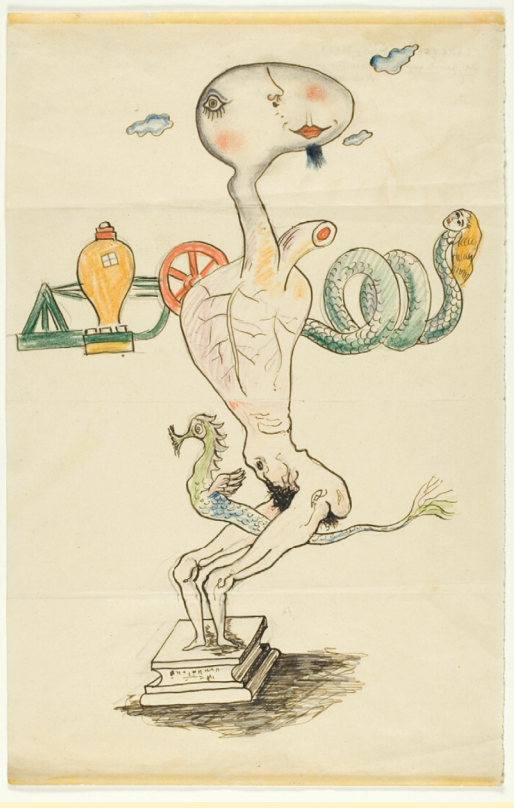
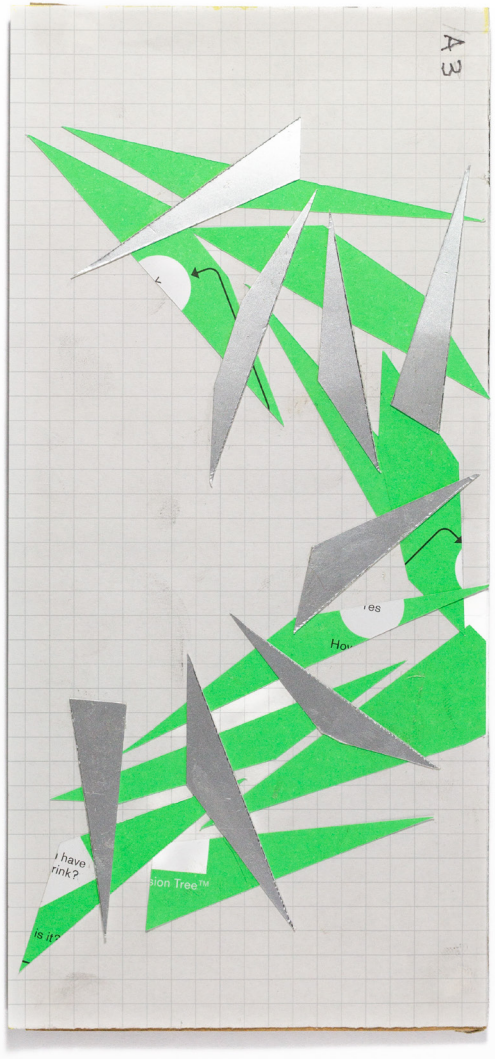
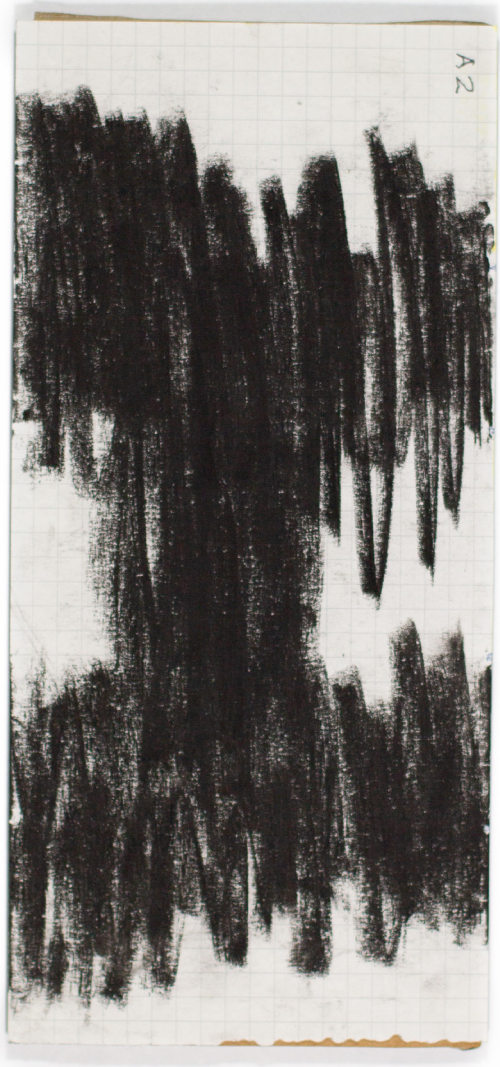


Figure 14: *Exquisite Corpse*, Man Ray (Emmanuel Radnitzky), André Breton, Yves Tanguy, and Max Morise, 1928.

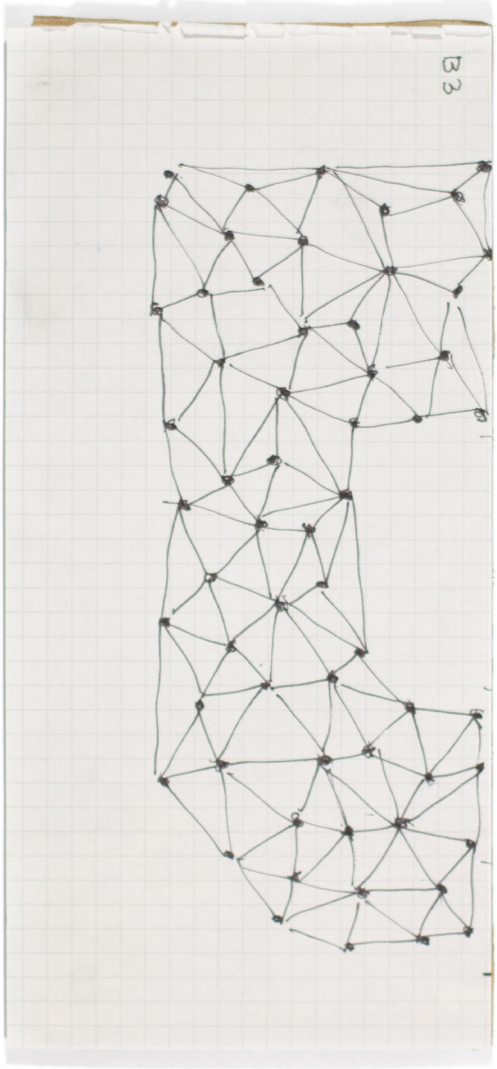
E3.A3: Coloured paper on paper



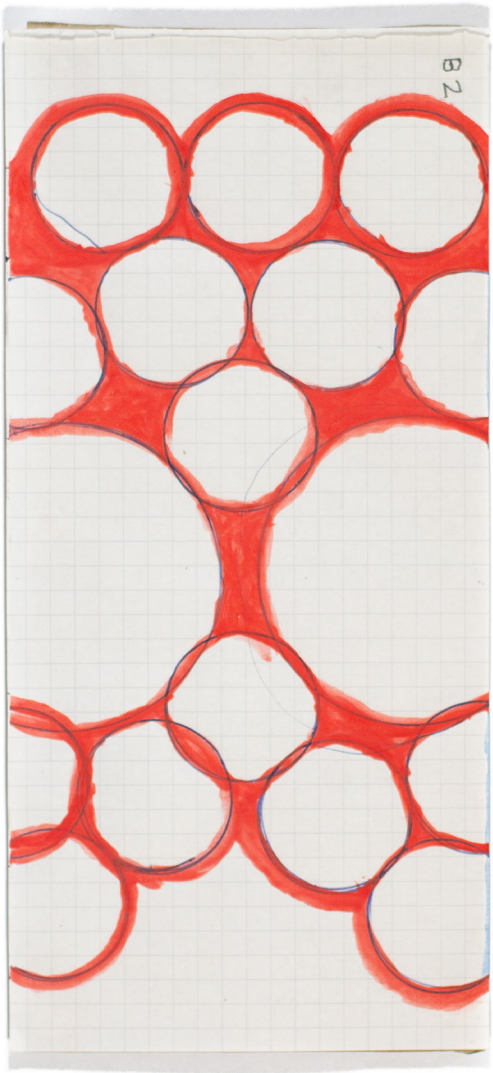
E3.A2: Charcoal on paper



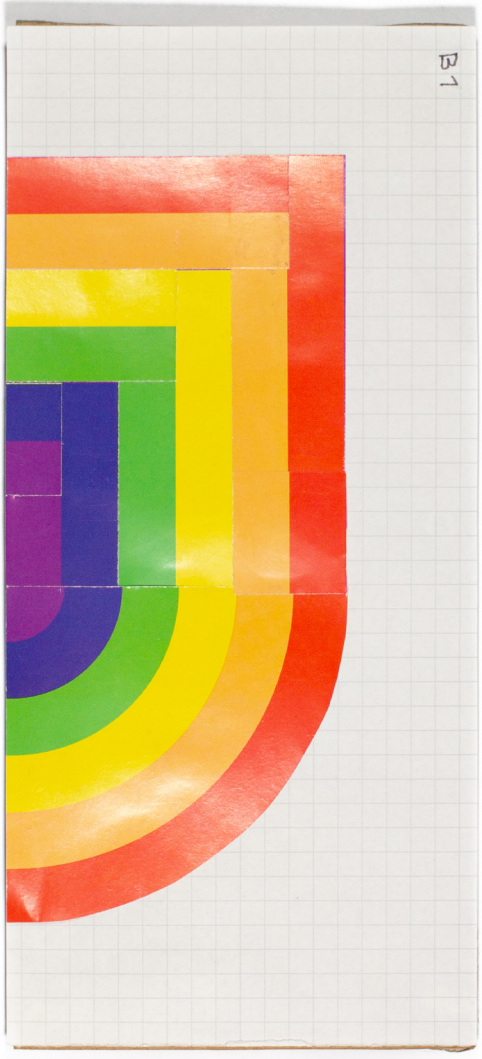
E3.A1: Marker pen on paper



E3.B3: Ballpoint pen on paper

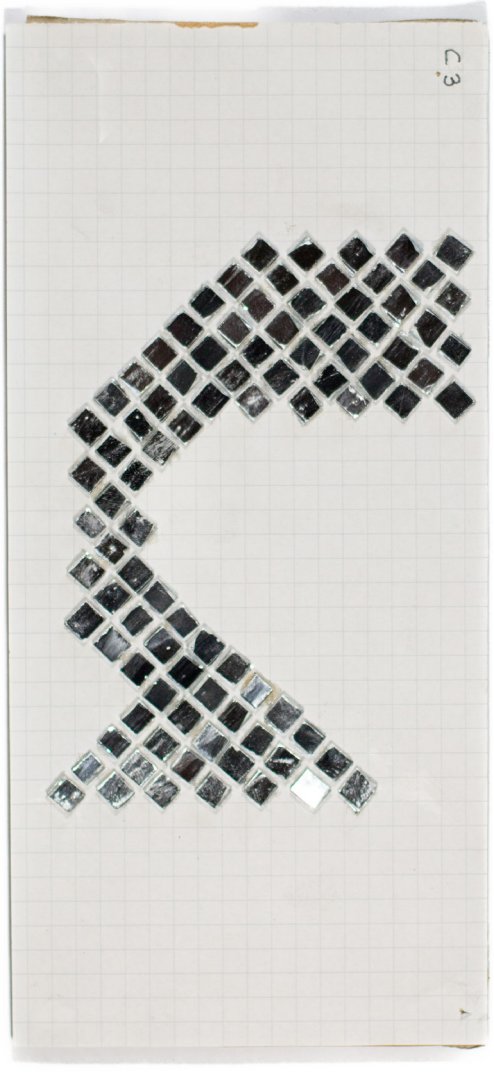


E3.B2: Watercolour pigment on paper



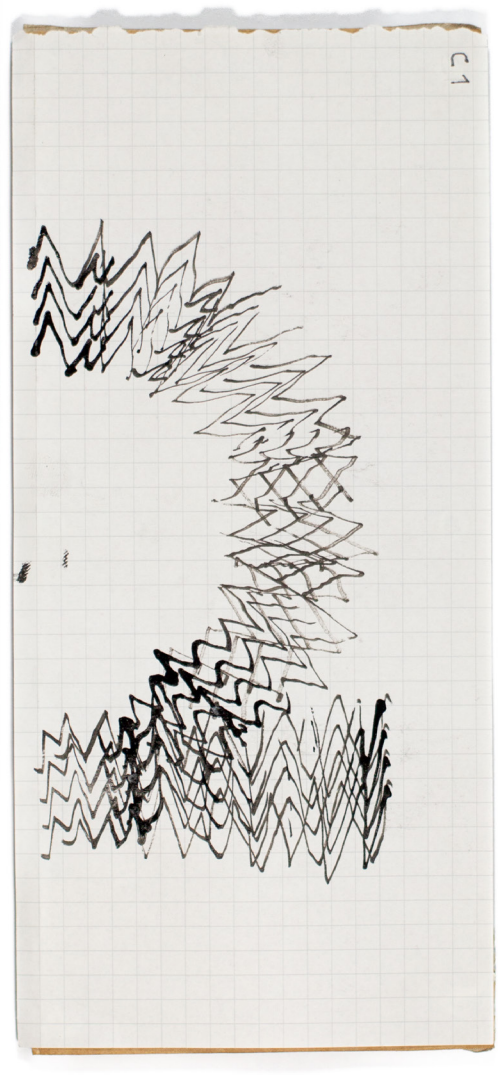
E3.B1: Coloured paper on paper

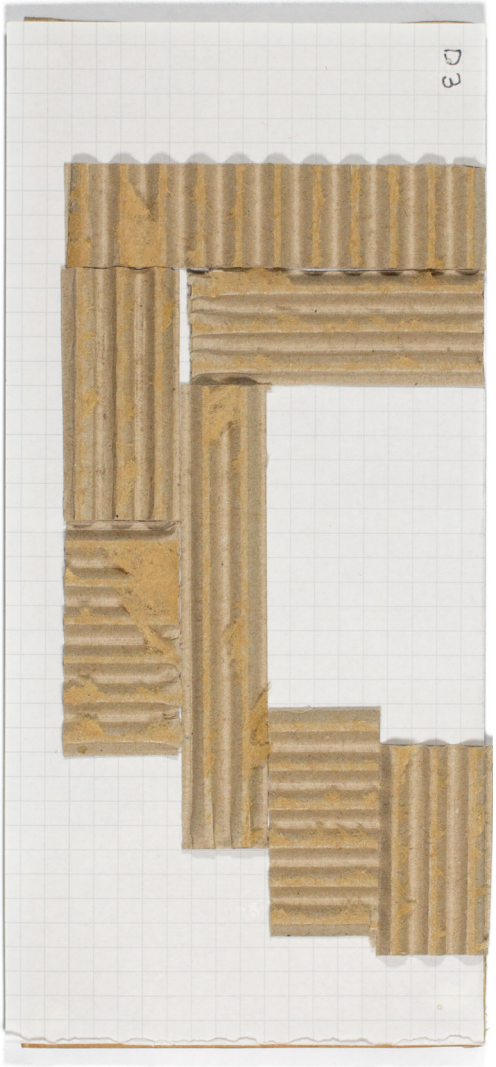
E3.C3: Mirror on paper



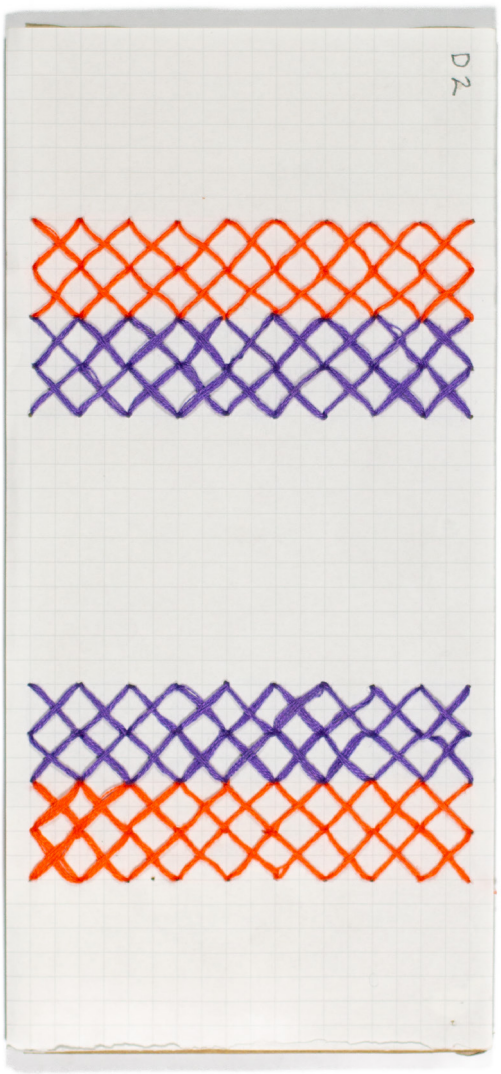
E3.C2: Indian ink and correction tape on paper

E3.C1: Indian ink on paper

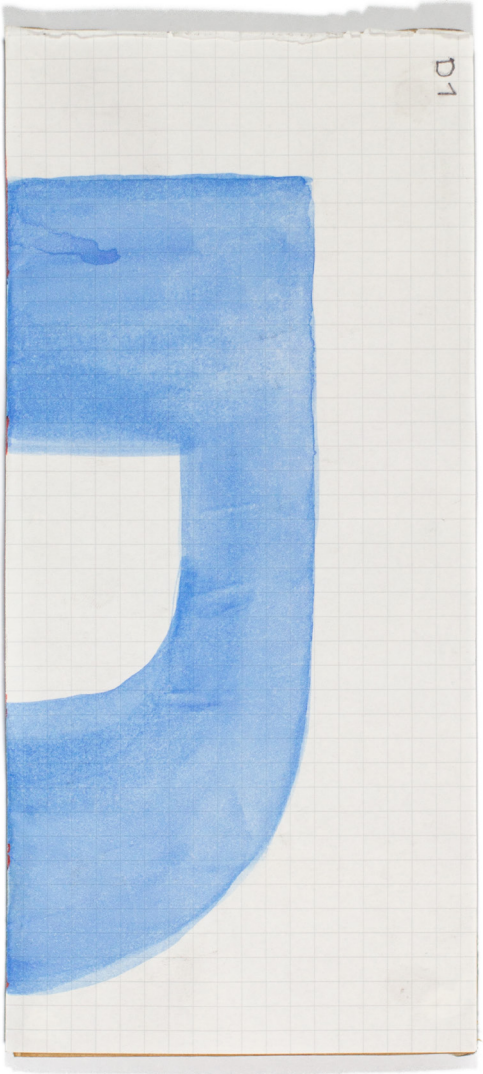




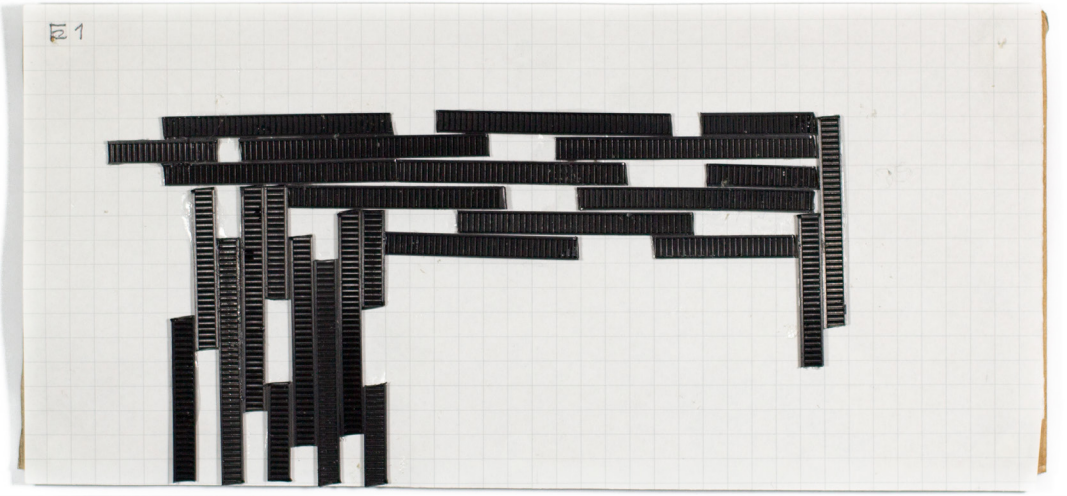
E3.D3: Corrugated card on paper



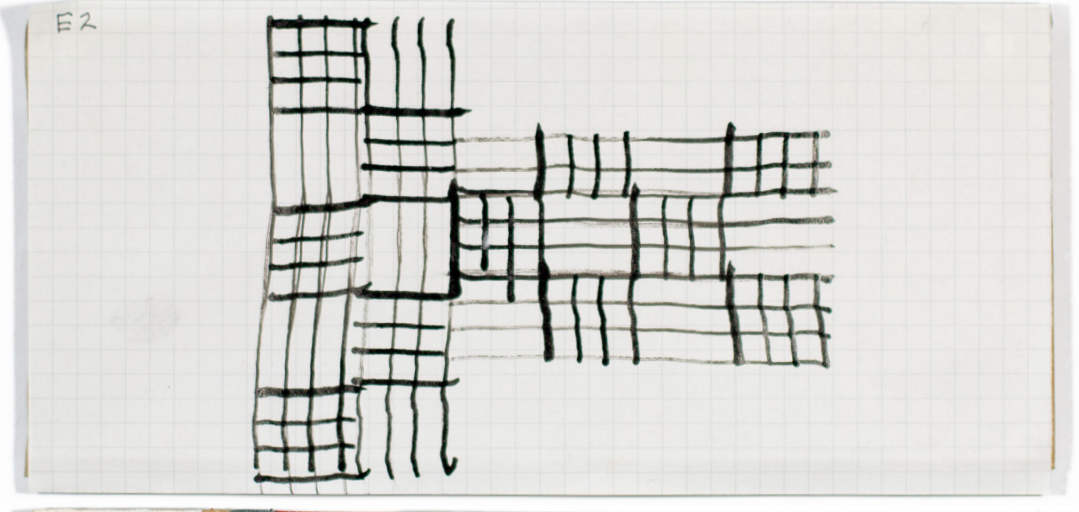
E3.D2: Thread on paper



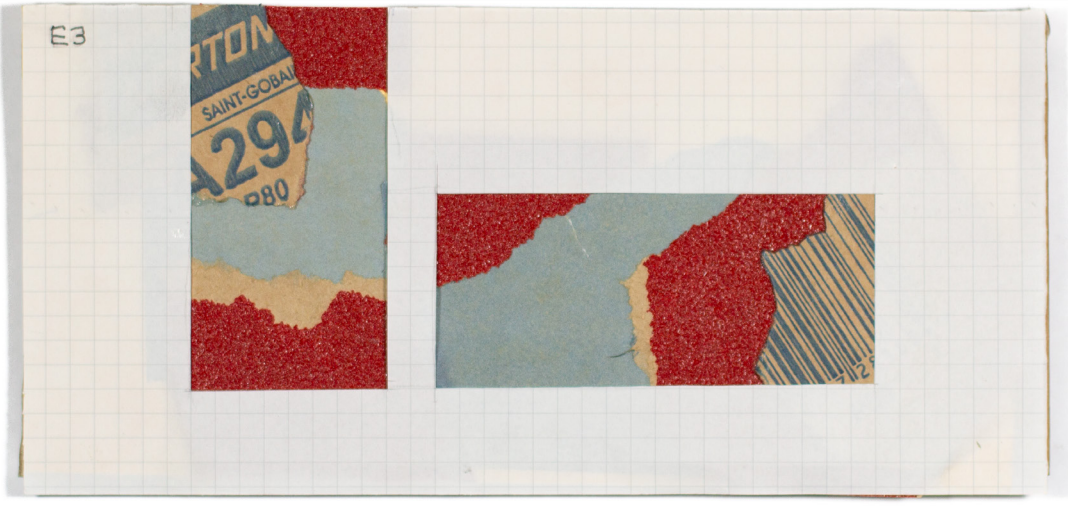
E3.D1: Watercolour pigment on paper



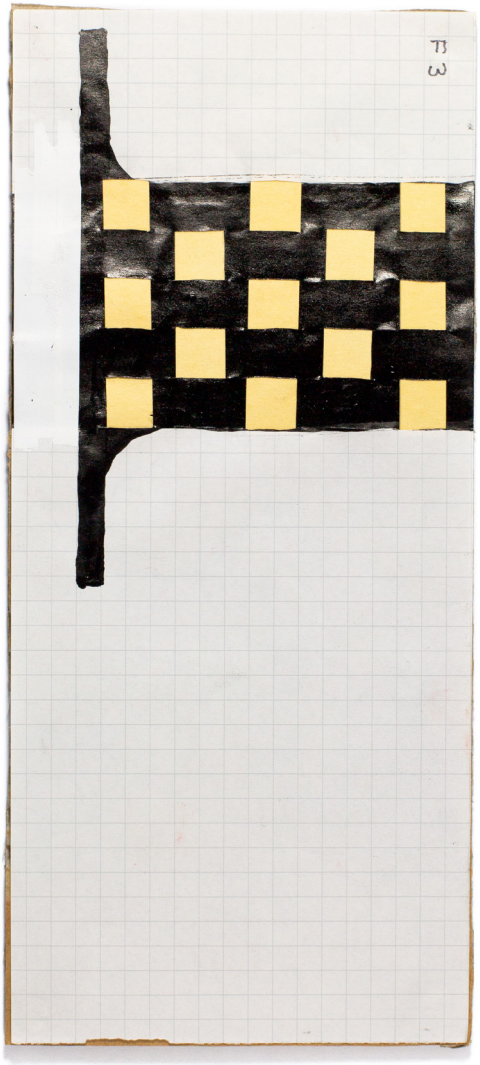
E3.E1: Cable ties on paper



E3.E2: Indian ink on paper

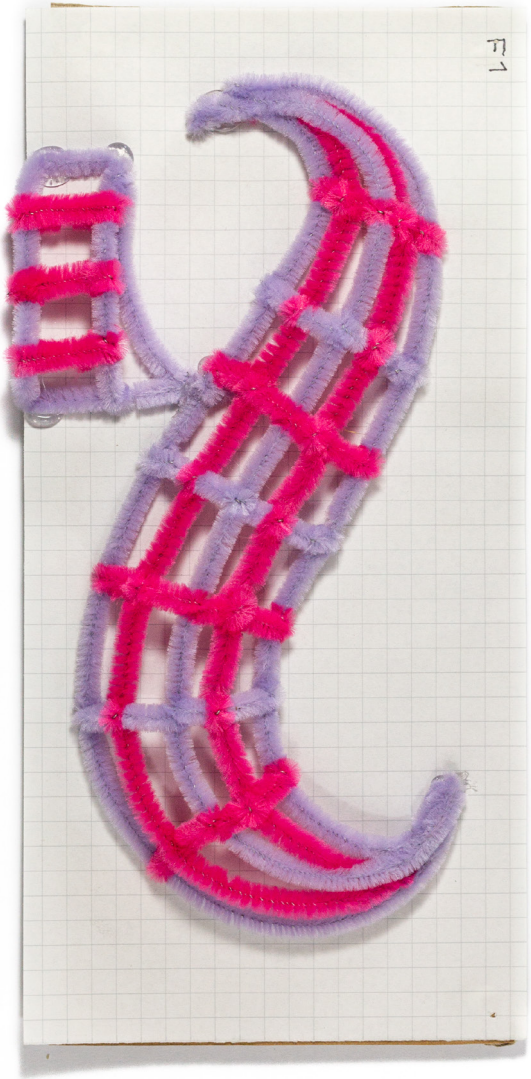


E3.E3: Sandpaper on paper

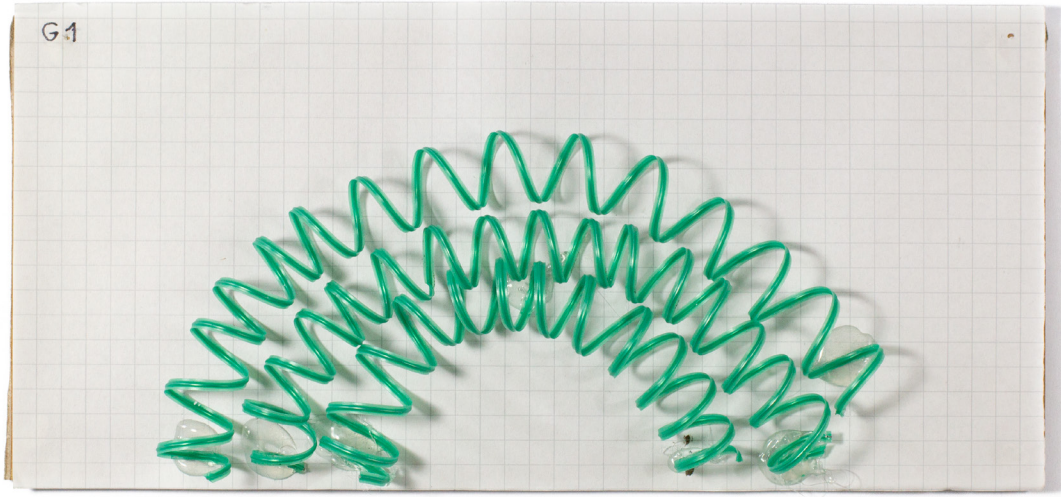


E3.F3: Indian ink and coloured paper on paper

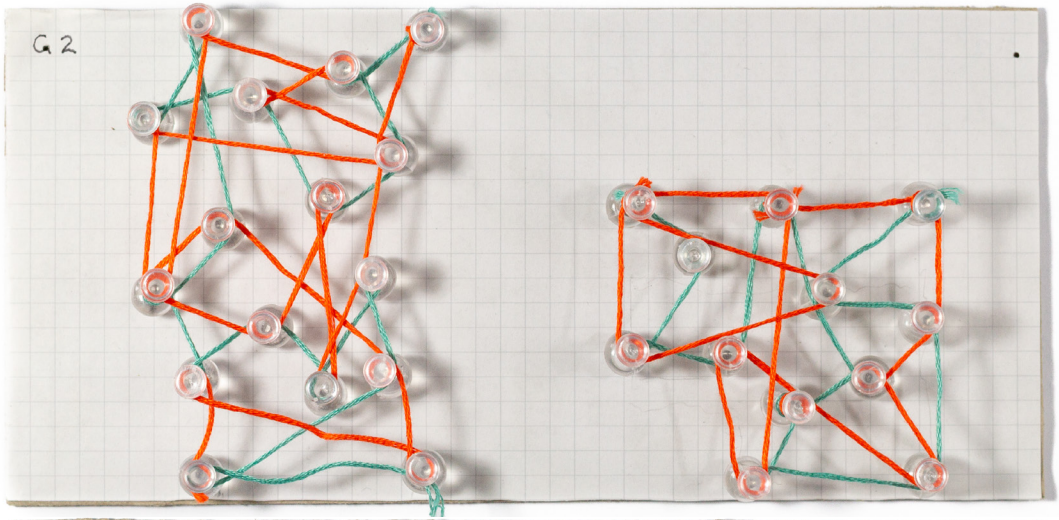
E3.F2: Coloured ribbon on paper



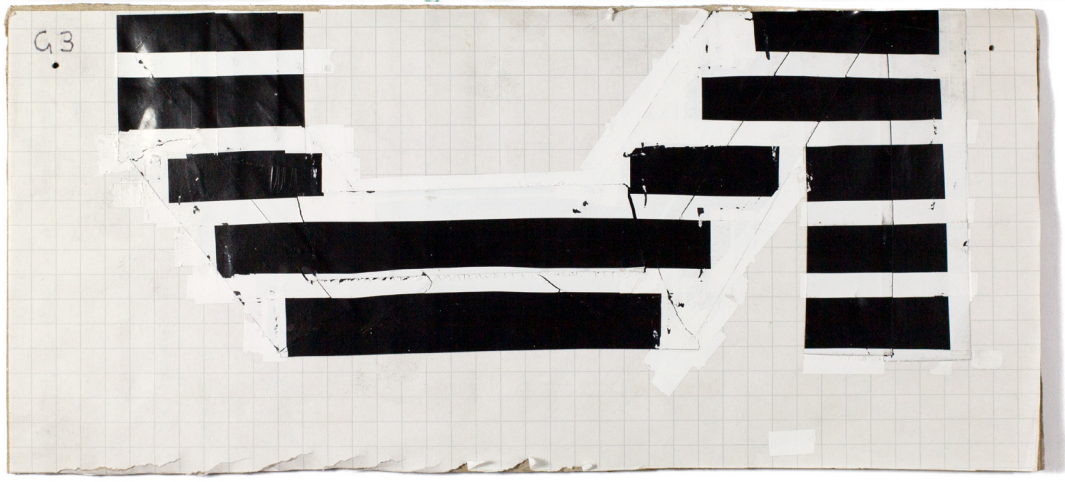
E3.F1: Coloured pipe cleaners on paper and card



E3.G1: Wire on paper



E3.G2: Pins and thread on paper



E3.G3: Plastic tape and correction tape on paper

E3 Reflections

Strengths: The process of making these was enjoyable. I was pleased and surprised with the novel results. When the letters were re-assembled, they created interesting combinations of form and texture that could easily be used as a starting point for developing a new display typeface. I looked forward to working on each day and it took me back to my early days working in the uni workshops.

Weaknesses: This system was very slow and laborious, so would not have much practical application in a fast-paced studio environment. The random mechanism of working in "semi-darkness" didn't work effectively, as I could remember what I had previously done even though I was hiding the slices from myself. This would have been more effective if performed with other participants.

Creative Play Score:

Novelty	3/5
Enjoyment	4/5
Absorption	4/5
Improvisation	3/5
Total	14/20

M.C. Escher

Geometric Play

Dutch graphic artist M. C. Escher's highly systematic work can be seen as a precursor to generative art and design. "Without the use of computers he invented and applied what can only be called algorithms in the service of art" (Galanter 13). Escher utilises tessellations and patterns with strict mathematical rules and principles to create playful visual illusions. He was heavily influenced by patterns and geometric designs found in the Moorish architecture which Galanter states are some of the earliest examples of generative art (Locher). His work *Circle Limit III* [Fig. 15] is an example of the use of complex geometry and repetitive modular parts. While Escher followed systematic rules, he had complete agency over the creation of his artwork. He made deliberate choices in the arrangement of shapes, the choice of subjects, and the overall composition. This is a departure from typical generative process, where the external system has more autonomy.

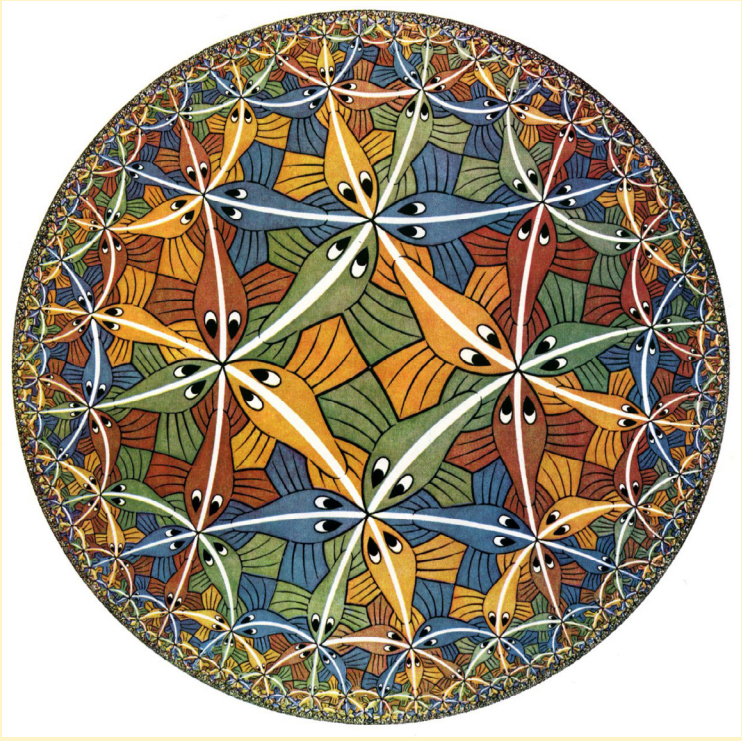


Figure 15: *Circle Limit III*, M.C.Escher, 1959.

Modular systems

Modularity is the breaking down of a system or object into independent elements or modules that can then be assembled to make a whole. These are typically repetitive and self-contained and can then be developed, modified or replaced without affecting the entire system. In generative systems, modularity allows for flexibility, iteration, and scalability. The next experiments explore the mechanics of simple modular systems and whether working within the constraints of very restricted elements could lead to play.

Experiment 4
Tile Typography

The inspiration for this experiment came whilst playing a board game called Trax which has simple modular tiles. I wondered if I could activate play through the use of game pieces as a generative system. The tiles had simple designs with one pattern on each side and, when combined, formed curvy or straight lines. This mechanism made a perfect modular letter creator where I could play within the tight constraints of the ready-made forms.

E4 System

Task:
Create a typeface.

Entities:
– Two-sided Trax tiles

Processes:
1. Create a letter using only the tiles.
2. Place the tiles on a straight grid.
3. Start with “a” and repeat for each letter.

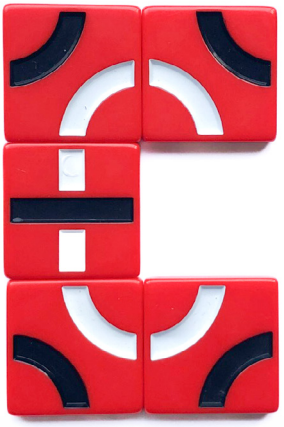
Interaction:
Human arrangement of tiles.

Outcome:
Pg. 65 →

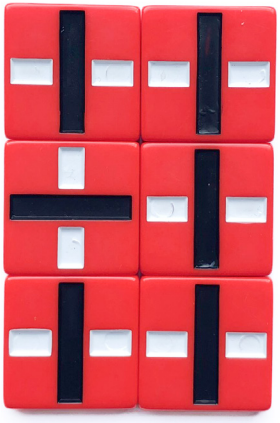
[Right] Figure 16: *E4 Tile Typography Series*, Image by author, 2023.

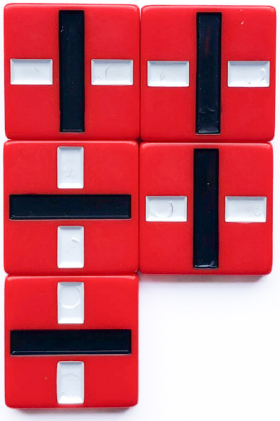

E4.1


E4.2

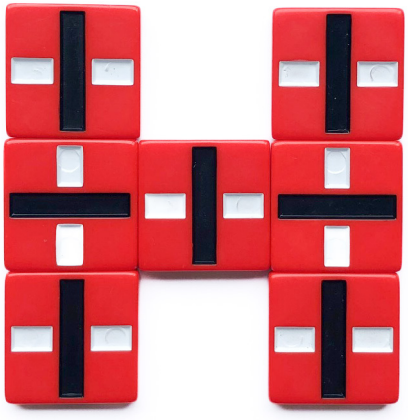

E4.3


E4.4


E4.5


E4.6


E4.7


E4.8


E4.9

E4 Reflections

Strengths: **This experiment was unexpectedly enjoyable and generated interesting results. The tactility of the tiles made it very fast to iterate and play with the shapes. There could have been a positive impact on my enjoyment due to the associations I had with the game pieces themselves.**

Weaknesses: **I became bored with the task quickly as it had little challenge, and the system's constraints did not allow for exploration. The absence of chance or randomness meant I had almost total control over the process, leading to predictable results.**

Creative Play Score:

Novelty	**2/5**
Enjoyment	**4/5**
Absorption	**3/5**
Improvisation	**2/5**
Total	11/20

Experiment 5
Modular Typography

This experiment was a development of the previous modular one but involved much more freedom from constraints. The system still did not involve any elements of chance, which meant I had total control of the outcome and was restricted to only three basic elements. I wondered if working with materials I wasn't skilful at was had been an impediment to the outcome, so I moved back to using the computer and vector-based digital design tools.

E5 System

Task:
Create a typeface.

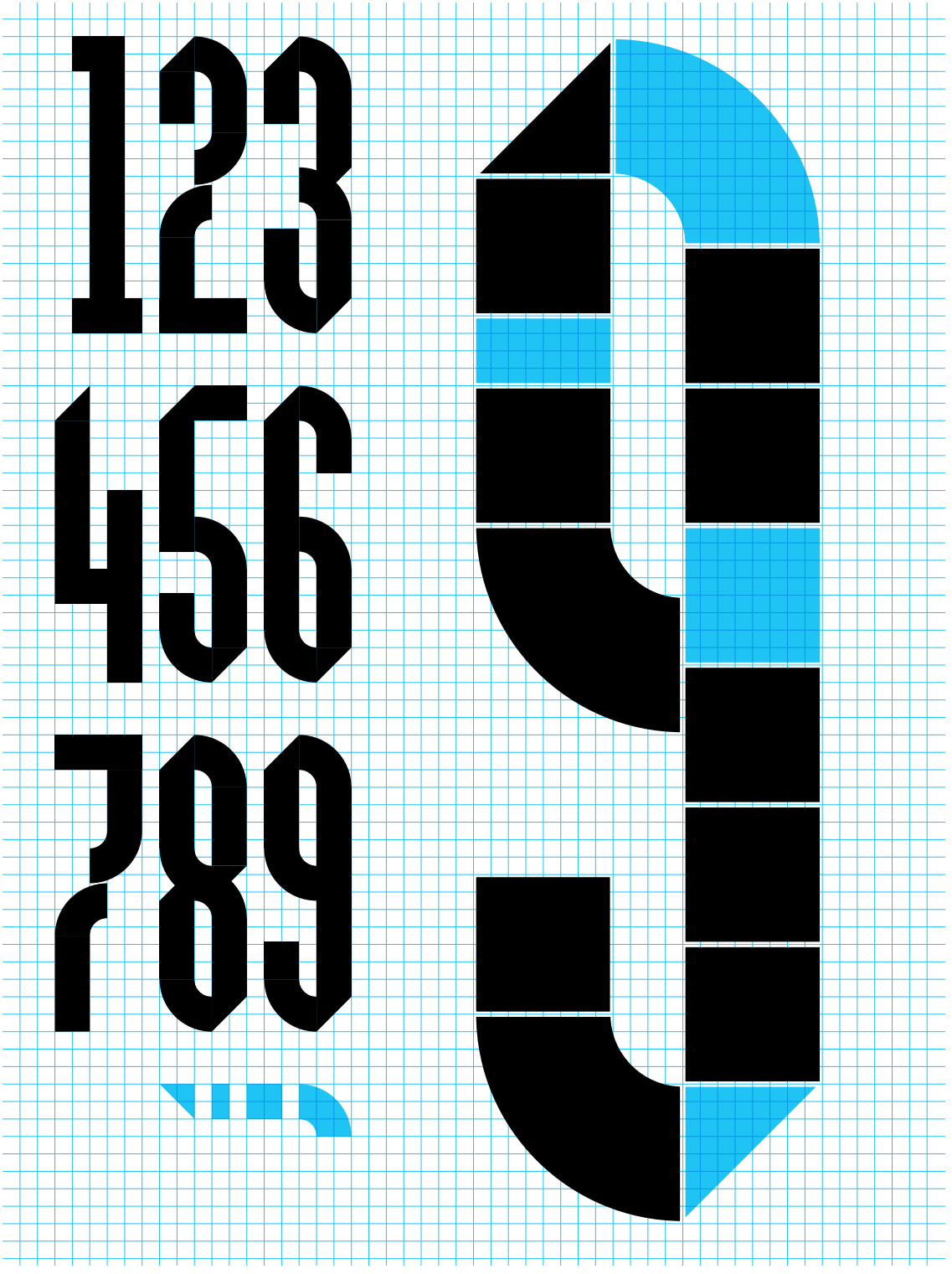
Entities:
- Four primitive shapes
- Modular grid

Processes:
1. Create a letter using only the four shapes.
2. You can use as many of them as you like.
3. Start with the letter "a" and repeat for each letter.

Interaction:
Human arrangement of shapes

Outcome:
Pg. 68–69 →

Figure 17: *E5 Modular Typography*, Image by author, 2023.


123
456
789

E5 Reflections

Strengths: I was aesthetically pleased with the outputs of this experiment. However, I needed to remind myself that this was not the goal. The grid system and modular elements allowed me to improvise and play within the constraints similar to the previous experiment.

Weaknesses: It was not effective at producing divergent results. During this experiment, I couldn't help wondering if I had just reverted to taking the path of least resistance, falling back into my well-worn patterns of making where my converging skill set was high, but the challenge was low.

Creative Play Score:

Novelty	1/5
Enjoyment	5/5
Absorption	4/5
Improvisation	3/5
Total	13/20

Manfred Mohr

Generative Thinking

German-born and New York-based artist Manfred Mohr is one of the fathers of Computer or Algorithmic Art. His work explores the use of computer systems to augment his creative process and produce art that forces him outside of his usual modes of thinking and making. Mohr's work is influenced by experimental musician Karlheinz Stockhausen and the writing of German philosopher Max Bense who, in Programmierung des Schönen, argued for the extreme rationalisation of aesthetics (Mohr). Although he began his career as a jazz musician and abstract painter, in 1969, inspired by Bense's writing, he began using computers to generate art. Combining both his musical and painting past, he developed computational tools, or as he called them, "visual instruments", with the goal of capturing his painting style in an algorithm. His 1970 work P021-G [Fig. 18] is a playful example of this, retaining the linear form of a musical score combined with the visual expression of painting.

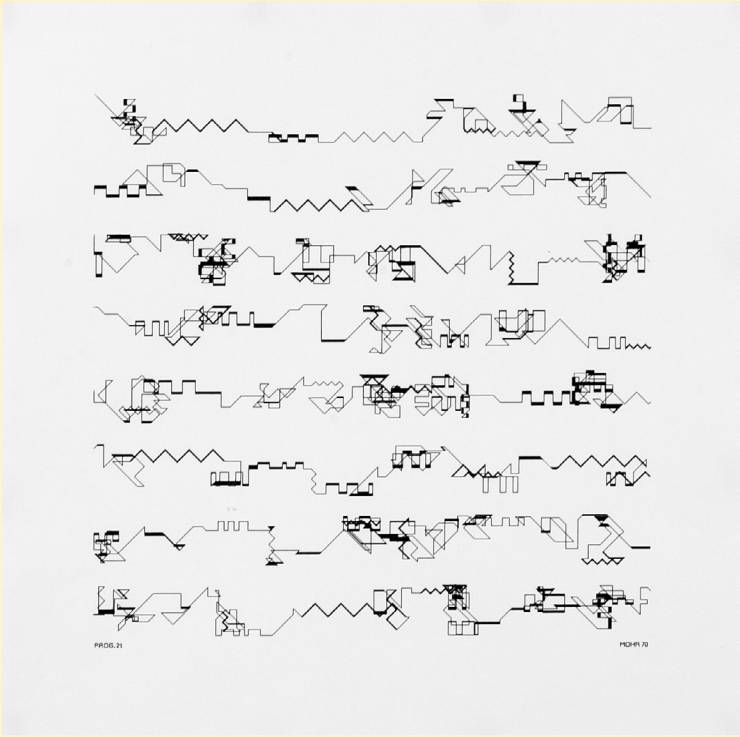


Figure 18: *P021-G*, Manfred Mohr, 1970.

Computational systems

Computation is the most common method used in Generative Art and Design today. The advantage of using a computational system rather than a manually operated one is that it can perform tasks of much more complexity. There are direct parallels between the process of writing rules or instructions, which I explored in my previous experiments, and the process of writing code, which is a set of instructions written in computer language. The following experiments feature minimal human interaction, with all of the assembly of the designs being automated by a computer.

Experiment 6
Algorithmic Typography

This series of experiments explored the use of code to generate letter forms with a software program called Processing. Using code gave me the potential to build much more complex systems and use computerised randomness. Coding is also an area where I don't possess a high level of expertise. I hoped this lack of expertise and control might produce unexpected results outside of my usual modes of making.

E6 System

Task:
Create a character.

Entities:
- Dots and lines
- Red and blue
- Coding software (Processing)

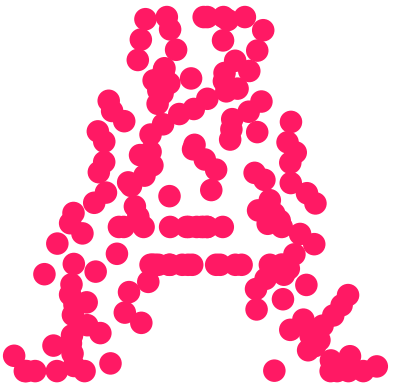
Processes:
1. Use code to create a letter.
2. Add a random process to code.
3. Leave it to run.

Interaction:
Cursor movement.

Outcome:
Pg. 75 →

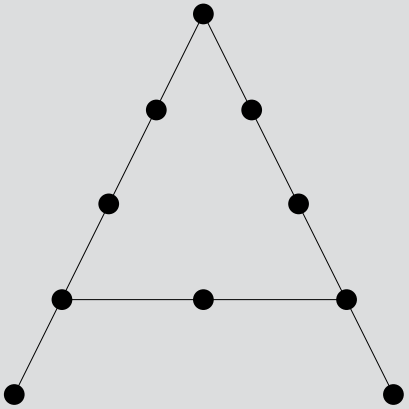
[Right] Figure 19: *E6 Algorithmic Typography Series*, Image by author, 2023.

E6.1

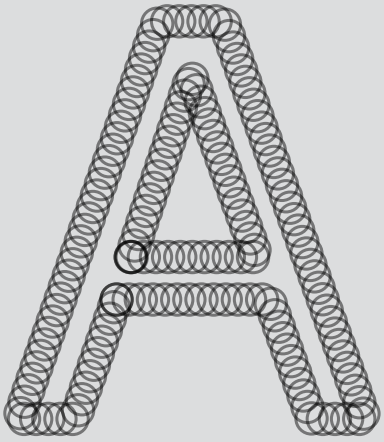


E6.2

E6.3



E6.4



E6.5

E6.6

E6 Reflections

Strengths: The outputs of this experiment were visually interesting, with the ability to generate very complex forms and iterate quickly. The use of random generators and interaction produced some novel results. The process of coding was also a useful exercise for thinking about the manipulation of visual form from a computational perspective.

Weaknesses: The separation between the process of coding and viewing outputs meant I didn't find myself absorbed in play. I also found my inexperience in programming led to frustration rather than unexpected outcomes. This heavily impacted my enjoyment of the process, making it difficult to play. This was different from other experiments where low skill had led to serendipitous discoveries.

Creative Play Score:

Novelty	2/5
Enjoyment	3/5
Absorption	4/5
Improvisation	1/5
Total	10/20

Experiment 7
Parametric Labels

For this experiment, I introduced a more complex design problem in the form of a hypothetical brief. Designing beer labels is something that I do frequently in my professional practice, so I choose this as a real-life example to test the system on.

The experiment used a combination of automated parametric processes and layered graphics. Parametric refers to the creation of a form being shaped by a real-world element rather than direct manipulation. In this instance, the form was determined by the variety of hops present within the hypothetical beer. Each hop variety was linked to a distinct coloured pattern and type layout, which I had pre-designed. These were then assembled into the final through an automated system of selection and layering, with no interaction from myself.

E7 System

Task:
Create labels for a series of hop-focused beers.

Entities:
- Selection of beer recipes
- Chart of hop varieties
- 6 coloured patterns (one for each hop)
- Design software (Indesign)

Processes:
1. Identify hop varieties.
2. Select the matching hop pattern.
3. Link patterns in design file.
4. Import hop names and info.
5. Update links to automate process.

Interaction:
None

Outcome:
Pg. 78–79 →

E7.1.1

E7.1.2

E7.1.3

E7.1.4

E7.1.5

E7.1.6

E7.1.7

E7.1.8

E7.1.9

Figure 20: *E7.1 Parametric Labels*, Image by author, 2023.

Figure 21: *E7.2 Parametric Labels*, Image by author, 2023.

E7 Reflections

Strengths: **This experiment created consistently aesthetically pleasing results, making it enjoyable to work with. The outputs were also quite novel and unexpected. Once the system was established, it was very fast at producing outputs as the system was almost fully automated.**

Weaknesses: **The system's automated nature meant I wasn't able to improvise or play. This lack of improvisation led to the process being less absorbing as I was removed from the making process. It was quite narrow in the variation of outputs, as it only used elements I set up when creating the system. Overall it felt like a convergent rather than divergent process, which is why it was able to produce such developed outputs.**

Creative Play Score:

Novelty	**3/5**
Enjoyment	**4/5**
Absorption	**4/5**
Improvisation	**0/5**
Total	11/20

Karl Gerstner

The Design Programme

Swiss designer and artist Karl Gerstner pioneered the use of Morphological Analysis as a way of solving design problems. Gerstner was a part of the 1960's New Tendencies, or Nouvelle Tendance, art movement. This movement rejected the popular Expressionist and Realist ideals of the era, instead promoting rational ideas and processes informed by recent developments in mass production and computer technology (Medosch). Gerstner was heavily informed by the movement, promoting the rational systematisation of the creative process into what he called The Design Programme. His aim was not to limit creativity but to ensure creative energy was efficiently allocated. He advocated for a shift in focus of the designer from the creation of outputs to the creation of systems that created the outputs. As stated in his 1964 essay Designing Programmes [Fig. 22], "Instead of solutions for problems, programmes for solutions." (Gerstner 9)

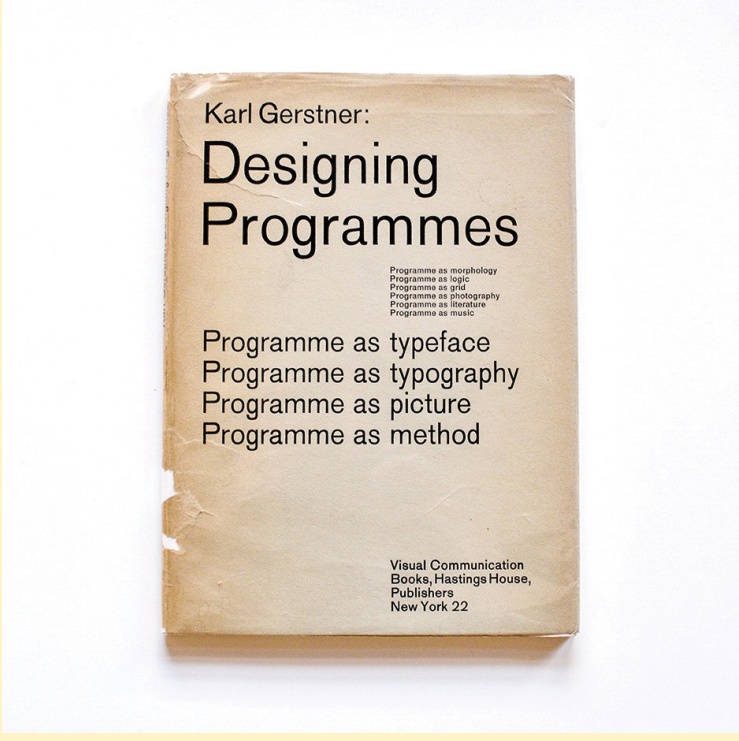


Figure 22: *Cover of Designing Programmes*, Karl Gerstner, 1968.

Morphological systems

The previous experiments had been successful at producing interesting and novel results, with some able to enable creative play. However, I wanted to explore a method that could be applied to any brief rather than needing to be created from scratch for each project. The systematic problem-structuring and solving method of Morphological Analysis offered a potential solution. This process works by breaking down a problem into its key elements, known as the “solution space”, which are then mapped on a chart. Elements are then selected and recombined to generate new ideas. This method forces the user to think deeply about the problem and encourages the generation of a broad set of lateral ideas. The next experiments explored how Morphological Analysis could be adapted to explore more complex briefs.

Experiment 8
Morphological Cards

This experiment was envisioned as a training tool for creative play. It is a generative system in the form of a card game that uses a combination of randomness and constraints to exercise designers' divergent muscles. It encompasses all elements of form creation and manipulation as well as external factors such as time constraints. Cards are drawn at random, which gives the user constraints to work within, simulating the divergent design process. Although I was not aware of it at the time, I was, in essence, creating a morphological chart for the entire visual design process.

E8 System

Task:
Create a poster.

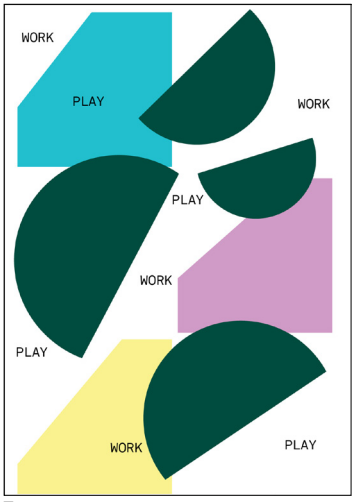
Entities:
- Generative card deck
- A selection of found images and words
- Design software (Adobe Creative Suite)

Processes:
1. Draw two ingredient cards.
2. Draw a format card.
3. Draw one card from each technique category.
4. Draw a method card from each category.
5. Start designing following the rules on the drawn cards.
6. Once time runs out, draw a chance card.

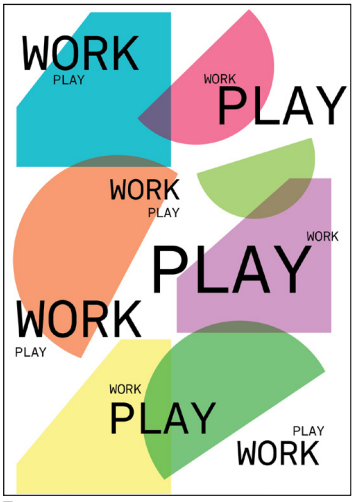
Interaction:
Human manipulation of entities.

Outcome:
Pg. 86 →

Figures 23 & 24: *Morphological Card Deck*, Images by author, 2023.

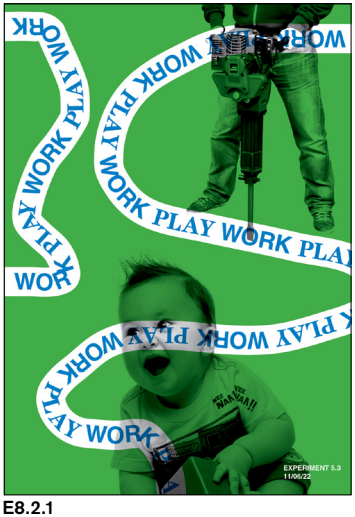


E8.1.1



E8.1.2

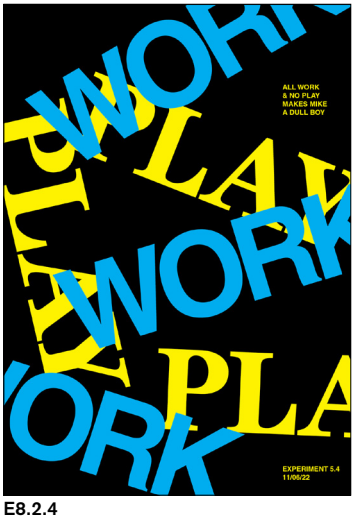
E8.1.3



E8.2.1

E8.2.2

E8.2.3



E8.2.4

E8.2.5

E8 Reflections

Strengths: The process of working with the cards was enjoyable, yielding novel and divergent outcomes. The combination of rules, constraints and chance meant that I was not able to premeditate the results and had to let go of creative control. It provided a safe space to be able to explore without worrying about what was being produced.

Weaknesses: The mechanics of the system itself did not function perfectly, which got in the way of absorption as my attention was split between developing the system and interacting within the system. I also found myself ignoring certain constraints that were too restrictive. There was potential in this prototype however, it would require a lot more development to get it to function effectively and was too complex to be used in everyday practice.

Creative Play Score:

Novelty	4/5
Enjoyment	4/5
Absorption	3/5
Improvisation	5/5
Total	16/20

[Left] Figure 25: *E8 Morphological Cards Poster Series*, Image by author, 2023.

Experiment 9
Morphological Labels

This experiment was a simpler version of the previous generative card set, focusing purely on the elements of visual form. It used a simplified morphological chart [Fig. 26] based on graphic designer and cartographer Jacque Bertin's "visual variables" matrix. The designs were created by randomly selecting a set of parameters from the chart to create constraints to improvise within. A hypothetical brief of designing a beer label was used to give the exercise content and context. This time it was based on a real product that I had already developed called Tropodrop Tropical Sour.

E9 System

Task:
Create a can label for a sour beer.

Entities:
- Product name and type
- Morphological chart of form

Processes:
1. Randomly select a parameter from each column of the morphological chart.
2. Start designing working within those parameters.
3. You have 15 mins for each version.
4. When finished, change one parameter and repeat process.

Interaction:
Human manipulation of entities.

Outcome:
Pg. 90 – 91 →

Morphological Chart Of Form

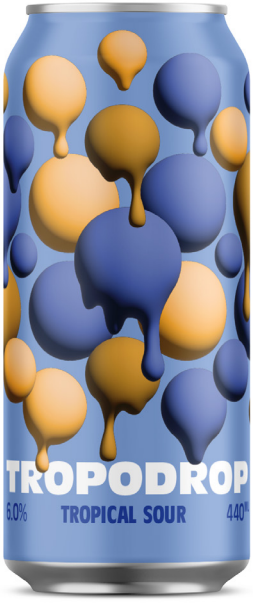
Shape	Colour	Form	Layout	Type
Geometric 1.1	Complementary 2.1	Layer 3.1	Symmetrical 4.1	Sans-serif 5.1
Organic 1.2	Analogous 2.2	Rotate 3.2	Asymmetry 4.2	Serif 5.2
Figurative 1.3	Triad 2.3	Mirror 3.3	Positive 4.3	Hand 5.3
3D 1.4	Mono 2.4	Repeat 3.4	Negative 4.4	Mono 5.4
Combination 1.5		Inverse 3.5	Repetition 4.5	Display 5.5
		Slice 3.6	Sparse 4.6	Combination 5.6
		Combination 3.7	Cluttered 4.7	
			Combination 4.8	

Figure 26: *Morphological Chart Of Form*, Image by author, 2023.

E9.1.1

E9.1.2

E9.1.3



E9.1.4

E9.1.5

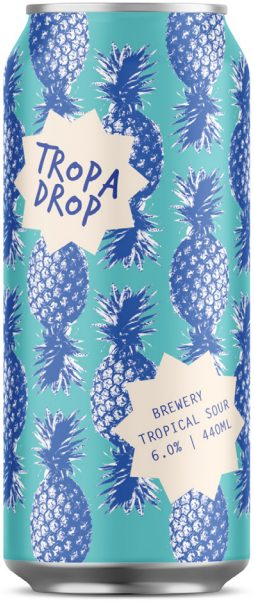
E9.1 Prompt Parameters

Shape:	3D
Colour:	Complementary
Form:	Repeat
Layout:	Busy
Type:	Display

Figure 27: *E9.1 Morphological Labels*, Image by author, 2023.

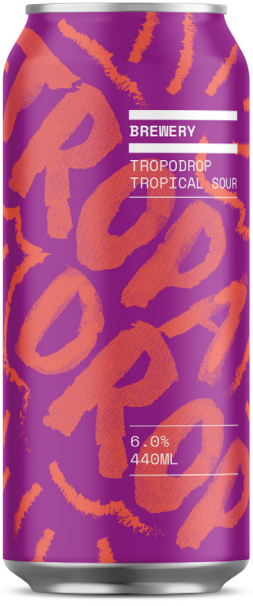
E9.2.1

E9.2.2



E9.2.3

E9.2.4



E9.2.5

E9.2 Prompt Parameters

Shape:	**Figurative**
Colour:	**Analogous**
Form:	**Inverse**
Layout:	**Asymmetrical**
Type:	**Combo (Hand, Mono)**

Figure 28: ***E9.2 Morphological Labels***, Image by author, 2023.

E9 Reflections

Strengths: This was the most successful experiment at enabling creative play and producing a broad variety of divergent outputs. It was an enjoyable experience where I felt free to improvise. The prompts created interesting and diverse paths of exploration and combinations that I would never have naturally tried myself. It was effective at forcing divergence and making me break out of my preconceived notions and self-judgement.

Weaknesses: I found I still required inspiration or visual references to draw from, which meant the outputs were not being created purely from the system. The prompts could be interpreted in many ways, so could be more specific.

Creative Play Score:

Novelty	4/5
Enjoyment	5/5
Absorption	5/5
Improvisation	4/5
Total	18/20

Mario Klingemann

Instruments Of Creation

Artist Mario Klingemann, an early adopter of machine learning and artificial intelligence, discusses the relationship between human creativity and machine creativity in his 2018 presentation *Instruments of Creation*. He states that he is interested in "transferring the agency and ability of making to machines and trying to take myself out of that calculation." (Klingemann 1:10) Klingemann's practice consists of building systems that autonomously generate artwork and then selecting the output based on personal taste. The implication of this is that the artistry is in the creation of the system and curation of the outputs rather than the making of the artwork itself. This challenges not only our perception of the role of human creative authorship but also raises the question, is creative value in the final output or in the human process of creation?

Figure 29: *Memories of Passersby*, Mario Klingemann, 2018.

Generative AI systems

During my research, Generative AI exploded into mainstream use. According to cognitive scientist and philosopher Margaret Boden, AI and human creativity can have complementary roles. AI excels in tasks that require extensive data analysis, pattern recognition, and generating large volumes of outputs, while humans have the unique capacity for emotional and contextual understanding and critical evaluation. Early studies of AI tools application in the double diamond design process also indicate that AI could be an effective augmenter of divergent ideation (Bouschery et al.). Through the next experiments I wanted to understand what would happen when I automated the creative process so that I was only remotely involved, and the implications this had for creative play.

Experiment 10
Generative AI Labels

My final experiment was a hybrid of several techniques from earlier experiments, including chance, constraint, computation, and morphology. I used the morphological chart from the previous experiment, randomly selecting parameters that I wrote back into natural language and fed into a text-to-image generator Dall-E. This meant that I was only very remotely involved in the process.

E10 System

Task:
Create a can label for a sour beer.

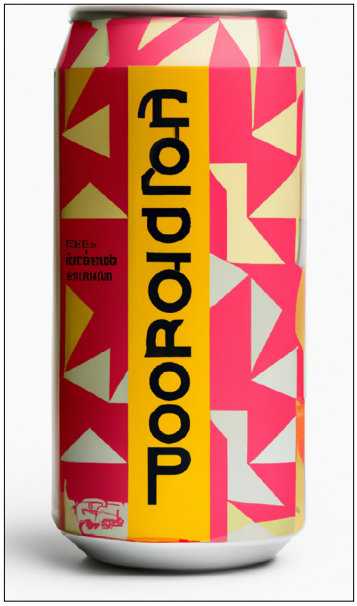
Entities:
- Beer name and type
- Morphological chart of the elements of form
- AI text to image generator (Dall-E)

Processes:
1. Randomly select parameters from the morphological chart.
2. Write this into a natural language prompt.
3. Include some context of what sort of product it is.
4. Input this into text-to-image generator.

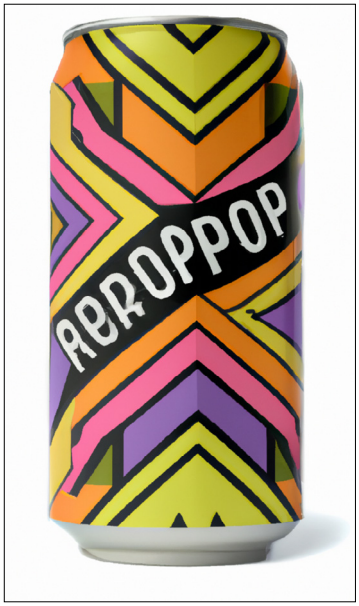
Interaction:
None.

Outcome:
Pg. 97 – 98 →

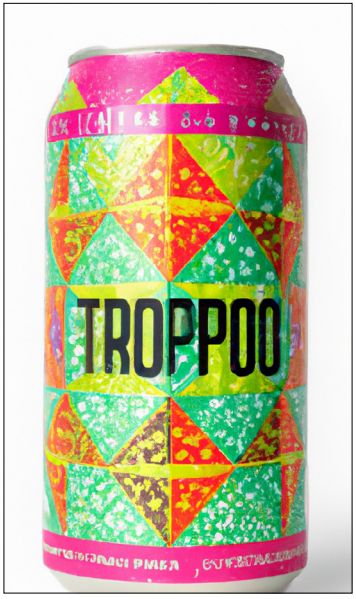
E10.1.1



E10.1.2



E10.1.3



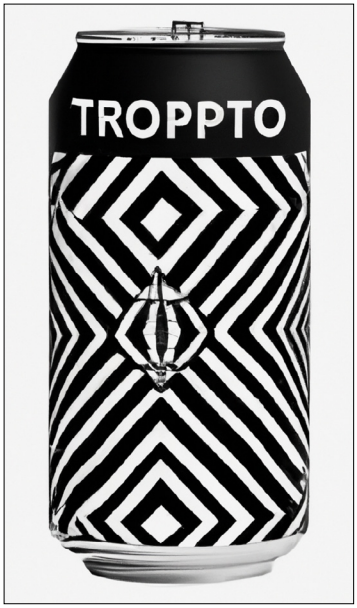
E10.1.4

E10.1.5

E10.1 Prompt Parameters

Shape:	Geometric
Colour:	Complementary
Form:	Layered
Layout:	Repetition
Type:	Sans-serif

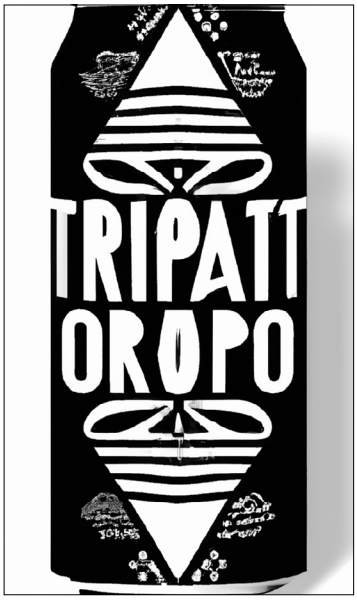
Figure 30: ***E10.1 Generative AI Labels***, DALL-E version 2, OpenAI, 2023.



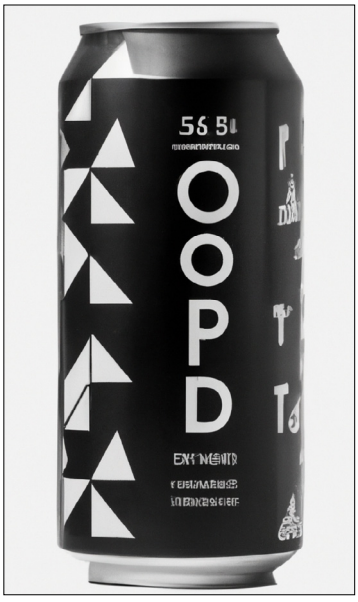
E10.2.1

E10.2.2

E10.2.3



E10.2.4



E10.2.5

E10.2 Prompt Parameters:

Shape:	Figurative
Colour:	Monochromatic
Form:	Rotated
Layout:	Repetition
Type:	Serif + Sans-serif

Figure 31: *E10.2 Generative AI Labels*, DALL-E version 2, OpenAI, 2023.

E10 Reflections

Strengths: This experiment produced novel and surprising results well outside of what I would have usually created. It was very efficient, taking a fraction of the time it took me to perform the same task. The use of a morphological chart created interesting combinations of prompts for Dall-E to follow. Sometimes, these prompts would be ignored by the system. However, this lack of control created novel and unexpected outcomes.

Weaknesses: The presence of creative play was almost non-existent, as most of the decisions had been outsourced to the external system. The outputs were difficult to control as the prompts were often ignored. I was the creator of the system, but the chart was randomly selecting the prompts, and the AI model was automating the output, drawing from a database of references from millions of other designers.

Creative Play Score:

Novelty	5/5
Enjoyment	2/5
Absorption	1/5
Improvisation	0/5
Total	8/20

Summary of generative experiments

Potential application in design practice

All of the systems explored in the experiments have potential for application in everyday design practice. Some are better suited to simple tasks whilst others are able to aid with much more complex design briefs.

Rules-Based Systems

Rules-based systems work well as exercises to free up the creative process and get the designer in a mode of creative play. For example, the system used in the Exquisite Characters experiment could be used as a collaborative exercise for design teams or in classrooms. They could also be incorporated as a minor element of a broader project. If a designer is stuck on specific form-based decisions, they can set up a system similar to the one used in the Chance Typography experiment and leave it to chance. However, the bespoke nature of these systems means they are not suited to broad application or dealing with complex design briefs.

Modular Systems

Working with modular systems can be very absorbing and have great potential for play. They are good for exploring graphic form as they provide clear constraints to work within. As demonstrated in the experiments, they can generate interesting and refined results. However, these systems' highly constrained nature with no element of chance means they do not produce divergent or varied outputs. They are more suited to use later in the convergent phase of the design process

Computational Systems

Computational systems are great for rapidly generating polished-looking outcomes. They are efficient at iterating and testing ideas and can perform technically complex tasks. In everyday design practice, they work well for executing specific design tasks with very little convergence required to produce the final output. However, this is also their weakness, as each system has to be created bespoke for the project and cannot be applied as a generic process. They also have a high barrier to entry, as to use them effectively, designers need to learn to use new tools and how to code.

Morphological Systems

Morphological Systems have great potential for broad use in everyday practice. They can be used in conjunction with a brief where the prompts are chosen at random, setting designers off on wildly different and divergent paths of exploration. They can be used to modify existing designs by randomly selecting singular prompts and then editing the design based on that prompt. They can also be applied without randomness, with designers selecting a set of constraints from the chart that they believe will best answer the problem. The disadvantage of using this type of system is its unpredictability when parameters are randomly chosen rather than selected. This means it is hard to integrate with a storytelling approach as the results can seem at odds with the concept or content. The potential number of combinations of the chart can also be problematic, as finding the most suitable combination can be very time-consuming.

Generative AI Systems

The process of using a morphological chart in conjunction with Generative AI is very good at producing divergent ideas quickly. It is useful in a situations requiring a diverse range of ideas under tight time-frames. If the parameters are purposefully selected based on specific criteria rather than at random, this allows for it to be tailored to a specific creative brief. However, if all creative control is outsourced to an AI system, there is little benefit for the design practitioner beyond pure efficiency. It is likely to have a negative impact on the development of a designer's divergent ideation skills and miss out on all of the benefits of creative play.

Generative Features	Play Characteristics	Creative Benefits
Structured Closed, controlled systems that have defined boundaries and constraints.	**Boundaried** (Huizinga) Play is confined to a specific space and time, creating a separate realm.	**Focused Creativity** Provides a structured set of constraints for focused creative exploration.
Systematic Operate within clearly defined parameters guides how entities are arranged and manipulated.	**Rule-ordered** (Huizinga) Play follows specific rules that determine what is allowed and what is not.	**Variety And Quantity** Encourages the systematic exploration of different combinations and solutions.
Non-Deterministic No predefined or correct output, only a series of variations.	**Non-Purposeful** (Huizinga) It is undertaken for its own sake, not for external goals.	**Creative Risk-Taking** Allows individuals to bypass personal judgement and try unconventional approaches.
Randomised Utilises chance to generate diverse and unpredictable outputs.	**Generator Of Novelty** (Bateson) Play often involves experimentation, improvisation, and trying out new things.	**Novel Outputs** Sparks new ideas and solutions by presenting unexpected combinations and outputs.

Figure 32: *Benefits Of Generative Systems For Creativity*, Image by author, 2023.

The experiments revealed that there are several ways that generative systems can benefit creative play [Fig. 32].

Structured = Focused Creativity

Generative systems are closed, rule-based systems that create defined boundaries and constraints for the designer to work within (Huizinga). These tight boundaries or constraints help aid focused creative exploration. Generative systems allow the designer to become a master of their own constraints rather than relying on an external brief that is often still very open. As generative designer Ken Frederick points out, "Design is a chess match of constraints; we as designers strategically use constraints to express visual ideas." (Frederick 118)

Systematic = Variety And Quantity

Using generative systems encourages the formalisation of all the problem elements into parameters. This process of systematisation sets out the rules of play before ideation begins and helps designers understand all possible permutations of the solution. The process of codifying makes the individual more aware that the design process itself is a decision-making process. Automating parts of the decision-making process and working within tight constraints enables faster iterations. Changing one rule or parameter can create a wide array of different results. This application of systematic methods forces the designer to use a lateral model of thinking rather than the traditional vertical one (Dacey et al. 177).

Non-Deterministic = Creative Risk-Taking

Generative systems can create a safe, low-pressure environment for creative exploration which works well for setting up the conditions for play. By their very nature, the systems do not have a preconceived singular outcome, only a series of variations. When outcomes are not preconceived, individuals feel more liberated to take risks and try unconventional approaches. This enables them to bypass any fear of failure and self-judgement and engage in creative play. The sense of being overwhelmed by the potential options evaporates.

Randomised = Novel Outputs

Most generative systems use chance through the incorporation of random generators, random selection or external interaction. This element of unpredictability can lead to unusual results and combinations that trigger inspiration and serendipitous discoveries. These randomised processes allow the designer to outsource parts of the decision-making process, creating unusual outputs that are outside of their usual patterns of practice. In the words of design theorist and architect Bryan Cantley, "Chance has a strong relationship with control, once the designer liberates part of his/her human control… design begins to follow new and stimulating directions, which are unexpected and thought-provoking." (Bianconi 278)

Conclusion

This project aimed to explore how generative systems could be utilised to enable creative play in order to enrich the divergent ideation phase of the visual design process. I utilised an autoethnographic approach to investigate the potential for generative systems to inject play back into the divergent ideation phase through a series of design experiments and reflecting on the process.

Both academic research, as well as anecdotal evidence from creative practitioners, highlighted the potential for creative play to make a productive contribution to the divergent ideation phase of the Double Diamond design framework. My research highlighted some commonly understood qualities of creative play, such as stimulation of the imagination to create novel ideas and positive well-being effects, as well as some less expected characteristics such as being rule-ordered and happening within fixed boundaries.

Although it had initially seemed contradictory to develop systems in order to facilitate creative play, my research suggested this would be a productive direction to explore. Informed by creative practitioners who utilise generative systems in their practice such as John Cage

and Karl Gerstner, I carried out a series of visual design experiments that explored rules-based, modular, morphological and AI, genereative systems.

Each experiment was analysed through criteria informed by key theoretical principles of play and a strengths, weaknesses and opportunities assessment. The experiments uncovered that there are productive correlations between the characteristics of generative systems and benefits for divergent ideation. Structure facilitated focused creativity, systematic processes facilitated variety and quantity, non-deterministic systems encouraged creative risk taking and randomisation produced novel outputs. Understanding these mechanisms of generative systems generally and how they can contribute to a state of creative play has enabled me to see my own creative process through a new lens.

These insights have enabled me to navigate the divergent ideation phase with more confidence. I now approach the ‘create phase’ as a process, rather than an outcome-oriented activity. It has shifted my thinking from a static print-based mindset of designing singular outputs to a flexible mindset of designing processes

and systems. It has also helped increase my ability to recognise the individual components of form as elements of play which have multiple possible combinations, rather than a singular correct answer. I have also learnt the value of relinquishing creative control to an external system of chance, as this results in more novel and interesting outputs.

The use of generative systems to enable creative play makes it an approach that has great potential for use in a commercial design setting. Some operate well as creative exercises (Rules-based systems), while some are effective at performing simple tasks within a broader brief (modular and computational systems), and others work well for more complex design problems (morphological and AI systems). I have begun to incorporate parts of these methods into my everyday practice however more development is needed to refine the techniques into practical tools.

There is unlikely to be a magic solution for generating novel ideas, however, this research has demonstrated such a solution could also eliminate what makes the creative process rewarding. This was highlighted

through the AI experiments. When human agency in the creative process is almost entirely removed, so is the opportunity for the joy of creative play or the satisfaction of creative problem-solving. It changes the role of the designer to one of observer and curator rather than creator. Yet I see potential for AI systems to augment and stimulate the design process and its inevitable presence in the industry. While it was out of scope for this project, this relationship between human control and AI agency in the creative process will be an important area of future research for the visual design industry.

This exploration has given me a new perspective on maintaining a sustainable and rewarding relationship with my creative process. I have learnt that I need to have a balanced design diet, where time and energy are given to both sides of the design diamond, divergence and convergence. Although I find it easy to lose myself in the converging process, I now have a variety of methods to help engage myself in divergent ideation and connect with creative play in a way that is both productive and rewarding.

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The visual design process can be exciting and challenging as designers strive to create innovative and impactful solutions. However, the challenge of producing original outputs within the time constraints of commercial context can lead to designers falling back on well-worn techniques, templated solutions, or imitating others' work. This fast-tracking of the divergent ideation phase of the design process reduces the possibility for experimentation and play, resulting in safe and expected outputs.

Research indicates that creative play has potential to enrich the creative process, improving divergent thinking and well-being. This project explores the potential of generative design systems to enable creative play through a series of visual design experiments using mixed methods inspired by practitioners in the generative art, music and design fields. Employing an auto-ethnographic perspective, these experiments are analysed through the lens of play theory and contextualised with insights drawn from a decade of experience working within the communication design industry.

This research demonstrates that generative systems can help enrich the divergent ideation phase through enabling creative play. Experiment results indicate that these systems can encourage; focused creativity, variety and quantity, creative risk-taking and novel outputs.