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MFA Thesis Written Component
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Summary

The artistic component of my thesis project is focused on exploring the relationship between drawing machines — in this case pen plotters — and the materials they work with: pen, ink and paper. I was intrigued and captivated by the mysterious and unexpected outcomes of my early plotter drawings. This led me to focus on these (seemly) random and idiosyncratic outcomes in order to investigate, understand and, potentially, utilise them further.

During the project, I attempted to both remove as much pre-determined visual signifiers (especially figurative) from the image making process and inputs from myself so that the symbiotic relationship between the materials could expressed with little interference or noise.

After many months of observation and research, the plotter drawing process was refined to scripted instructions which would allow for it to be repeatable and, therefore, comparable. The research was, therefore, not unlike a scientific experiment, with me in the role of the researcher and the drawings the (artistic) result. These drawings were exhibited at Kuvan Kevät 2022.

The written component opens up the thinking and decision-making processes over the course of the project, and compares and contrasts my practice with the work of other practitioners who have used similar tools but typically to differing ends.

In the first part of paper, I look at the origins of my interest in pen plotters and how this interest evolved into the thesis project. I also examine the history of pen plotters and their use in the visual arts, together with reflections on generative and conceptual art.

The second part of the paper deals with the practicalities and processes used during the execution of the artistic component combined with observations, thoughts and questions relating to the work undertaken.

Finally, the third section concerns the Kuvan Kevät exhibition, its installation and analysis of the final outcome.

The HP 7475A (1984) with 6 pen carousel in action.

Introduction

In this degree paper I will look at how my interest in pen plotters developed into my MFA thesis project, the origins of plotters and plotter-art, my position therein, and the evolution and execution of the work which was exhibited at Kuvan Kevät 2022.

Beginnings

My thesis project can be seen as the culmination of several years of working with drawing machines, more specifically, pen plotters. To "plot" is to draw a line between two points. A pen plotter is a machine that can be fitted with a drawing instrument (typically a pen) and instructed to plot — usually via computer. They come in various shapes and sizes and have different approaches both to their construction and to how they draw. Some move the drawing head (which holds the pen), others move the substrate whilst the head remains stationary; some are enclosed in a rigid metal frame, whilst others are free to roam.

Plotters were originally developed from the late 1950s onwards for primarily technical drawing applications such as maps, blueprints and CAD (computer-aided design). These were much faster, more precise and higher in definition than printers at the time.[1] Whilst the technology of pen plotters is now seen as outdated, and to have been superseded by the speed, quality and convenience of ink-jet and laser printers, there has been a growth of interest in plotters as a tool for artists, not least in the makers-community, where people are busy sharing ideas about not only what to do with plotters but how to build one's own. However, for detailed information about the origins and history of plotters, there is little in the way of traditional literature available, and much of the information I have used in this thesis is gleamed from the internet.[2]

As for the history of plotter art, there is even less information available. It is certain, however, that during the heyday of plotters (1970s and 80s), there wasn't such a concept as plotter art and artists that used plotters typically came from backgrounds in science or mathematics and were working with computer-generated images. Pioneers of work that used plotters include Charles Csuri, Manfred Mohr and Vera Molnár.[3] Charles Csuri's piece *Sine Curve Man* (1967) for example used IBM's then state-of-the-art computer 7094 (which used punch cards) connected to a Calcomp

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1   https://en.wikipedia.org/wiki/Plotter
2   Two sources in particular. Primarily, Martin Bircher, *Numerically Controlled Pen Plotters in Art* (University of Lapland, 2022), and, also, Sher Minn Chong, *History of Computer Art - Part 2: Plotters.* https://piratefsh.github.io/2019/01/07/computer-art-history-part-2.html#fn:1
3   Honor Beddard and Douglas Dodds, "Digital Pioneers", in *V&A Pattern Digital Pioneers* (London, V&A Publishing, 2009), 8

565 drum plotter to realise his self-portrait, which is claimed to be the first example of digital morphing.[4]

However, none of this was familiar to me when I purchased my first plotter in late 2019. As an artist and printmaker, I was intrigued by the possibilities of plotters prior to ever having tried or even seen one in real life. I sensed that plotting had some transgressive qualities which appealed to me; it produces a drawing that challenges our preconception of what a drawing can be and, also, what the process of drawing actually is. Drawing is seen as something fundamentally human, distinctive to homo-sapiens (if we ignore drawing bears and the like.) There is something mystical and primaeval about it as if it were a conduit for the mind or soul; an act that we have done and needed to do for millennia. Each act of drawing and the image that results is unique and unrepeatable, just like us. And yet, the plotter drawing can be replicated and endlessly repeated. It can seem like an affront to the concept of drawing, a trick or fraud: it is a heretical up-ending of the sacred act. To learn that a drawing has been made by a machine rather than by hand alters how we view it. No longer is it a window into the soul or essence of the artist but something else. Here is a drawing that has been produced without emotion and without effort. What effect does that have on our conception of drawing?

But whilst this redefining of drawing was the impetus for investigating plotters in the first place, as I worked with the plotter and materials (pen/ink/paper), I noticed something else happening too. Something was being revealed, or rather, revealing itself. A plotter drawing need not be just a realisation of pre-existing information (digital coordinates made physical). Once the plotter is in motion and starts to draw, the qualities of the materials with which it works and interacts exert an influence on the final outcome — one that can be even profound, if encouraged. A crisp, precise digital line, when drawn by a plotter, ceases to be crisp and precise. Ink bleeds. Paper has texture and imperfections. Nibs become dulled or blocked. Even using the most exact tools will result — on close inspection — in a line that has variation, fluctuation and, from perhaps a certain perspective, flaws. This is the material talking.
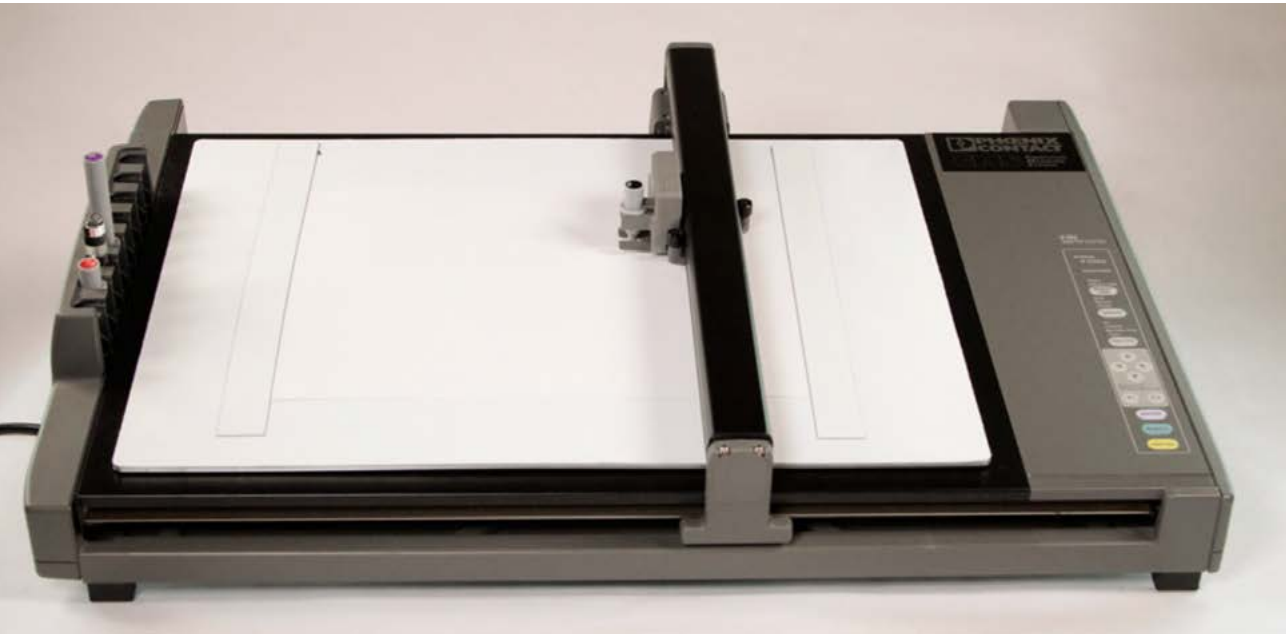

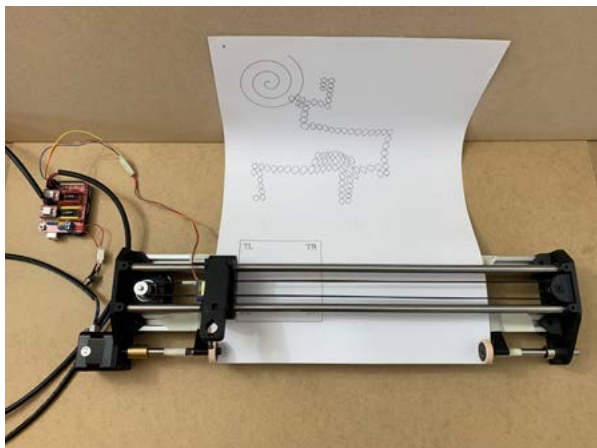4 https://www.charlescsuri.com/historic/sine-curve-man
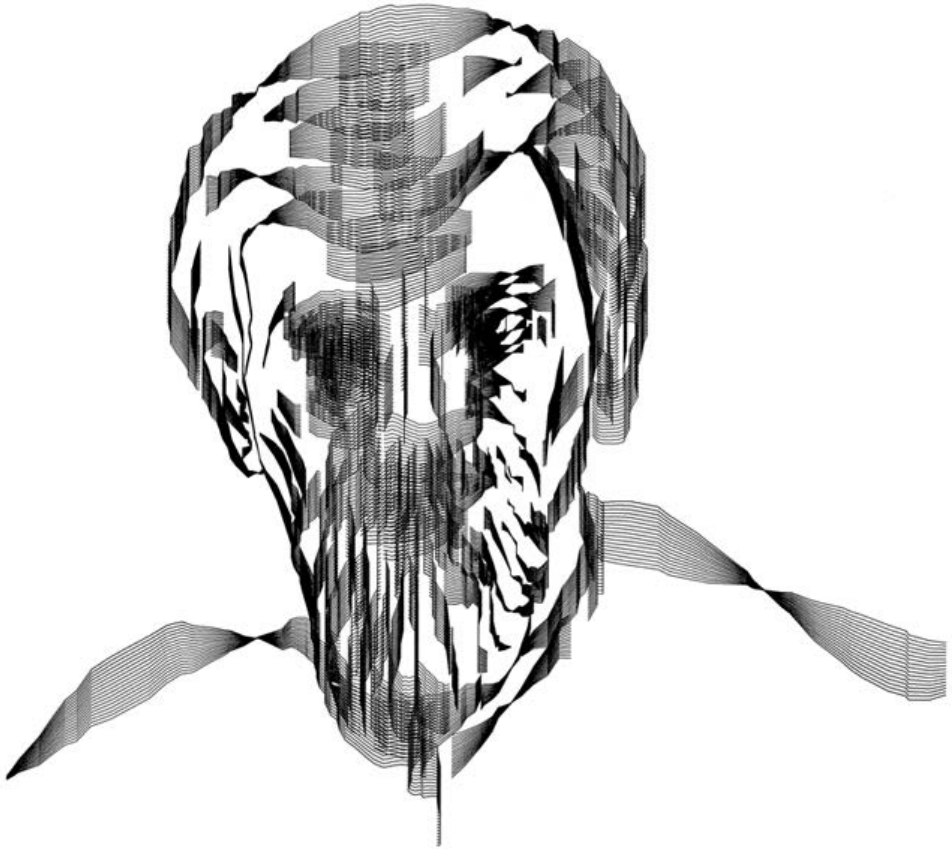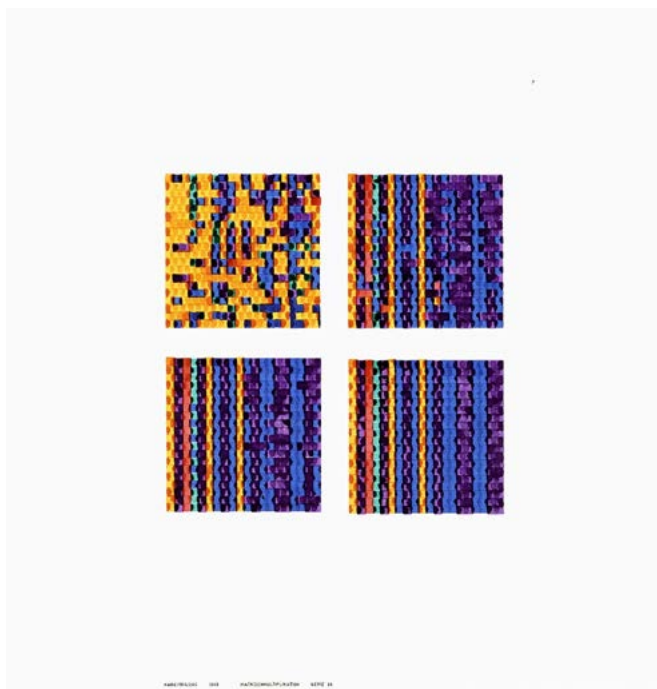
Cine Curve Man (1967) by Charles Csuri

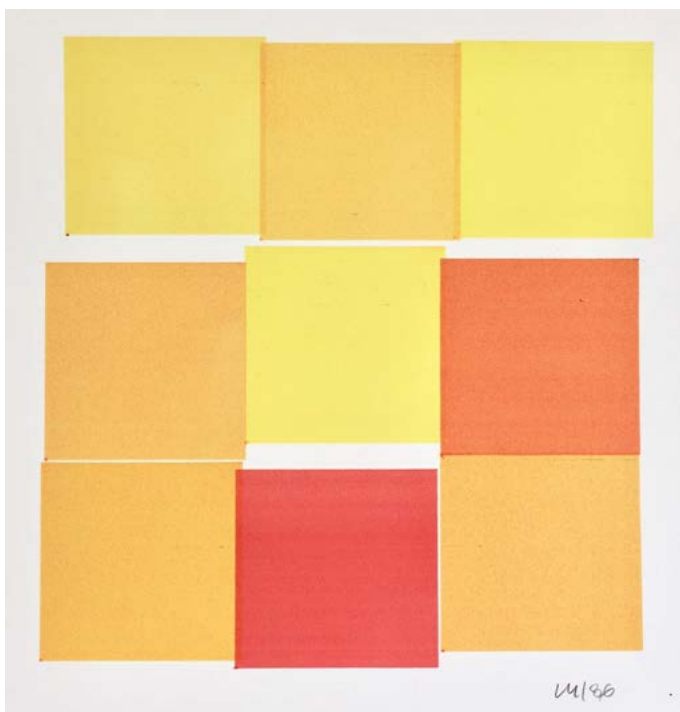*Calcomp 565* Drum Plotter (1959)

Mutoh IP-220 flatbed plotter (c.1993)

A contemporary DIY plotter

Matrix Multiplication Series 36 (1968) by Frieder Nake

9 Carrés (1986) by Vera Molnár

In a sense, my initial interest shifted away from the plotter to the materials that it can work with. This makes me something of an outlier, as most plotter-art practitioners are either using them as hard copy devices to output their vector-drawn artworks, or they are coming from a coding angle and the plotter is used for drawing the results of (typically) an algorithm.[5] In other words, for most artists, the plotter is a vehicle for realising the work in tangible form rather than a crucial component in the process. My approach is different. The works that my process produces do not pre-exist in any form; they are born in the moment of production, where a symbiotic relationship between the materials causes the image produced to take on a unique and particular form. I'm focused on the exact moment that the pen comes into contact with the paper and ink flows from the pen onto the paper surface, and of the journey that the pen makes over that surface and the traces it leaves behind. The resultant artwork is a document of that journey.

When I first started using a plotter, I, too, was attempting to render and reproduce works that had a pre-existing form as vector art. These were figurative works which I was attempting to replicate as editions with the plotter. As I worked on these editions with felt-tip pens and paper, I came across the same issues time and time again, namely that the materials were want to do their own thing; pens would suddenly run dry mid-drawing, nibs would become buckled and flared, the paper would warp and curl, which in turn would influence the application of ink causing variations in my precious editions. The larger the drawing or plotted area, the greater the chance of something unexpected happening. One never knew when a pen might run out or the ink would bleed more than wanted. Initially, these things were a source of frustration, but gradually they began to hold my attention; I became interested in what was happening on this physical/material level. I started to wonder if this might not be more interesting than my drawings. Bit by bit, I began removing the elements from the source images, eventually stripping figurative elements away entirely so that the qualities of the materials might become more apparent. And I set the plotter in motion and observed. And observed. And observed some more.

5   For typical examples of contemporary plotter art refer to the Instagram account "penplotart": https://www.instagram.com/penplotart/?hl=fi

And through this, I was able to make various "observations" of my own; about the plotter, the materials used and their interdependence. Here are some of them:

- The plotter is a machine.
- The plotter is a machine capable of drawing with a speed and exactitude/precision which alludes the human hand. A human can draw at speed or with exactitude, but not simultaneously.
- Drawing at speed allows certain things to happen which can't happen when drawing more slowly.
- Drawing with precision allows certain things to happen which can't happen when drawing without it.
- Although the plotter is a machine, and is capable of exactitude, it is not devoid of personality; the mechanics of the plotter impart their own flavour to the image being produced.
- The plotter is a tool. It doesn't work independently. It does what it's told — by and large.
- A plotted image is a hybrid. What starts out in the digital realm is "plotted" onto a surface and translated into a 2D analogue image. During this process a transformation occurs.
- Depending on the materials used (and the set-up), this transformation can be to a greater or lesser extent i.e., the plotted image may, by degrees, resemble or differ from the source image/file.
- Each plotted image is an "original" although it may closely resemble another plotted image produced from the same file.
- Plotting can be considered printmaking.[6] Jennifer L. Roberts in her Mellon Lecture series Contact: Art and the Pull of the Print,[7] talks about four elements of printmaking 1. Matrix - the object that bears the image to be transferred (the plate/screen). One could argue that the digital file that the plotter uses is the matrix 2. Support - the surface that receives the image 3. The Substance transferred between matrix and support — typically ink. At a stretch, yes, with pen plotters too, though there is no direct contact between the matrix and the support. 4. Pressure. Without pressure the pen would not leave a trace during plotting. Moreover, one can use the plotter for making a series of (near) identical works, so it can have a reproductive function just like printmaking.
- Plotting cannot be considered printmaking. Firstly, printmaking is somewhat hidebound and as pen plotters are not traditional printmaking then ergo it isn't printmaking. Pen plotting also deviates from traditional printmaking in a variety of ways, not least that the image isn't printed in a matter of seconds (such as when it passes through the press) but is drawn anew each time. A plot may take therefore

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6   I mean this in the traditional rather than the expanded printmaking sense, though clearly, it is printmaking in that sense too.
7   Jennifer L. Roberts, "Contact: Art and the Pull of the Print" (A. W. Mellon Lectures, 2021), https://www.nga.gov/research/casva/meetings/mellon-lectures-in-the-fine-arts/roberts-2021.html

minutes or even hours. One could also question whether the file is a matrix. In traditional forms of printmaking, the matrix is inked up and then comes into contact with the support or substrate.

- Plotting happens in real-time.
- It is possible to observe the image come into being as the plot takes place. This contrasts with other printmaking techniques where the image is hidden — in the press, under a silk screen — during the moment of creation.
- The plotter can be fitted with various drawing tools (e.g. pen, pencil, brush). This can allow for multiple versions based on the same source.
- The pen plotter holder for the drawing tool can lift but not push down. When in the down-position, the drawing tool rests on the drawing surface by its own weight. This means that tools that require a degree of pressure in order to leave a mark (e.g. coloured pencils) leave only a faint one. Drawing tools that leave a stronger mark, regardless of pressure applied (markers and felt-tip pens in particular,) are less affected by this quality.
- The ink from a pen is transferred from the tip or nib when it comes into contact with a surface. If the surface is absorbent (e.g. paper) more ink will be transferred than if the surface is non-absorbent.
- The longer a pen nib is in contact with an absorbent surface, the more ink will be transferred. The shorter the time, the less ink is transferred. Under these conditions, a slow plot will lead to a different result than a fast plot, even if the source image is the same. The process of the ink transferring from the saturated nib to the absorbent paper is called capillary action.
- Felt-tip pens by different manufacturers have different qualities e.g. some deposit more ink than others.
- No two felt-tip pens are alike. Even two brand-new, identical-seeming pens will behave differently. The difference might be in the subtle variations in the nib (resulting in a different mark being made) or how quickly the pen runs out of ink or other.
- Cheaper pens are as legitimate a tool as professional-grade pens, though they might run out quicker.
- The inks in felt-tip pens are transparent or semi-transparent. They can be combined (overlaid) to create new colours and hues.
- Inks in felt-tip pens are typically made with dyes and not pigments. Their lightfastness is poor.[8]
- The basic building blocks for image-creation with a pen and plotter set-up are either dots or lines.
- In order to fill an area with ink (to create an impression of solid colour), one must fill the area with closely spaced dots or lines (hatching).

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8   Francesca Caterina Izzo, Valentina Vitale, Chiara Fabbro, and Henk Van Keulen, "Multi-analytical investigation on felt-tip pen inks: Formulation and preliminary photo-degradation study." *Microchemical Journal* 124 (2016), 919–928.

- The larger the plotted area, the more likely that the ink will run out, the nib will dull and/or something unexpected will happen.
- Ink doesn't run out in a smooth way, gradually getting fainter and fainter, but, rather, rapidly drops off.
- The substrate plays a significant role in the outcome of the plot. Thin paper will buckle (due to the water in the ink) which in turn causes the ink to be laid down in a patchy formation. This is more visible in solid areas of colour than in lines. Heavy-weight paper buckles less.
- Highly absorbent paper is "thirsty" and will suck the pen dry quicker than less absorbent paper.
- Identical-seeming paper doesn't perform identically e.g. buckling does not occur in a uniform way. Whether this is a result of the paper or ink or other factors (humidity, temperature) or all of them is uncertain.
- Paper has a saturation point at which it cannot take on any more ink (fluid) and starts to tear/break up. This is true of cheap copy paper and of high-quality artist papers.
- Anything under the paper, especially if the paper is thin, will influence the amount of ink deposited — even a grain of sand can be visible as a small, darkened area on the inked paper surface. This is more pronounced when the ink is running out.
- Flat surfaces aren't necessarily flat. Even a seemingly-flat surface such as a tabletop or sheet of glass has slight unevenness which can result in a non-uniform deposit of ink.
- The scale of a plot and the speed with which it is plotted result in a plot of a certain duration. The larger the plot, the longer the plot time. The quicker the plotter moves the pen, the shorter the plot time.
- Time can be "seen" in the final plotted image, albeit through visual metaphors such as a greater or lesser deposit of ink, or through the process of the ink running out.
- The plotting process is akin to a performance with a script or score. Despite always using the same "score" there will always be variations in the performance or outcome.[9]
- The plotter is not physically present in the final outcome of the plot, just the ink and paper.
- When something "new" or unexpected appears in the plotted image, which is not present in the digital file, it is a result of the interaction between the plotter, ink and paper.
- These images are akin to monoprints - the matrix is the digital file and the plotted drawing the unique outcome.[10]

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9   I'm indebted to Noora Lehtovuori for this observation.
10   I'm indebted to Laura Vainikka for this observation.

Not all these observations, obvious though they seem, are a given. Only by pairing back the process, removing extraneous "noise" — so that the process itself shines through — were they noticeable. And with noticing these phenomena, I wished to encourage them further by reducing everything in the process to a bare minimum so that result wouldn't be "distorted" by visual devices or figurative elements. It would be fair to say that I was aiming for some kind of purity, if that were even possible with this hybrid form.

This reduced process can be pictured as a triad with the plotter on one side, pen & ink on another and paper on the third. To this, one can add other factors such as myself and physical phenomena which can subtly or otherwise influence the outcome of the process (and which are constantly running in the background), such as absorption, speed, acceleration, friction and humidity.
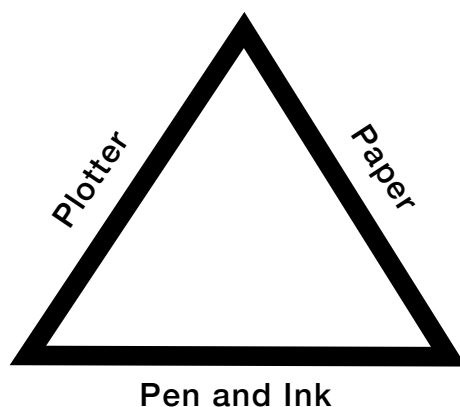
Works produced using this process can be skewed to one or more elements in the triad, seeming to speak say more of the paper and ink than plotter, but it is not possible to remove an element; this would result in nothing being produced.

And why I should find all this so interesting? I think the answer primarily lies with my interest in the idiosyncrasies and vulnerabilities of materials: paper buckles and warps, ink runs out and pen tips dull; even the properties of the machine are exposed and highlighted. And, combining a machine with fallible physical materials results in a curious hybrid of machine-rigour and analogue idiosyncrasies, and only through the utilisation of this robot arm can these idiosyncrasies be revealed. In essence, it was the by-product or "surplus" occurrences of working with a plotter — those which might typically be considered unintended or "mistakes" — that were holding my interest.

Focus and formulation

At this juncture, I still hadn't explicitly formulated my thesis project. The above observations were just the raw material that I had to work with, and my ideas were somewhat nebulous. But I could feel a pull in a certain direction. It was apparent that much of the phenomena that I found interesting occurred when plotting areas of "solid colour"; in other words, areas filled with closely-hatched lines which give an illusion of solid colour. So, in order to focus on this, I created a simple vector file of a rectangle filled with horizontal parallel lines. This was fortuitous because, by making this vector file, I'd inadvertently created a kind of "blank-image template"; I'd endeavoured to remove as much visual information as possible whilst still allowing for a semblance of an image to remain, one that if plotted in "optimal conditions" would result in a rectangle of solid colour. On reflection, it seemed to me that a rectangle is something of a blank slate , a form which has little or even no content at all and, therefore, can be regarded as almost invisible or at least, devoid of meaning.[11] Any other shape would immediately imply intent on my behalf. The rectangle was, therefore, an ideal form for my project, as I wished for the "content" of any given image to be created through the interaction of materials — the process — rather than something pre-determined.

It should also be noted that at this stage I was using a commercially available plotter which had a maximum plot-area of A4. It was, therefore, abundantly clear to me that I'd need to scale up the size of the plotted images. This was not only to give me more freedom with regard to the size of the works produced, but also because much of the phenomena I wished to investigate required either time or distance (length) in for it to reveal itself fully. For example, in the order for a pen's ink to run out, a large plot area is required.

After a little bit of research, it became evident that my only recourse was to build my own large-format plotter. Fortunately, this wasn't too big an undertaking, and whilst pen plotters are decidedly "niche," there is still plenty of help out there for making one's own.[12] As this part of the project doesn't concern the artistic component, I won't go into technical detail or recount my travails whilst making the machine. Suffice to say, I worked on it over a period of a couple of months whilst simultaneously using my A4 plotter for tests and idea generation. The plotter

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11 This, I admit, isn't strictly true; Suzanne Hudson talks about how the artist Robert Ryman chose the square as his preferred format because the rectangle was too culturally loaded: "The rectangle for him had a history; had a way that you read narrative into abstraction…" Suzanne Hudson, "Agnes Martin" (Teams presentation, Rethinking the Landscape, University of Arts, Helsinki, Autumn 2021.)
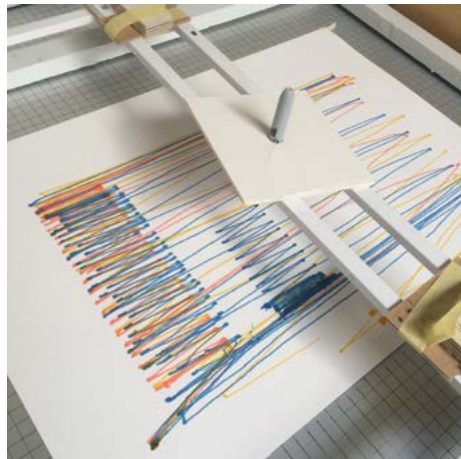12 Actually, my first two attempts at building a plotter were unsuccessful. I'd taken a too challenging D.I.Y. route.
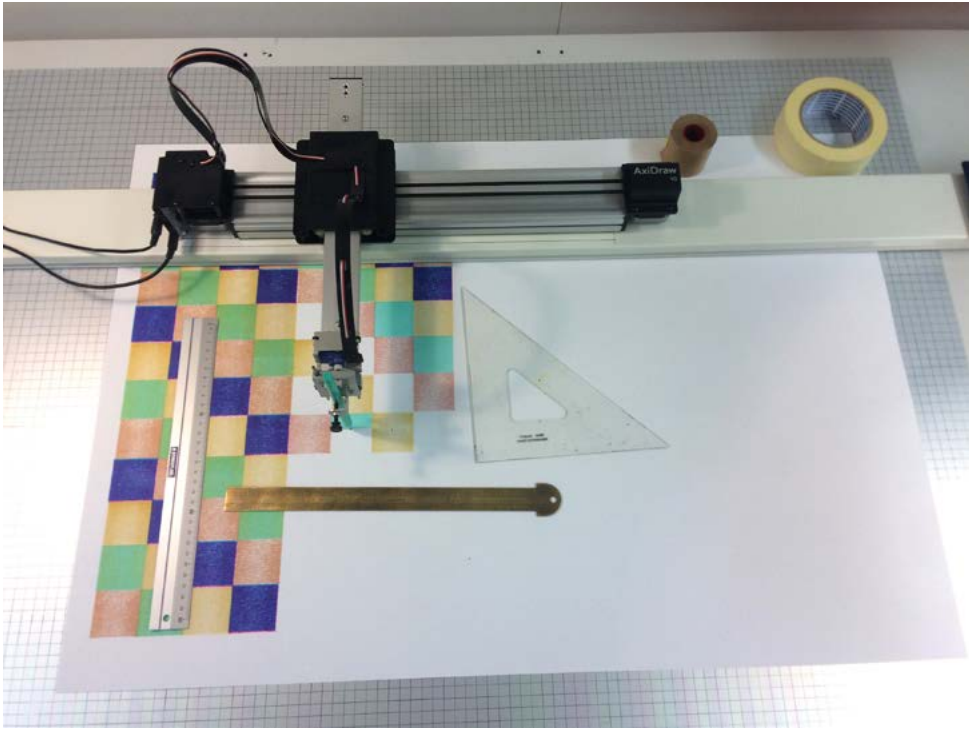
Early colour experiments with the AxiDraw. Plotting larger than A4 involved tiling.
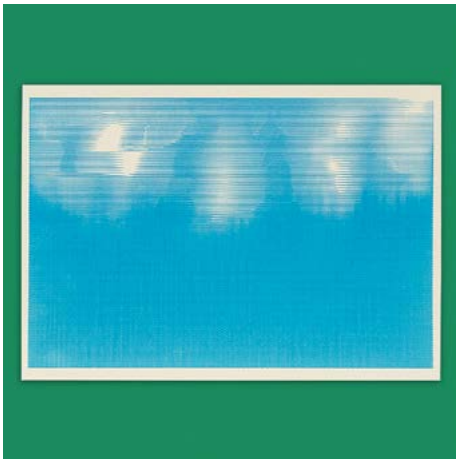
Early test using a rectangle of plotted horizontal lines. Ink on paper, 20 x 30cm. Spring 2021.

D.I.Y. plotter Mk1. This prototype shook itself to pieces after just two plots and was adandoned.

I ended up making used an OpenBuilds[13] design intended for a laser cutting head which required just a few tweaks and additions to make it suitable for pen plotting. The advantage of using this (apart from the robustness of the design) was that it had pre-prepared software for communicating with the plotter, which side-stepped the issue of having to get my head around tricky coding or spending time troubleshooting issues. The pen plotter once completed had outside dimensions of 100 x 150 cm and was capable of plotting an area of approximately 75 x 125 cm.

By the time I got the new plotter up and running, I had already formulated my thesis project which was to explore

> the relationship between drawing machines and the materials that they work with. Using a pen plotter, I will make images whose starting point is a simple rectangle which the plotter is instructed to fill with parallel lines. Under optimal conditions, this would result in a filled rectangular form. However, with subtle adjustments and a willingness to allow the materials to exert an influence over the process, a totally different result can be obtained; something which is amorphous and evocative, suggesting natural forms such as skies and landscapes. By encouraging the process to unfold and "just happen", images appear which are at odds with their means of creation. No longer do we have precise lines and clear forms rendered with ink on paper but rather something other. Something unexpected.

As I hadn't actually been able to plot on a larger scale, this proposal was somewhat hypothetical, and I was yet to find out if the process could be translated to a larger format.

With the large-scale plotter finished and starting to work, I realised that it was a different beast to the one I had been previously working with. That one I knew intimately, having been using it for two years. But this one was different, like an articulated lorry to the A4-plotter's nippy Fiat Uno. It was big and cumbersome, and I didn't have an intuitive feel for it. This eventually worked in the project's favour, as it meant that the small interventions and fine-tuning that I had been using with the smaller plotter had to be abandoned and I was left with something much purer, with much less outside interference.

But what was it exactly? It took me some time to drill down and get to the essence of the process. My first efforts with the new plotter were somewhat scattershot and haphazard: I'd fit the plotter with a pen, set it off on its journey and observe the results. I'd then fit a different pen and repeat the process, building up layers and complexity. With this approach, those classic conundrums of art making — such

13   https://openbuilds.com/builds/openbuilds-acro-system.5416/

as when to stop and/or when a work is finished — came into view. It felt that the onus was on me and that was problematic as I'd hoped to remove myself as much as possible. By involving myself too much in the process, the images were difficult to "read" (pages 23, 24-25.) Upon noticing this, I realised that I should simplify the process and that it needed to be scripted in a way that would preclude the problems mentioned above. The approach of conceptual artists, in particular, Sol LeWitt's and his wall drawing instructions, offered me a road out of this cul-de-sac and suggested how I might free myself from these decisions.

Simplifying the process had the additional advantage of making it more easily repeatable. The previous work I had made with the plotter, with my frequent fiddling and adjustments, would have been challenging, if not impossible, to replicate. But replication began to feel crucial to the project. By placing two images (which have been produced in the exact same way) side-by-side, one is able to see the influence of the process more clearly, essentially through a comparison of the similarities and differences. The images, therefore, become "readable."
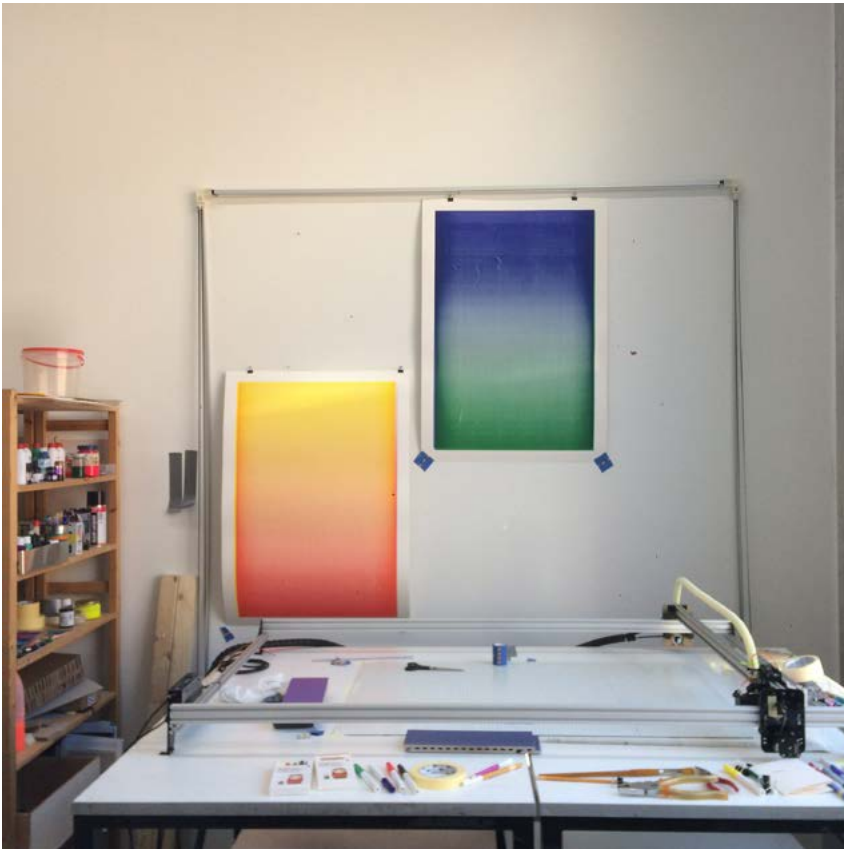
Studio view with completed OpenBuilds plotter.

Plotter drawing (*Holding My Breath*).

Plotter drawing (*Porpoise Sky*).

During my ongoing project work, the issue of how and what to show or reveal in the *Kuvan Kevät* exhibition became a topic of conversation during studio visits and with peers. Considering that I might work with this process for many years, this issue is not just a mere afterthought. Many people were strongly of the opinion that the plotter should be included in the exhibition either as simply a static object or in action, both of which had their pluses, but about which I felt conflicted. Firstly, there were my fears regarding the plotter's novelty factor. Despite it being "old technology," for many, the plotter would be a curiosity and one which, if present in the space, could well become the main focus of attention and distract from the artwork. I'm all too aware of how hardware can become fetishised, and that possibility was unappealing to me. I also wasn't sure how much the presence of the plotter would open up the process unless it were actually in action.

The idea of the plotter creating work in situ was, therefore, logical, especially as it really would show the process in real-time. For a while, I considered this. However, on reflection, this too felt unworkable. A plot may take just a few minutes to run its course, after which the pen may have to be changed or paper swapped over. It would need constant supervision. My project hadn't been planned as a performative piece, and it seemed to me that such an approach would involve re-thinking the project from the ground up, something I neither could nor wanted to do.

More broadly, I also started to question the reason for showing the plotter. This seemed to relate clearly to its novelty factor. If this were not the case, then should not the printmaker also exhibit the printing press, the video artist the camera or the painter their paints and brushes? Perhaps they could, but it is not deemed necessary for the work to be appreciated. The argument was put forward that my process is less familiar, but I suspect that people know next to nothing about, for instance, lithography either and that it is simply the term "lithography" which seems familiar, and, therefore, demands no further explanation.

There was also my fear that the novelty factor of the plotter would not only distract from the artwork but would also posit the machine at the centre of the process, effectively side-lining the other elements. At the risk of sounding in denial (having spent already some time discussing the ins and outs of the plotter,) I need to stress that this project is not about the plotter but about the plotting process and, therefore, the materials that it is very good at working with: ink and paper. I think that it is only fitting that when confronted with the artworks, the ink and paper are present, whilst the presence of the plotter, whilst certainly there, needs to be deciphered. And in order to decipher there must be a cipher, which is the works themselves.

I was happy with this decision, therefore, to omit the plotter. If desired, one could attempt to unpick the process by which the images had been created; there is, after

all, a breadcrumb trail. But I'd like to think that these images can work on another level too which is free of the anchorage of the process so that they can go in any direction that the viewer takes.

One last word about "process;" in discussion with lecturer James Prevett, it was posited that all art is "process-based." I think that this is essentially true. There is no less process in the doggedly traditional art of, say, still-life or self-portraiture than in my work. Process is process and cannot be quantified. A process may be simple or complicated but there cannot be more process. In my work, however, process plays a greater role in the outcome than I do (which I have tried to reduce.) In other words, the ratio of inputs is different. Therefore, it is still useful to talk about "process-based" art as a shorthand for work where process plays a larger role and other agents are reduced or removed.

Back at the studio, I started to conceive of a series of works in which the process would be strictly scripted: the materials, the order of execution and my role should all be pre-determined. Having by now made comprehensive tests, I chose to use acrylic pens from the chain store Flying Tiger (green and blue) and smooth Keaykolour 300gsm paper. The smoothness of the paper was a deliberate choice since heavily textured paper has quite a domineering influence on the outcome when working with these tools, which I felt was undesirable.

The pens, meanwhile, whilst cheap and (from an archival perspective) probably poor quality, had the advantage of a good flow rate and didn't need recharging[14] like some of the high-end pens I had tried. This enabled me to plot the entire area of the paper (100 x 70cm) without having to pause the plotter. Any break in the plotting process not only changes the process by adding an extra layer of complexity but also causes various physical changes to occur which are typically visible in the outcome. For instance, a pause will allow the paper, moistened by the pen ink, to dry (even a little), which would mean that it behaves differently. It was my wish that the work would be a record or document of an uninterrupted journey of the pen from one end of the paper to the other. As for the colour choice, this was a simple case of practicality and personal preference; the pens come in a pack of five colours — black, yellow, red, blue and green. The yellow was too pale, the red not to my taste and the black too dominating. This left me with blue and green. And what of my role? My duty was to watch.

The stages of the process were as follows. Firstly, remove a brand-new green pen from the packet, mount it in the plotter and set the plotter running so that horizontal, parallel lines are drawn back and forth from the bottom of the paper to the top. Once the plot has finished, the paper is rotated 180 degrees, a brand-new

14   Depressing the nib of the pen so that ink once again begins to flow.

blue pen is fitted in the plotter, and it is once again set in motion. This process was to be repeated eight times to produce eight 100 x 70cm plotted drawings.

Watching the first plot, I notice that initially the ink deposited by the pen is thick and even. However, after a short while, there is a noticeable change; the ink becomes slightly fainter, and artefacts are beginning to appear. As the plot unfolds, what at first seemed to be random areas of lighter ink begin to take on the form of quivering lines. There is something elemental about them, like the tributaries of a river or maybe forked lightning. They seem to speak of physical forces, which, in fact, is how they have been formed: as the paper buckles and shifts slightly — due to the moisture in the ink — the deposit from the pen becomes uneven. But not in an arbitrary way. Rather it reveals the structural change to the paper in the form of a trace, a trace which remains even once the paper has settled and straightened again.

As the plotter continues to plot its way across the paper there is a steep drop-off of ink intensity at about a quarter of the way up the paper. After that, the ink becomes fainter and uneven. As I repeat the process again and again the results are superficially the same but subtly different. Sometimes the ink runs out sooner, sometimes later. The markings appear in different places though always at the same moment —when the ink has begun to run out but before it is too dry to have a physical impact on the paper anymore; this is the "sweet spot" for this phenomenon to be revealed to us.

As I watch the results of the plotting process unfurl, I ponder on the conception of these pieces: am I the author or is the process? I have made an effort to reduce my input, to withdraw myself, and for the process to do the talking. But I'm still involved in a myriad of ways, not least in conceiving of and developing the process in the first place. Maybe this is what I have been unconsciously aiming for anyway, some kind of hybrid of myself and the process. But what of the other actors, such as the manufacturer of the plotter or the software it uses?

Martin Bircher, when discussing Generative art, argues that an artist who creates an algorithm can at the least be considered the co-author of a generative artwork and goes on to recount that the artist Frieder Nake signed his early works with NAKE/ER56/Z64 "giving credit to the computer system Standard Elektrik Lorenz ER 56, which was calculating his algorithm and the Zuse Graphomat Z64, which was drawing its output."[15]   Bircher goes on to say that "it has to be noted that all computer-based art builds on the work of skilled individuals responsible for developing all the utilised hard- and software."[16] This is undeniably true. However, the need to stress this point has, I feel, something to do with computer-based art's

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15   Bircher, *Numerically Controlled Pen Plotters in Art*, 37
16   Bircher, *Numerically Controlled Pen Plotters in Art*, 37

novelty factor rather than it being an exception. All artists are using tools and materials that have been created either by nature or by humankind, and which lend the works distinctive features beyond the authorial voice of the artist.

I'm fine with being the co-author but would have been equally happy to have removed myself entirely. But might that have even been possible? Possibly. I could have, for example, outsourced decisions to an algorithm. However, there seemed little point in doing so, because, as I have mentioned earlier, it is the plotting process that is my focus and the interaction between materials. I don't think there would have been, therefore, any practical or conceptual benefit in automating the entire process from beginning to end. In fact, I believe the project benefits from my input and the clarity that my decisions can give to the outcomes. Despite the significant input that I contribute to the artworks, they can still be considered Generative art, in that an autonomous system — the process — "independently determine[s] features of an artwork that would otherwise require decisions made directly by the artist."[17]

Returning to Sol LeWitt, in his 1967 article for Artforum, he refers to the art that he is involved in as "conceptual art" with a small 'c':

> When an artist uses a conceptual form of art, it means that all of the planning and decisions are made beforehand and the execution is a perfunctory affair. The idea becomes a machine that makes the art. This kind of art is not theoretical or illustrative of theories; it is intuitive, it is involved with all types of mental processes and it is purposeless. It is usually free from the dependence on the skill of the artist as a craftsman.[18]

It seems to me that this is also the kind of conceptual art that I am practising, one in which the machine "idea" is realised by an actual machine.

But what of the appearance of the artworks, how do they look? I have already mentioned that my approach is somewhat different to others working with plotters, so it should come as no surprise that the work doesn't closely resemble plotter art with its emphasis on clean lines, smooth curves and geometrical forms. The 8 plotted drawings that constitute Shift — which was the centrepiece of my exhibition — bear a superficial resemblance to Color Field painting (dare I even mention the name Rothko?) with their large areas of colour. However, apart from the marked contrast in how the plotter drawings are produced (and the intent behind it), there is also, on closer inspection, a presence of gesture in the works; an unbroken line that goes back and forth across the surface of the paper. However, the expressive qualities of the works (those quivering lines) are paradoxical as they are not produced by a

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17   https://en.wikipedia.org/wiki/Generative_art
18   Sol LeWitt, 'Paragraphs on Conceptual Art' (*Artforum 5*, no. 10, 1967) 79–83, quoted in Christian Berger, *Conceptualism and Materiality* (Boston, Leiden, 2019) 25.

single gesture (as would traditionally be the case) but rather through the symbiotic relationship between the ink and the paper, leaving a mark each time the pen has travelled across the surface. This is one of the things which appeals to me about this approach, in that the appearance of the work and their means of production are at odds, contradictory, and fool the eye.

Installation and exhibition

Moving on to the Kuvan Kevät exhibition, there were many decisions and changes made which influenced the final outcome of the show. I rarely have a fixed idea of what and how I want to show. This is perhaps partly due to my personality and partly due to my approaches which preclude, to a degree, grand statements or visions. I had the 8 works which comprised Shift, but at this stage I wasn't sure how to exhibit them. The only solution for me was to get them up on the wall and see. And not any old wall, but the actual wall, surrounded by the other works in the same space (Valkoinen Studio). So, I had no other recourse but to wait until everyone else had installed their works before I made any serious attempt to hang mine.

Regarding installation, I use the same method as I had used in my previous exhibition in Project Room, which was using nails/screws with neodymium magnets.[19] The artwork is hung by sandwiching the paper between the screwhead and magnet. By leaving a centimetre or so of the screw protruding from the surface of the wall results in the artworks floating above the surface, which both creates a drop shadow — which frames the work and separates it from the surrounding wall — and, also, emphasises the materiality of the paper. Seeing as paper, and its behaviour, are central to the process, it seemed appropriate that I should utilise this method rather than having the works framed (which would be more customary.)

I had in mind that I might show some other works but as Shift was clearly going to be the central piece, I started with that. I already had a display format in mind: a grid of 2 x 4, with the top row of drawings being arranged with the green at the top and blue at the bottom, and the top row with blue at the top and green at the bottom. However, on seeing this in situ, the result appeared too static and lifeless. I, therefore, decided to shift the second and fourth columns so that the colours were inverted, resulting in a piece that was more dynamic and rhythmic. Via this process the work also obtained its name. But it needed something else; not only did the wall feel incomplete, but it, also, seemed to me to be a pity that wild and variable results of the plotter work should be reduced to just one artwork. I needed to expand the scope of the exhibition, and to, also, welcome the randomness that my process had achieved. It should be noted that by this stage, I was now envisaging something akin to an installation which would be made of individual works.

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19   The original idea for this came from a discussion with lecturer Tatu Tuominen.
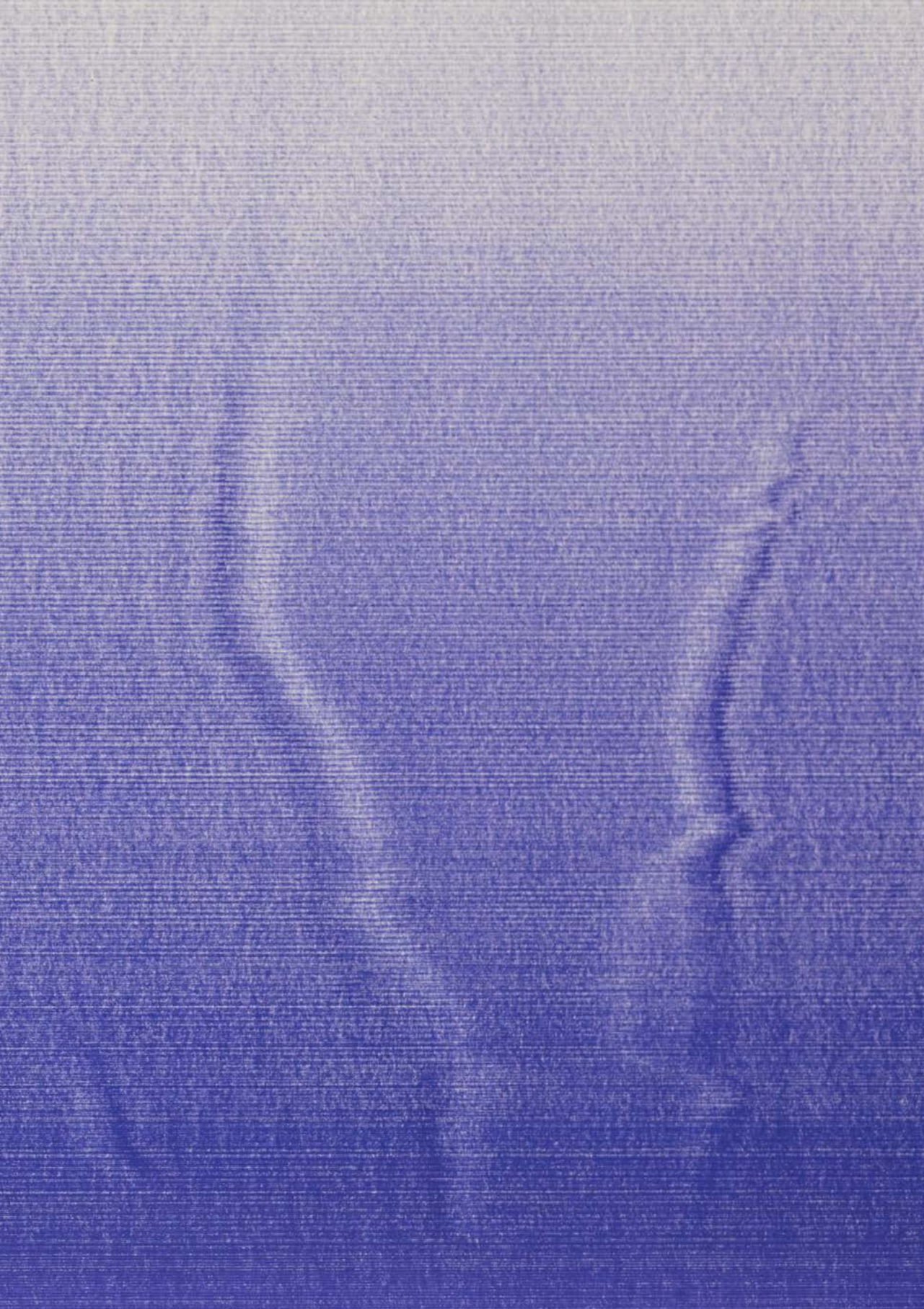
Over a few days, I experimented with various solutions to this issue.[20] I had countless options but needed to see how they could fit together and what they would say. One of the pieces I decided to include was from my previous exhibition. *Revered and Dreaded Scene* is a small piece measuring 17.7 x 29.4cm (pages 36-37). It is quite representative of the work produced with the AxiDraw plotter during a phase when I was playing with suggestions of landscape through format and nomenclature. However, in essence, it is produced in the same way as Shift, that is with a series of plotted horizontal parallel lines. And as with that work, its outcome is dictated by the materials with which it is produced. The paper onto which this drawing is made is small and thin and, when subjected to the water-based ink of fibre-tipped pens, wishes to shift and move. This is what we see mapped out in front of us. With every pass of the plotter-controlled pen, the paper has transformed. And as each pass is swift — about 2 minutes — it is possible on the following pass to capture these changes before they disappear and to record them onto paper.

I liked the juxtaposition of this small, mysterious, evocative work next to the formal simplicity and scale of *Shift*. When two works are side by side a dialogue occurs, in this case, something akin to a narrative. There was an interesting change in scale: the diminutive landscape with the dominating simplicity of *Shift*.

To these two was then added a third piece which was created with the larger plotter before I'd formalised the scripted process. If *Revered and Dreaded Scene* was the landscape, then *Pass/Over* (pages 38-39) appears to be a glimpse into the microscopic level — the invisible made manifest. There are strong suggestions of natural forms and phenomena, and there is, also, a sensation of depth and movement: the dark blue forms appear to be suspended in motion, caught mid-dance. This seemed to be an ideal companion to the other two.

But I had one more work in mind, which I thought could complete the installation. I had noticed during my research that where I had handled the paper it repelled ink when plotting; the oils in one's skin acted as a resist. I wondered whether it might be possible to make a portrait of myself in this way, and one morning casually squashed my face against the surface of some paper and then plotted it (with my usual rectangle of parallel lines.) I was absolutely astonished to see my profile appear as the plot unfolded, with a level of detail I couldn't have imagined; even my stubble was visible (page 40). The idea to introduce this work into the show alongside works from which I had endeavoured to remove myself was simply too tempting: the artist as authoritative creator overseeing works from which he had been near eradicated. I placed the artwork high above the others and called it *The Artist Will Make an Appearance*.

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20   My supervisor Tuomo Rainio was extremely helpful and influential during this phase, for which I am very grateful.

Regarding my allusions to natural phenomena and forces, I think that this is understandable. Does not the process utilise the forces of the universe which surround us and that so often remain hidden? These physical phenomena are, of course, at the core of everything we do but are often disguised or cloaked in "noise." I think, to a degree, these artworks strip away some of that noise, allowing a glimpse of another world, one which surrounds us but often goes unnoticed.

Thinking back to my observation at the beginning of this thesis concerning machine-drawings, I spoke of them being produced without emotion or effort. Whilst I think this is essentially true, it perhaps applies criteria which are not applicable to these artworks.[21] In one sense they are drawings, in the concrete way in which they are produced — a drawing tool making lines on a surface. But in another sense, they are not; there is no intent, no idea or vision which is then realised through the drawing process. From this perspective they are closer to documents or records; much like a frottage is a record of a surface from which it is taken, so these are records of physical phenomena manifested in the form of a drawing. They are, therefore, like other plotter-drawings a hybrid, though less in the sense of digital/analogue than in the blurring between document and drawing, record and expression.

Conclusion

In this paper I have attempted to reveal as much about the processes and experiences that went into creating the work for Kuvan Kevät. Alongside that, I have brought in references and examples from historical and contemporary sources in order to frame my practice.

My project was in essence a stripping away of the extraneous elements in the plotter-drawing process in order to understand what was happening and how— at a material and conceptual level. With this foundational knowledge, I can add back some of those elements. Or not. I anticipate that future work will always involve a push and pull between myself, the plotter and the materials which offer endless possibility and combinations thereof.
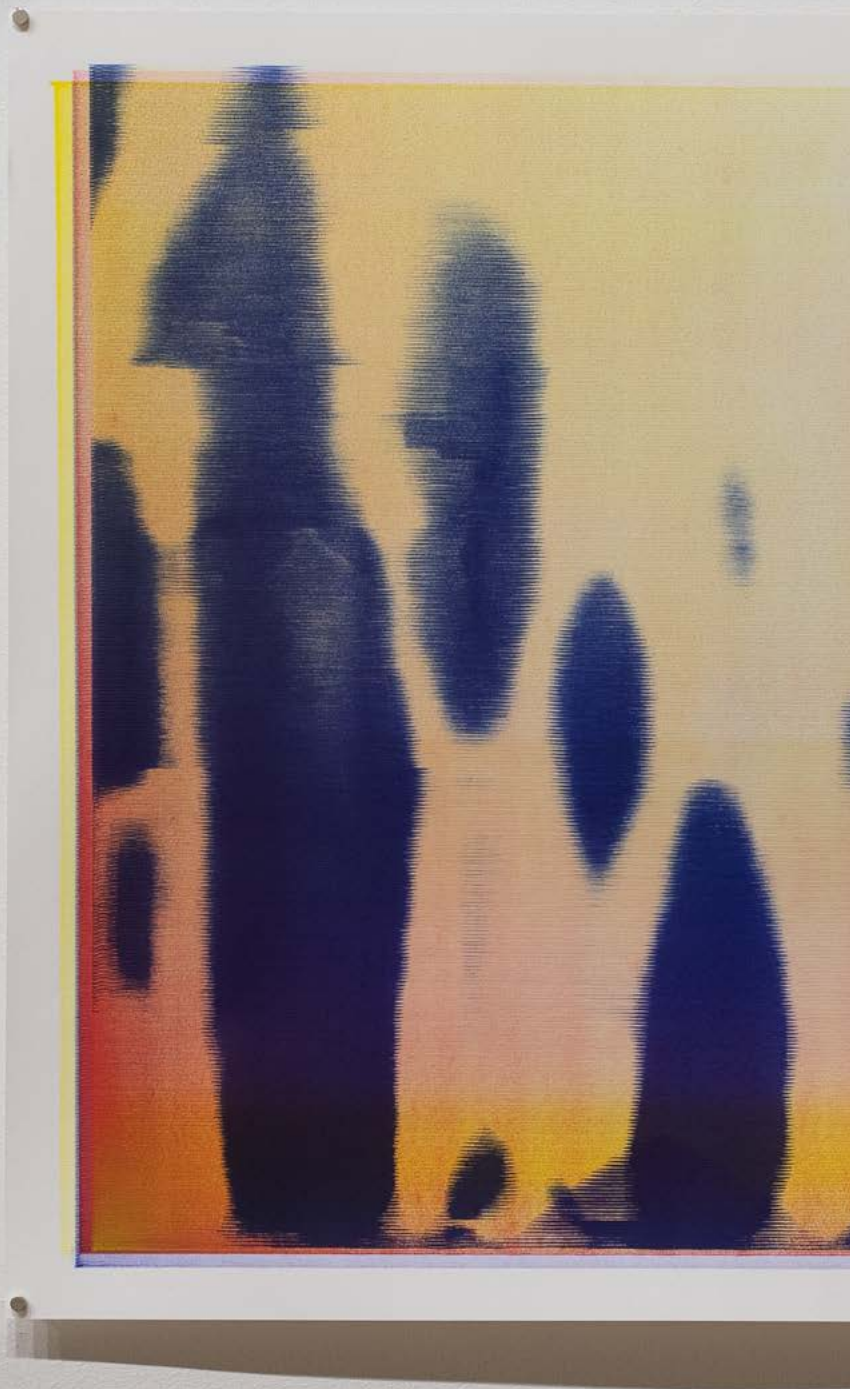
21   The 'term work of art' might be more suitable here, as defined by artist-theorist Barbara Bolt (2004), Art Beyond Representation: The Performative Power of the Image, (London: I.B. Tauris) 5.
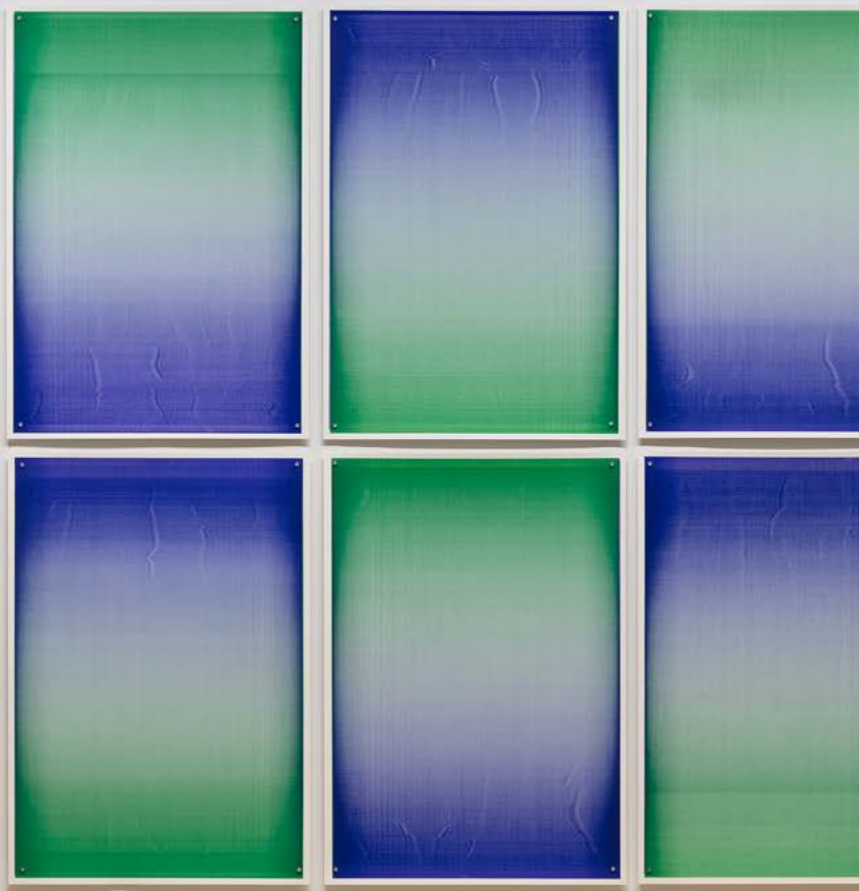
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Images

Cover - Detail from Shift. Photo: artist's own.

Page 6 – Hewlett-Packard promotional image. https://www.hpmuseum.net/display_item.php?hw=74

Page 9 – Sine Curve Man by Charles Csuri. https://csuriproject.osu.edu/index.php/Detail/objects/761

Page 10 – Calcomp 565 Drum Plotter. http://computermuseum.informatik.uni-stuttgart.de/dev/ccmp565/

Page 10 – Mutoh IP-220 flatbed plotter. Photo: Martin Bircher (Numerically Controlled Pen Plotters in Art. University of Lapland, 2022.)

Page 10 – D.I.Y. Plotter. Photo: Andrew Sleigh. https://andrewsleigh.github.io/plotter/

Page 11 – Matrix Multiplication Series 36 by Frieder Nake. https://dam.org/museum/artists_ui/artists/nake-frieder/matrix-multiplication/

Page 11 – 9 Carrés by Vera Molnár. https://dam.org/museum/artists_ui/artists/molnar-vera/works-from-the-1980s/#lightbox[rel-12514-1306714093]-1

Pages 16-17 – Artist's studio. Photo: artist's own.

Page 20 – Early colour experiments with the AxiDraw. Photo: artist's own.

Page 20 – Early plotter test. Photo: artist's own.

Page 20 – D.I.Y. Plotter Mk.1. Photo: artist's own.

Page 22 – Studio view. Photo: artist's own.

Page 23 – Untitled (Holding My Breath). Plotter Drawing. Ink on paper. 49x71cm. Photo: artist's own.

Page 23 – Untitled (Porpoise Sky). Plotter Drawing. Ink on paper. 49x71cm. Photo: artist's own.

Page 24-25 – Untitled (It's My Rug). Plotter Drawing. Ink on paper. 49x71cm. Photo: artist's own.

Page 31 – Detail from Shift. Photo: artist's own.

Pages 34-35 – Kuvan Kevät installation view. Photo: artist's own.

Pages 36-37 – Revered and Dreaded Scene. Plotter Drawing. Ink and chlorite on paper. 17.7x29.4cm. Photo: artist's own.

Pages 38-39 – Pass/Over. Plotter drawing. Ink and chlorite on paper. 48,4x63cm. Photo: artist's own.

Page 40 – The Artist Will Make an Appearance. Ink and sebum on paper. 42x29,7cm. Photo: artist's own.

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