‘Towards an Uncausal Practice of Visual Communication’

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39.969 Words

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PhD Degree by Project

Declaration

This thesis represents partial submission for the degree of Doctor of Philosophy at the Royal College of Art. I confirm that the work presented here is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

During the period of registered study in which this thesis was prepared the author has not been registered for any other academic award or qualification. The material included in this thesis has not been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

07.08.2023, Charlotte Lengersdorf

Abstract

This practice-based PhD introduces the concept of uncausality as both method and methodology to uncover potentialities for action and thought beyond habitual patterns of causality and experience.

The concept derives from an investigation of asemic writing's paradoxical dynamic, also referred to as 'asemic effect'.[1] Asemic writing's formal and gestural resemblance to conventional writing evokes expectations of legibility and semantic meaning. At the same time, any effort to retrieve meaning remains unsuccessful.

The asemic effect is detached from its immediate context and explored to offer a dynamic that is divergent from the 'causal pleasure' of human-computer interaction.[2] The direct and predictable causality between human action and computer reaction not only appeals to, but also consolidates the human being in their position as the all-knowing agent in the face of an increasingly complex world. This thesis critiques the emphasis on pleasure, power and control that confines human thought and action to the comfortable, protected realm of the already known, hindering any venture into the unknown.

The concept of uncausality taps into the potential of an encounter with the unknown, the nonsensical and the dissonant. The contemporary condition

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1. Peter Schwenger, *Asemic: the Art of Writing* (Minneapolis, MN; London: University of Minnesota Press, 2019), p. 2.
2. Wendy Hui Kyong Chun, *Programmed Visions: Software and Memory* (Cambridge, MA; London: The MIT Press, 2011), p. 92.

that asks humans to revaluate their habitual ways of being underlines the urgency for such an exploration.

While this research originates from a practice of visual communication with a focus on interactive type design, it follows a transdisciplinary methodology, after Guattari, to weave a heterogeneous net of connections across disciplines and modes of research. It draws on the philosophical explorations of Deleuze and Guattari, their own sources and thinkers who followed them.

This research engages in a practice and process of programming visually abstract real-time human-computer interfaces to explore, test and expand on the concept of uncausality. The iterative nature of the process of programming becomes an entry point to create, and encounter, a continuous mutation of the relation between cause and effect, action and reaction. The practice, conscious of the symbiotic relationship between culture and technology, explores an approach to interactivity that maintains human action and thought in a state of physical and intellectual tension.

Introducing the concept of uncausality, this research hopes to invigorate practices that keep the human mind elastic in a confrontation with a changing world.

Acknowledgements

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I would furthermore like to thank those who have contributed greatly to making this PhD the wonderfully challenging and invigorating, and equally pleasurable and frustrating, adventure it has been for me. It is one thing to begin a PhD enthusiastically, but it is another to come out the other end with the same curiosity and drive to continue searching.

A huge thank you to my supervisors Dr. Eleni Ikoniadou and Dr. Catherine Dixon for their continuous support and thoughtful guidance beyond their official commitment. Their thinking has greatly inspired this research's journey and opened it up to new encounters.

I also wish to thank my colleagues and friends at the Royal College of Art. Thank you to Prof. Dr. Teal Triggs for her great curation of our weekly Postgraduate Research sessions, her open ear and advice throughout any challenges along the way, and for introducing me to Dr. Catherine Dixon.

I would also like to thank Dr. Rathna Ramanathan, Adrian Shaughnessy and Jack Llewellyn who encouraged and supported me in my endeavour of applying for this PhD research project while finishing my MA at the RCA. I would also like to thank my colleagues and students at Kingston University. Thank you to Prof. Andreas Uebele and Prof. Holger Jacobs for nurturing my interest to design and to create during my Bachelor's degree at the Peter Behrens School of Arts

in Düsseldorf and for opening up opportunities in my educational career that have contributed to where I find myself now.

Finally, I thank my friends in London and abroad who helped me to maintain a life beyond this PhD, when this project often felt all consuming. Thank you to my parents Josef and Ursula and my sisters Jeanne and Greta for always having my back. Lastly, I would like to thank my partner Alex for his selfless and unconditional support in everything I do. Your ease, patience and company kept me sane.

Contents

A Guide to Reading the Thesis

The following outline provides basic guidance on how to approach the reading of this thesis. It elaborates on some of the decisions taken concerning the structure and layout of this thesis in response to its key themes and ideas.

Elements of this PhD Submission by Project

This PhD submission is by project, and consists of two elements:
1. A written thesis that follows this 'Guide to Reading the Thesis'
2. A body of practice, submitted in form of a mov. file, including sound.

It is recommended that the video should be watched in one viewing, after reading the written thesis. Watching the video, the viewer should turn on the speakers on their device.

Footnotes

The reader of this PhD thesis is invited to pay equal attention to both the body text and the footnotes. Footnotes are not restricted to textual elements of the thesis; images or image titles may also be footnoted, emphasising the equal status of writing and practice in context of this thesis.[1]

A distinction is made between two different types of footnotes, which are intended to serve different purposes and that are differentiated by the font used.

Footnotes that fulfil their conventional purpose of identifying references, comments and elaborations are set in Adrian Frutiger's Avenir Next.[2]

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1. Following Felix Guattari's transdisciplinary metamethodology, the discourse in context of this thesis mutates freely between disciplines, as well as between modes of research.
2. Adrian Frutiger's Avenir Next (2004) is a reworked version of the Avenir family (1987). Avenir is a Mac system font and may therefore seem familiar to the

A visual distinction between body text and footnotes is kept to a minimum, decreasing their hierarchical difference. A footnote is usually positioned in an inferior position at the bottom of the page, emphasising its subordinate role. At the same time, it is precisely the position of the footnote in the lower part of the page that allows it to flexibly fill up as much space as it needs. If a footnote becomes more elaborate, an element that was once considered inferior then dominates the page, relegating the main text to the following page of the thesis. It essentially determines and alters the structure of the written page. The main text floats in from the top of the page and the footnotes float in from the bottom, engaging in a creative interplay, encouraging the reader to engage with the thesis in a non-linear way, to digress, make connections to their own practice and experiences and let their thoughts wander.

Footnotes set in the typeface 'mingle' (in the style 'unmingled') will point towards a more experimental, playful, or even paradoxical relation with the main text.[3]

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reader. It is a sans-serif typeface representative of the International Typographic Style/ Swiss Style of the 1980s and '-90s, that foregrounded typography's role of neutrality, rationality and harmony that were emblematic of the ideals of the post-war scientific and technological age.

3. The typeface 'mingle' is a typeface that I created as part of my MA at the RCA. Mingle is a monospaced font. Each letter of the typeface has the same width. Monospaced fonts are commonly used for source code and are therefore often considered as synonymous with code. While a typeface most commonly includes styles like 'Regular' 'Italic' or 'Bold' the typeface 'mingle' comes in the two styles: 'mingle' and 'unmingled'.

Further, the same font is used to visually distinguish screenshot titles, as well as more experimental or poetic sequences in the thesis, from the body text.

Screenshots/Figures

Throughout the written thesis, the body of practice is referred to via screenshots. All the images shown in this thesis are part of the research practice of this thesis. However, they present a careful selection that drives the narrative of the thesis and are not an exhaustive representation of the entire body of practice.

The screenshots are not labelled as 'figures', but, in reference to their digital origin, maintain their original title. A screenshot file is saved and automatically named with a time stamp. They capture the contents of a computer screen output at a given moment in time and in the context of specific circumstances, as opposed to functioning as an outcome. In the context of this PhD research, the screenshots are taken automatically each time the mouse cursor moves out of a single programme's canvas, forming a remnant of the interaction.

Reading this PhD thesis on a computer screen, a reader is asked to use a mouse-click, rather than scrolling, to navigate from one page to the next within the document. Screenshots are placed in the same position at the top of the page so that screenshots on consecutive pages will reveal potential changes, initiated by the reader clicking the mouse. This is an action that is intended to give the reader a sense of agency over the programmes displayed. This dynamic also works in a printed version of the thesis, where a page turn is considered the equivalent of clicking a mouse.

A reminder can be found on the respective pages of this thesis. It should be noted that this choice of layout sometimes results in a white space on the preceding page, which does not necessarily mark an end of a chapter or subchapter.

Distributed throughout the written thesis, the screenshots are isolated from the browser environment. A mouse cursor is usually invisible in a screenshot, which further alienates it from its digital context. However, forming an essential element in the screen-scape of the computer, mouse cursors were added retrospectively to the screenshots, indicated as  . In addition, the act of a clicking a mouse in a screenshot is indicated as  .

Screen Capture Video

The mov. file is a screen capture video that records my interaction with the digital programmes that form the practice-based element of this research project. With the practice-based work's equal focus on the process of programming as well as the resulting programmes, it is a deliberate decision to position the reader of this thesis as a spectator, rather than as a user of the programmes. [4]

When interacting with the computer, the sound of a mouse click forms an essential part of the experience. It is an acoustic confirmation that the mouse has been pressed. However, this sound is commonly not recorded in a screen capture. The cursor silently moves across the screen and a mouse click can only be inferred through its visible effect on the screen.

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4. Although it is not intended that the reader should interact with the programmes, I do not rule out the possibility of presenting the programmes as interactive pieces in a context outside of this PhD project in the future.

This also implies that if a mouse click does not lead to an effect, the click remains invisible to the viewer. Therefore, in order to make a mouse click visible/audible in the screen capture, the sound of the mouse click was implemented as a sound effect in the programmes.

Preface

What Does It Mean?

Asemic writing, by definition, seeks to dissociate itself from meaning: a seme is a unit of meaning; the prefix 'a-' is a prefix of negation, meaning 'not,' 'without' or 'away from'. And yet, when encountering a piece of asemic writing, the question of meaning becomes almost unavoidable.[1]

1. Charlotte Lengersdorf, typeface 'mingle' in the style 'mingle' (2017). While a typeface most commonly includes styles like 'Regular' 'Italic' or 'Bold' the typeface 'mingle' comes in the two styles: 'mingle' and 'unmingled'.

'The literature about paradoxes is marred by persistent attempts to explain the paradoxes away.' (Patrick Hughes and George Brecht, *Vicious Circles and Infinity*)

'Meaning becomes a "vicious" machine […] both a furious desire (one wants to decipher at all costs) and a deception without closure (there is nothing to decipher: one knows it, but one persists).' (Roland Barthes, *all except you: Saul Steinberg*)

'Born, raised, educated in a purely "verbal" environment and culture, I paint to decondition myself.' (Henri Michaux, *Emergences-Résurgences*) [my translation]

The spark for this research project germinated during my MA in Visual Communication (Graphic Design) at the Royal College of Art, which I completed in 2018. This preface is intended to provide insight into the background and context from which this PhD research project emerged, forming a transition to the thesis itself.

The 'mingle' typeface, presented on the preliminary page to this preface, is one of the outcomes of my MA at the RCA. 'Mingle' confronts readers with what appear to be letter-like shapes – that is, a composition of black lines on a white background that is reminiscent of letterforms. While the similarity of the shapes to letters, and their linear arrangement in rows, automatically prompt the cognitive processes involved in the act of reading – as opposed to looking at images, for example – an initial effort to retrieve meaning may leave the reader disappointed.

Asemic writing, by definition, seeks to dissociate itself from meaning: a seme is a unit of meaning; the prefix 'a-' is a prefix of negation, meaning 'not', 'without' or 'away from'. And yet, when encountering a piece of asemic writing, the question of meaning becomes almost unavoidable.

Indeed, asemic writing and its sparse discourse appears unconditionally linked to persistent attempts to explain the asemic away. Asemic writing, in defying any definitive answer to such a question of meaning, may hastily be dismissed as nonsense and a subject not worth pursuing. Common sense and rational thinking initially devalue it as a subject worth investigating. At the same time, the profound fascination with asemic writing is persistent, and its growing popularity increasingly requires theoretical investigation: there is a yearning for relief from its paradoxical nature. In recent years, asemic writing has gained

attention via anthologies and two large-scale exhibitions,[2] but mainly via various web blogs, forums and online groups. Most recently, Peter Schwenger's book *Asemic: the Art of Writing* (2019) for the first time endeavours to explore asemic writing in its historical, critical and contemporary contexts, attempting to investigate 'how […] the noncommunicative communicates', as Jed Rasula summarises on the cover of the book.[3] While the beginning of this PhD research involved major detours into the semantic and semiotic implications of asemic writing, it eventually assigned itself a purpose that departed from that of attempting to explain or theorise the asemic.

From my perspective as a visual communicator and type designer, I was initially fascinated by asemic writing because it shifts the focus away from predetermined alphabetic forms to the creative implications of the act of writing and reading. Throughout my education as a visual communicator, type design and typography were the elements I was most drawn to in my practice. At the same time, I was never really interested in type design, a realisation I confessed to the audience at the *ATypI* (Association Typographique Internationale) in Antwerp in 2018 in my presentation about my practice: this was, paradoxically, focused on type design and my endeavour of starting this PhD.

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2. *Asemic Writing: Offline and in the Gallery*, Minnesota Center for for Book Arts, March 10-May 28, 2017.
Scrivere Disegnando (Writing by Drawing) When Language Seeks Its Other, In collaboration with Collection de l'Art Brut, Lausanne, 29 January – 23 August 2020.
3. Jed Rasula, in Peter Schwenger, *Asemic: the Art of Writing* (Minneapolis, MN; London: University of Minnesota Press, 2019), back of cover.

The ease of digital type production and desktop publishing today increasingly questions the role of the type designer.[4] Gerard Unger, in his book *Theory of Type Design* describes how the 'desire of type designers to challenge the established norms or conventions of type design has become an integral part of the profession'.[5] At the same time, such efforts often remains confined to the seemingly unchallengeable frame of alphabetic code, leaving little space to reimagine principles of type design on a more fundamental level.

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4. Personal computers and desktop publishing in the late 1980s and early 1990s led to an expansion of the discipline of type design outside of peripheral knowledge and specialism and brought it within the reaches of the graphic designer. The interdisciplinary graphic and type designer Peter Bil'ak, in his essay 'We don't need new fonts…' suggests that the mastery of drawing curves is no longer the defining feature of a type designer. Instead, he argues that being a type designer today implies being critical, rebellious and willing to contribute to the evolution of the discipline. Bil'ak writes: 'Many people drawing type today have solid drawing skills, but no desire to advance the field (let alone rebel against it) by creating original solutions. Can we call them type designers? I think not'. The seamless and even interactive variation of letterforms in new font technology, such as 'variable type,' 'open type,' 'kinetic type' or 'parametric type' furthermore challenges the role of the type designer, ultimately exhausting the discipline.

5. Gerard Unger, *Theory of Type Design* (Rotterdam: nai10 publishers, 2019), p. 129. 'Thanks to digitisation, the design process now offers great flexibility, with the possibility to experiment, modify, refine and correct […]. While the technology for type design and the type design process have changed fundamentally, letterforms have changed very little with the transition from tangible and analog type to digital and immaterial shapes' (p. 21).

Unger observes that, 'apart from the history of letterforms, legibility is probably the aspect of type design which has been studied and written about most'.[6] Given the illegible nature of asemic writing and my background in type design, it might come as little surprise that another major detour at the beginning of this PhD research led me into an exploration of legibility and illegibility in type design. However, an all-encompassing investigation of legibility and illegibility would go beyond the scope and intention of this thesis.

During my MA, I was looking for ways to explore the potential of departing from the history, tradition and ideals of the discipline of type design. I designed interactive typefaces that challenge the habitual, and thus automated, interaction with reading and writing in order to shed light on the creative and inventive potential of a typeface.[7]

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6. (Gerard Unger, *Theory of Type Design*, p. 169). Legibility is not only the aspect of type design that has been written about most, but also the one that is most contested. While throughout the history of Latin type design the improvement of legibility has always been the ideal to strive for, post-modernists questioned the very foundations of type design by refusing and challenging the dualistic thinking of right and wrong, good and bad, legible and illegible, as well as specialism and disciplinarity. The term of 'The Legibility Wars' gives a glimpse of the clashing opinions and the seriousness with which designers were involved in such discussion. For example, the 1992 essay 'Legible?' in Emigre No. 23 by Gerard Unger, that explores typography as offering space to be more than a 'transparent' holder of information, in reference to Beatrice Warde's 1932 essay 'The Crystal Goblet, or Printing Should Be Invisible'.
7. Gerard Unger describes how 'reading [becomes] a custom – close to automatism – and ensures that readers have no difficulties in processing letters and lines of a text while concentrating on its content' (*Theory of Type Design*, p. 63)

For me, type design became a framework through which I began to explore, challenge and disrupt, rather than servicing the peculiarities of human action and thought. My abandoning of the disciplinary ideals of harmonious curves and ideal letterform proportions in favour of a focus on human interaction resulted in letter-like, yet illegible, shapes. This is where I came across the term 'asemic writing'. Asemic writing gave me a sense that there is room for the other, the undisciplined, the nonsensical, and a potential discourse beyond disciplinary ideals and traditions. The question when embarking on this research was about investigating the value of asemic writing for visual communication practice.

Considered individually, characters in the typeface 'mingle' in the example that introduces this preface, revealing a hybridity of two alphabetical letterforms, bisected horizontally. A character may therefore appear to be familiar, alphabetically, yet it is not necessarily assignable to an individual letterform. A reader may further observe that in each case the upper half of a bisected alphabetical letterform is complemented in the lower half of the subsequent character in a word. Here, when focusing on the top half of a letter, the text reveals its semantic meaning. Indeed, research in cognitive science and reading processes has shown that the identifying characteristics of an alphabetical letterform are held in its top half, meaning that the bottom half of a letterform is not as essential for reading.[8] A modification of the bottom half of a line of printed text – as we find in 'mingle' – may therefore distract us, and thus delay, slow down or complicate our respective reading performance, but it does not make reading impossible.

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8. 'In the Latin alphabet we are able to read the top half of characters, without needing the bottom half' (Kate Brideau, *The Typographic Medium* (Cambridge, London: MIT Press, 2021), p. 171).

The ‘mingle’ typeface was designed to disrupt the reader in their habitual, responsive, nearly automatic action of reading. In resisting a shortcut through habit, it prolongs a passive (because automated) gesture into an active encounter.[9]

‘Mingle’, due to its legible and semantic nature, does not qualify as asemic writing.[10] However, the typeface makes use of and emphasises essential qualities of asemic writing that are starting points for this practice-based PhD. ‘Mingle’, in revealing an unsettling effect of the loss of control, power, universality and meaning, uncovers a human desire for mastery and understanding. It not only creates an acute awareness of such longing for immediacy and transparency, but further highlights the pleasure resulting from communicative fulfilment and from the relief of understanding.

Unlike ‘mingle’, asemic writing suggests knowledge and understanding but always thwarts it rather than fulfilling it. It deliberately resists any closure and fails

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9. A multidisciplinary team of designers and researchers from RMIT’s School of Design and its Behavioural Business Lab created ‘Sans Forgetica’, a font that uses an effect called ‘desirable difficulty’, wherein the font’s ‘visual distinctiveness causes readers to dwell longer on each word, giving the brain more time to engage in deeper cognitive processing, thus enhancing retention of that information.’
(RMIT’s Behavioural Business Lab, ‘RMIT Sans Forgetica: The font to remember’ <sansforgetica.rmit> [accessed 26 September 2018]); Of course, the level of such engagement cannot be universalised. After all, ‘mingle’ is a proposition rather than an imposition.

10. ‘Mingle’ combines qualities of asemic writing with a typeface that is still legible and decodable.

to satisfy the communicative expectations it raises. It is asemic writing's complex dual dynamic – alluring and shattering – that is the essential entry point for this thesis. Thus, while this research grew out of a fascination with asemic writing, it is more concerned with its complex dynamic qualities rather than its semantic or linguistic implications.

This unique quality of asemic writing, simultaneously encouraging and frustrating our human meaning-making impulse, is described by Peter Schwenger as the 'asemic effect'.[11] The asemic effect introduces a dissonance, a tension, a rupture in the process of reading that is not paralysing or inhibiting, but is, on the contrary, unsettling, productive and active. Schwenger suggests that 'even at the heart of the illegible [...] there is a perverse persistence, a compulsion to find meaning'.[12] The visual poet Jim Leftwich, who coined the term 'asemic writing' in 1997, together with Tim Gaze, states: 'The asemic appears as an aporia of excessive production.'[13] Confronted with something we cannot understand, we prolong our attention in pursuit of the pleasure of knowledge and of the relief of the unknown.

The 'mingle' typeface, shown above, gives in to this desire, eventually revealing its legibility. In asemic writing, though, the satisfaction and pleasure found in communicative fulfilment remains nothing more than an attempt. Encountering Saul Steinberg's undecipherable writings, Roland Barthes describes his inability to resist his 'furious desire' for meaning, even though he knows that 'there is nothing

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11. Peter Schwenger, *Asemic: the Art of Writing* (Minneapolis, MN; London: University of Minnesota Press, 2019), p. 2.

12. Ibid. p. 39.

13. Jim Leftwich, 'Every Word is an Adverb' (8 April 2006), in Tim Gaze, *asemic movement 3* (May 2010).

to decipher'.[14] Asemic writing deliberately refuses any determination or closure in favour of potentiality, interactivity and spontaneity. It hints at a pleasure that is found not in closure and fulfilled expectations, but in an opening between promise and frustration. Schwenger identifies the 'pleasure of not getting it', that is much more enduring than the 'pleasure of getting it' since it is an 'endless source of speculation'.[15]

Such asemic effect, though, cannot be reduced to an effect produced in the viewer when they encounter a piece of asemic writing. It is not only the act of reading that is contained by conventions and expectations, but equally the act of writing. With 'mingle', each alphabetic character is cut up in such a way that it mingles – while typing – with the subsequent character within a word, forming a new hybrid letterform. The characters in 'mingle', therefore, do not come ready made. Rather, they are assembled and collaged in the act of typing. The typeface explores the choreography of typing as a creative rather than reproductive act.

Writing the asemic is an active engagement with a tension and oscillation between gestural freedom away from routines, habits and recognisable signs and the disciplining properties of writing's conventions. Thus, any gestural and visual variety is always contained and limited, not only by the visual and gestural properties, but also by the tools, support or formatting principles of (mostly Western) inscriptive systems.

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14. Roland Barthes, *all except you: Saul Steinberg* [my translation] (France: repères édition d'art, 1983), p. 22.
15. Schwenger, p. 140.

The characteristic tension in asemic writing therefore challenges not only the human meaning-making impulse but also the choreographic possibilities of the disciplined body. It combines gestures and a consciousness of writing with a deliberate working against it, without losing its reference to it. Asemic writing then becomes a deliberate move away from writing without dissociating itself completely from it. However, asemic writing is mostly distributed and shared as a product to be encountered, and its process and context of creation are neglected, a tendency that prevails in Western culture. Despite the apparent meaning of the term, 'asemic writing' often appears to be reduced to 'asemic reading': as this preface argues, a separate and equivalent consideration of the practice and act of writing in reference to the asemic effect may therefore be of essential relevance. What the artist Henri Michaux refers to as a 'kinetic desire' is a desire to move beyond the conditioning and 'mechanical gestures of Western gymnastics' in order to access untapped gestural and graphic potential.[16] He argues: 'I am freeing myself from what I hated the most, the static, the fixed, the everyday, the "expected" [le "prévu"], the fatal, the satisfied'.[17]

The term 'asemic writing' itself thus already refers to asemic writing's characteristic tension. Asemic writing is not simply a negation or rejection of writing — quite the opposite. The term introduces a paradox, referring to writing whilst negating it, thus opening up a space of possibility that never settles in meaning or definition. It is in this way that asemic writing needs to retain the reference to writing to be

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16. Henri Michaux, *Mouvements* [my translation] (France: Éditions Gallimard, 1951).
Henri Michaux, *Passages* [my translation] (France: Gallimard, 1963), p. 91.
17. Henri Michaux, *Emergences-Résurgences* [my translation] (Genève: Albert Skira éditeur, 1972), p. 43.

successful. It needs the reference to its opposite to create a tension.
Indeed, asemic writing, and its dynamic, is abstract and should remain abstract as a means to maintain engagement. If asemic writing can be called a discipline or movement, it cannot simply be seen as an umbrella term that brings together different pre-existing practices or ideas. In contrast to conventional writing that is contained and modulated by the alphabet, asemic writing has no defined or pre-conceived form. Indeed, there is a minimum of coherence in asemic writing's appearance. More importantly, the term implies the potential of terminology to provoke and encourage the creation of new practices and new discourses that refuse to settle in disciplinary binaries. Asemic writing's form emerges from a tension between the predetermined and the indeterminate. It is invented and reinvented in the act of writing. In asemic writing, it is the act of writing itself that destabilises any predetermined conception of writing's form to reveal its inherent potential. It is this tension that gives rise to a variety in asemic writing that is not reducible to a common form.

Thus, both terminologically and methodologically, asemic writing is defined by a tension: a conceptual tension that introduces a simultaneous lure and resistance to resolution — a tension that needs to be maintained and emphasised as a way to open up a space of potentialities beyond expectation, knowledge and habit. Asemic writing's tension opens up a generative, productive, unsettling and inexhaustible space. The asemic generates a desire for meaning, an aim for closure. Rather than taking a shortcut, on the contrary it embarks on a deliberate detour, with the purpose of following thought along the efforts to find its way back to the familiar path, that is, to find a way to return to the pleasure of closure and meaning.

Thus, my fascination with asemic writing, instead of leading me to an investigation of asemic writing itself, was merely a starting point for what the American political

scientist James C. Scott refers to as 'an intellectual detour'.[18] While the question of asemic writing's meaning is an essential starting point for this research, it is not the question this research asks, or, even less, seeks to answer. Instead, this research argues that it is specifically this question of meaning and the ongoing attempt to theorise asemic writing that reveals our innate human struggle to resist closure and determination and our striving for causal closure.

Asking about asemic writing's meaning reveals its inability to be categorised according to causal and rational binaries. The question of meaning implies the anticipation of a solution. It assumes a rational answer to such a question, the possibility of an imposition of regularity, universality and causality. It seeks to cover the unknown with categories of the known. The asemic, then, refusing a definitive answer, challenges and displaces our sense of the world as intelligible to human reason.

Thus, while the discipline of type design was the starting point for this PhD research, it is not its destination. It was against the background of the discipline's boundaries that my interest in asemic writing emerged. This is not to dismiss the value of the discipline of type design or typography. Rather, this research explores the potential of departing from and transgressing the boundaries of a discipline seeking its place amongst other models of thought and action. It is motivated by a curiosity about where else an exploration of asemic writing might lead and what new perspectives for visual communication might emerge. It investigates how asemic writing might become a starting point for exploring a different understanding of the way we make sense of and interact with the world around us.

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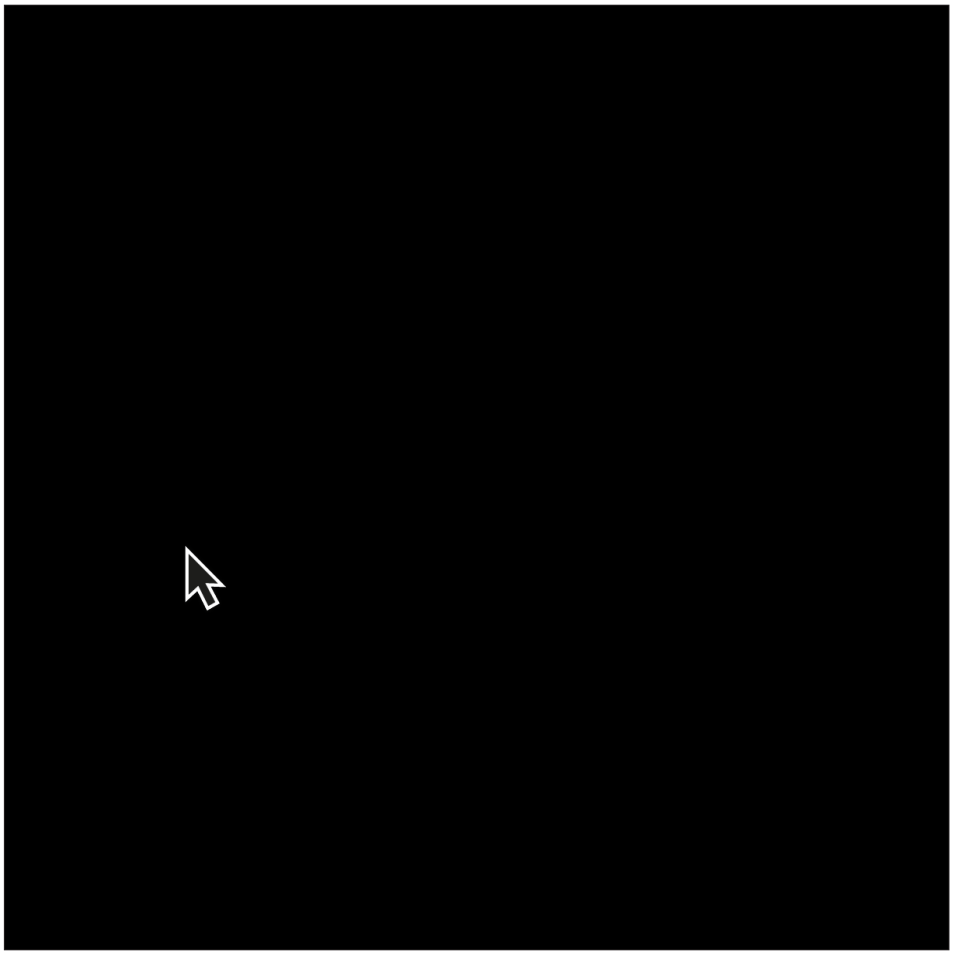
18. James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT; London: Yale University Press, 1998), p. 1.

Chapter 1

Hello, World!

'My typing and clicking seem to have corresponding actions on the screen.' (Chun, 'On Software or the Persistence of Visual Knowledge')

'We do not have knowledge of a thing until we have grasped its why, that is to say, its cause.' (Aristotle, *Physics*)



Screenshot 2022-08-10 at 12.09.10 uncausal2.png [1] [2]

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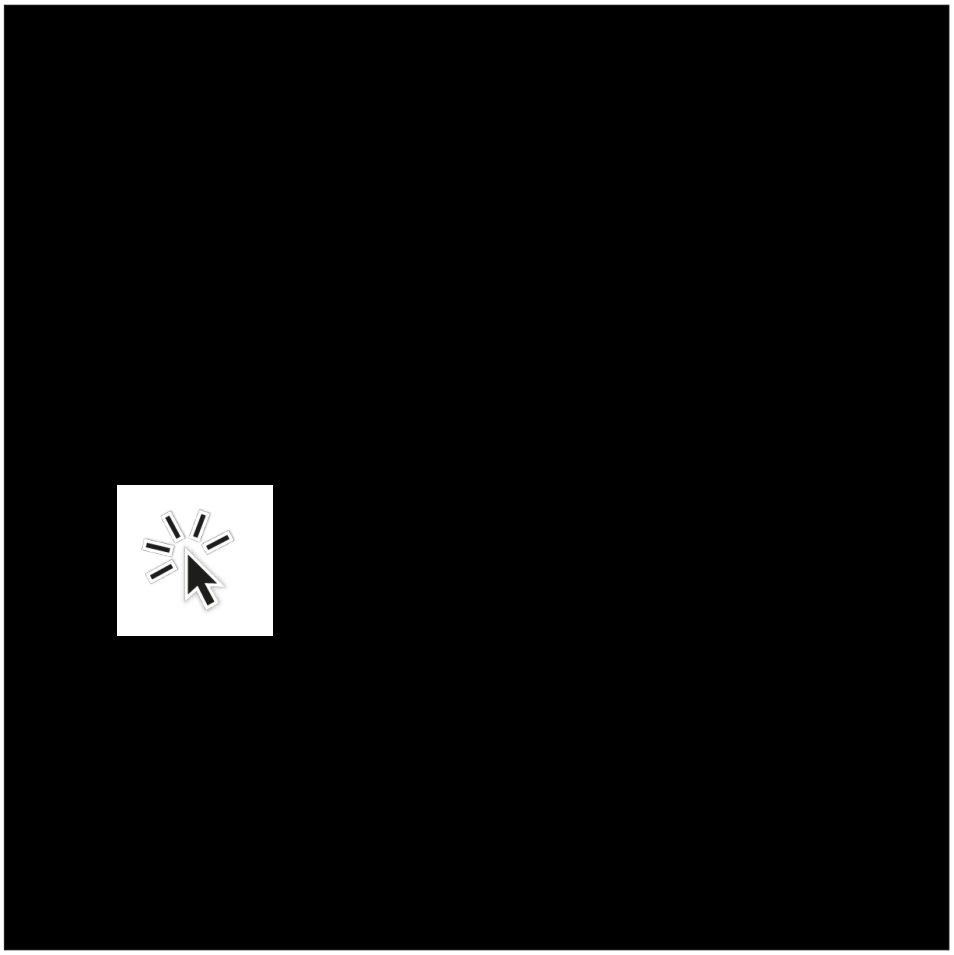
1. A mouse cursor on a black backdrop. An explicit symbol for human agency on the computer screen. A first rough spatial orientation and hand-eye-coordination is achieved through random hand/mouse movements. The cursor on the screen and the hand navigating the computer mouse on the tabletop move accordingly. The mouse offers a limited range of common functions that call an event, every time the mouse is either clicked, double clicked, dragged or scrolled. Mouse functions are easily tested via trial and error. The singular mouse-click is the most common, thus usually the first one tested.
2. A page turn on the following pages of this thesis should be considered as



Screenshot 2022-08-10 at 12.09.11 uncausal2.png [3]

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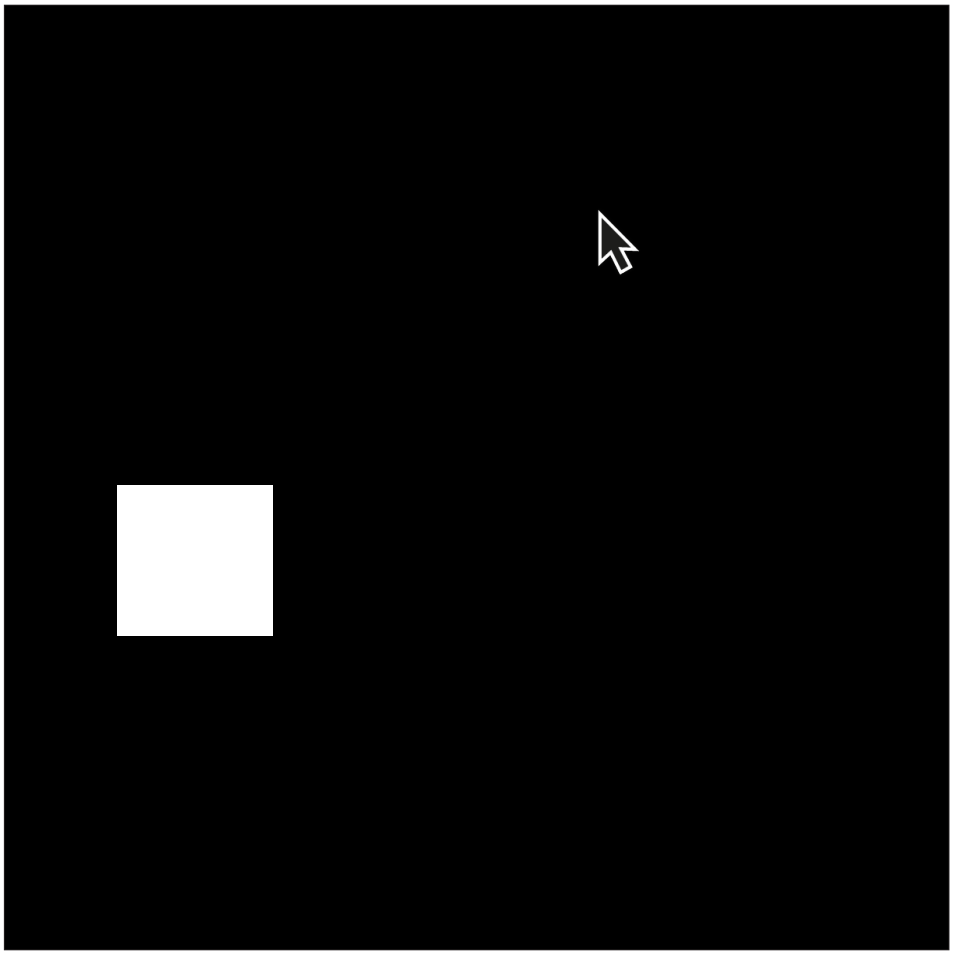
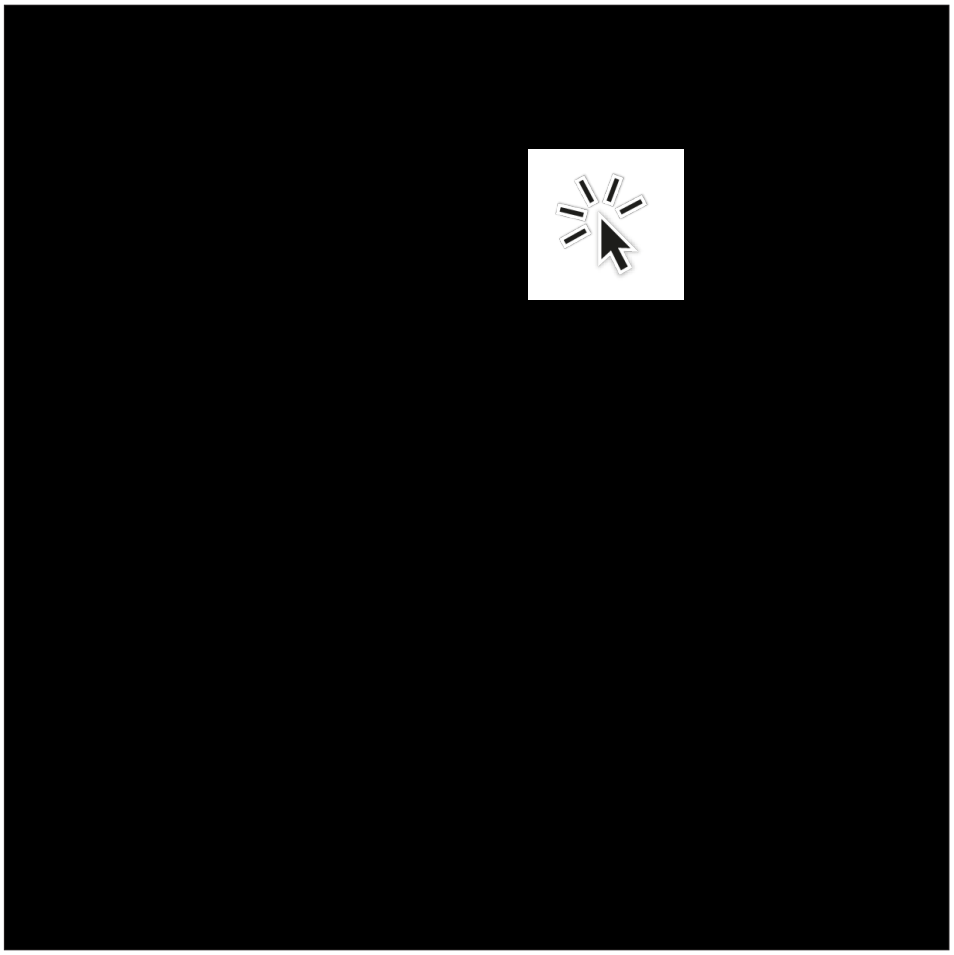
consecutive mouse clicks within the same programme. A mouse-click, rather than a scroll, should be used to navigate from one page to a next page within the document to reveal potential changes in screenshots on subsequent pages.

3. The mouse-click results in an effect on the screen. A white square displays on the black canvas. The conformity of the cursor's position and the white square's position, as well as the timely correspondence between the mouse click and the square's appearance, emphasises clear causality, affirms agency and brings pleasure.



Screenshot 2022-08-10 at 12.09.12 uncausal2.png [4]

4. Habit leads us to expect a similar event from a similar action, even when such assumption is only founded on a single experiment. There is an immediate universalisation from the observed to the unobserved.

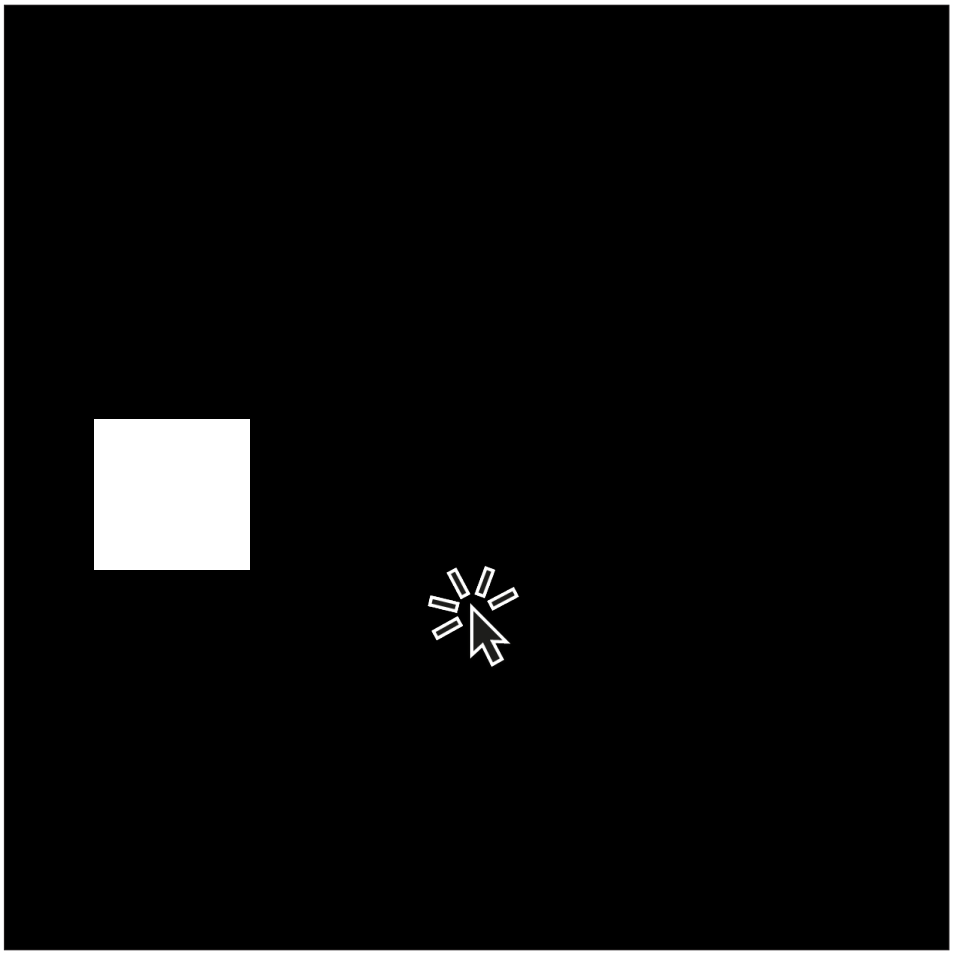


Screenshot 2022-08-10 at 12.09.13 uncausal2.png [5]

5. Any further action happens in anticipation of the repetition of the previously observed effect. Experience is replaced by expected experience. Action is replaced by habit. At this stage, the mind even anticipates the image by conceiving the new square in the corresponding cursor position prior to the visual manifestation of such an effect.

'[...] Signs that encourage us to read them at the same time that they systematically frustrate our reading.' (Schwenger, *Asemic: The Art of Writing*)

'When I see, for instance, a billiard-ball moving in a straight line towards another [...] may I not conceive, that a hundred different events might as well follow from that cause? [...] Why then should we give the preference to one, which is no more consistent or conceivable than the rest? All our reasonings a priori will never be able to show us any foundation for this preference.' (David Hume, *An Enquiry Concerning Human Understanding*)



Screenshot 2022-08-10 at 12.09.14 uncausal2.png [6]

6. In contrast to anticipation, the position of the cursor and the white square no longer conform. The square's position is slightly out of line in relation to the cursor.

1.1. Causal Effect and Asemic Pleasure

The preface to this thesis introduced asemic writing's paradoxical dynamic, that simultaneously lures and disappoints humans in their habitual interaction with reading and writing. This chapter sets out to detach what Peter Schwenger refers to as 'asemic effect', from its immediate context, seeking both resonance and dissonance with other modes of thought and practice.

In the computer programme referenced in the introductory screenshots to this chapter, a mouse click triggers a corresponding effect on the screen.[7] A white square appears at the cursor's position — an immediate affirmation of human agency. In human-computer interaction, witnessing a direct and anticipated

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7. Screenshots in context of this thesis make use of what the psychologist Albert Michotte in *The Perception of Causality* refers to as 'perceptual causality'. Michotte observes that if certain conditions of spatial contiguity, position and time are satisfied, an observer of a simple perceptual event receives an 'immediate causal impression' (Albert Michotte, *The Perception of Causality* (New York: Basic Books, 1963), p. 19.). In Michotte's example, the observers see a black square move across a screen and stop at the moment when it comes into contact with a red square. If the latter then starts and moves away from the black square, observers report that it is the blow given by the black square which causes the red square's movement. Michotte therefore argues that 'one can "see" an object act on another object, produce in it certain changes, and modify it in one way or another' (p. 15). This impression is, furthermore, 'not necessarily dependent on the use of "real", solid objects. It can be produced perfectly clearly by using objects which are simple coloured shapes without apparent thickness, or even images projected on a screen' (p. 18). Thus, even though the observer is aware that there is no actual physical contact between the two squares, the situation is perceived to be causal.

reaction to one's mouse action in the form of a corresponding effect on the screen is, according to media theorist Wendy Hui Kyong Chun, both pleasurable and motivational. In the programme above, the clear causality, furthermore, leads to the anticipation of a repetition of that which was previously observed. A second mouse-click in a different position on the screen affirms this assumption. As expected, the square reappears at the new position of the mouse cursor. Causal inference leads to the firm assumption that any subsequent mouse-click will reveal a white square in the corresponding mouse position. However, the next mouse-click breaks with this pattern. The position of the white square no longer matches that of the the cursor, but is slightly different from it.

The programme is part of the practice-based research of this thesis. Translating asemic writing's dynamic into the context of human-computer interaction enables an exploration of the dynamic qualities of asemic writing from an interactive perspective rather than from a semantic or linguistic one. This kind of investigation of asemic writing then becomes less about the quality of the writing, or the creation of a product, and more about the quality of the interaction.

The programme contrasts what Schwenger refers to as 'asemic effect', with what Chun, in her book *Programmed Visions,* describes as 'causal pleasure'[8]. United in a single computer programme, the fundamentally different dynamic of the two concepts is highlighted. Chun's notion of causal pleasure could be described as a comfortable accordance and a moment of harmony in a cause-and-effect relationship. In contrast, Schwenger's notion of the 'asemic effect', translated into the context of human-computer interaction, refers to an unexpected non-conformity and moment of rupture between an action and its anticipated effect.

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8. Wendy Hui Kyong Chun, *Programmed Visions: Software and Memory* (Cambridge, MA; London: The MIT Press, 2011), p. 92.

In the programme above, the position of the white square can no longer be inferred from past experience. A confrontation with a situation that contradicts the human expectation of regularity makes it impossible to respond to a present situation based on past experience.

It may appear paradoxical to construct a PhD thesis based on something that seeks to remain undefined, nonsensical and unresolved, and that, furthermore, frustrates our habitual way of navigating the world. Asemic writing seems to resist theoretical consideration and academic attention in a way that intellectual engagement with the asemic seeks to resolve, and thus invalidates its characteristic tension through principles of rationality and causality. If it is theorised, asemic writing is cast out as outside a discipline, as the illegible, the bad, the nonsense, the non-rational, the unknown. Elizabeth Sewell, in *The Field of Nonsense,* underlines the assumption that the 'dogmatic realist's mind' would 'dismiss Nonsense as skimble-skamble stuff along with dreams, magic [...] and other such sets of mental relations which do not correspond with what this mind calls "reality" [...] deviations from which can neither be tolerated nor enjoyed.'[9]

However, while Chun finds herself 'swayed by and enamoured of the causal pleasure of software', she considers the fact that such sensations of directness are only simulated and programmed into the interface: 'The mastery [...] is "felt" not possessed'.[10] She suggests that the direct causality between human actions and a change on the screen is a 'compensatory gesture'.[11] Chun argues that real-time human-computer interfaces not only appeal to, but directly

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9. Elizabeth Sewell, *The Field of Nonsense* (Victoria, London, Dublin: Dalkey Archive Press, 2015), p. 4.
10. Chun, *Programmed Visions,* p. 92. and p. 64.
11. Ibid., p. 17.

nurture and amplify, the human desire to control and to master an increasingly complex and invisible world. She asserts that the causal pleasure of software has 'disciplined us, created certain expectations about cause and effect [...] that we believe should be transferable elsewhere. It has also fostered our belief in the world as neoliberal: as an economic game that follows certain rules'.[12]

Considered from this perspective, the clear causality between human action and computer reaction does not necessarily imply real engagement, but it may be argued that it functions as a compensation for the lack of understanding. This thesis suggests that the dynamics of the asemic effect, by contrast, in introducing a dissonance in the relation between cause and effect, might hint at an approach to interactivity that does not primarily aim to please or affirm the human, but that creates an encounter with a world in change. Causal inference and the desire for mastery runs the risk of leading to a state of passivity in an interactive environment, where an action is guided by a generalisation from past experience. The unexpected loss of agency and control that we find in the asemic affect may open up action and thought to new encounters beyond their routine functioning.

12. Ibid., p. 92.

1.2. Let There Be Light

The contrasting of Schwenger's notion of asemic effect and Chun's notion of causal pleasure in the previous subchapter led to a problematisation of the compensatory implications of causality. This subchapter will contextualise and expand on this problematic. It draws mainly from the work of a network of thinkers who are united in their shared frustration at the privileging of rational and representational thought in Western philosophy.

Deleuze, in *Difference and Repetition* elaborates that thought appears trapped in 'everyday banality [...] as though thought should not seek its models among stranger and more compromising adventures'.[13] Deleuze hints at a thought that remains 'imprisoned' and contained within the *doxa,* that is constituted by its two halves of good sense and common sense.[14] In *What is Philosophy?*, written with Félix Guattari, Deleuze describes causality, models of recognition and generalisation and a striving for closure and solvability as ordering and thus protecting mechanisms in the face of a complex and disordered reality – 'an umbrella that shelters them and on the underside of which they draw a firmament and write their conventions'.[15] While chaos, and thus a loss of mastery, are distressing, we naturally seek to maintain a minimum number of constant rules, as Deleuze and Guattari argue.

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13. Gilles Deleuze, *Difference and Repetition*, trans. by Paul Patton (London, New York: Bloomsbury, 2014), p. 178.
14. Ibid., p. 178.
15. Gilles Deleuze and Félix Guattari, *What Is Philosophy?*, (New York: Columbia University Press, 1994), p. 202.

David Hume, in *An Enquiry Concerning Human Understanding,* discovers that an imposition of causality is simply a means to 'regulate our understanding […] and make us approve or blame any particular object, action, or behaviour.'[16] It satisfies human curiosity and breaks down the world's complex and particular operations into general and digestible principles.

At the same time, Hume considers that habit, and thus generalisation, implies a 'natural state of ignorance' towards the potential changeability of nature and the implicit possibility of a divergent course of events.[17] In Hume's well-known 'billiard-ball' scenario, referenced at the beginning of this chapter, he describes the human tendency to give preference to one course of events that appears most consistent with past experience, while excluding 'a hundred different events [that] might as well follow from that cause'. Hume argues that neither reasoning nor experience is able to guarantee that the future will resemble the past. Because experience is based either on the present testimony of our senses or the records of our memory from past events, it cannot justify any inference beyond this past experience, nor exclude the possibility that the course of nature may change. He argues: 'It is impossible […] that any arguments from experience can prove this resemblance of the past to the future'.[18] Causal inference, according to Hume, should therefore not be confused with intelligibility of the world and its processes. The intelligibility of nature through principles of causality is an illusion generated by habit: that is, an instinctive supposition of uniformity, as Hume suggests. It is habit alone that gives us the certainty of causal necessity.

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16. David Hume, *An Enquiry Concerning Human Understanding* (New York; Oxford: Oxford University Press, 2007), p. 27.
17. Ibid.
18. Ibid., p. 21.

In reverse, as Millican states in the introduction to Hume's book, this implies that 'intuitive "unintelligibility" to human reason is no impediment to empirical truth'.[19]

Friedrich Nietzsche, in *Twilight of the Idols*, finds that in causal inference, 'emotional appeal is privileged over factual accuracy or true understanding. He grounds this tendency in the psychological urge to reduce the feeling of fear and unrest caused by the unknown. Nietzsche argues: 'Tracing something unfamiliar back to something familiar alleviates us, calms us, pacifies us, and in addition provides a feeling of power. The unfamiliar brings with it danger, unrest, and care—our first instinct is to do away with these painful conditions'.[20] The pursuit of the pleasure of understanding thus leads to the tendency to exclude the new, the unfamiliar and unexperienced. Any investigation of a cause is inhibited and excluded by the habit of favouring explanations that are already familiar, already experienced. Nietzsche suggests that active and productive thought is repressed by a static and dominant system of rigid categories that prevent any responsiveness to the world.

In line with Deleuze, Hume and Nietzsche – albeit in the context of politics rather than philosophy – the American political scientist James C. Scott, in his book *Seeing Like a State*, observes how 'legibility', and thus standardisation and uniformity in a high modernist context, implies an ignorance of the contingency of nature and of human interaction. Scott refers directly to a prevailing theme in Western philosophy and science: to 'reformulate systems

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19. Peter Millican, 'Introduction to Hume', in *An Enquiry Concerning Human Understanding*, p. ix.

20. Friedrich Nietzsche, *Twilight of the Idols* (1889), trans. by Richard Polt (Indianapolis, IN; Cambridge, MA: Hackett Publishing Company, Inc., 1997), p. 33.

of knowledge in order to bracket uncertainty and thereby permit […] logical deductive rigour', in defence of the disorder that threatens society.[21] In the context of high modernist ideology, complex, and thus illegible, practices are subjected to methods and grids of standardisation, simplification and uniformity as a means to allow for a synoptic view and thus the capability to monitor, measure and manipulate. What Scott considers specifically problematic is the way in which high modernist designs, with their strict functionality, rationality and profit orientation resemble 'sensory-deprivation tanks'. In neglecting and diminishing any possibility for initiative, spontaneity or tractability, they become 'ultimately stupefying'.[22] Scott observes that pleasure in such environments does not result from personal freedom or autonomy, but is rather a 'pleasure of fitting logically into a rational plan'.[23]

The tendency to restrict action and thought to the known and to rule out the unknown from the outset is observable not only in the interaction between humans and the world, but also in the relation between humans and technology. The French philosopher Gilbert Simondon, in his book *On the Mode of Existence of Technical Objects*, observes: 'Culture behaves toward the technical object as man toward a stranger […] it is a rejection of a strange or foreign reality'.[24] He finds that such rejection is a defensive rejection by a partial and biased culture characterised by ignorance and resentment, that creates an opposition between

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21. James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT; London: Yale University Press, 1998), p. 321.

22. Ibid., p. 349.

23. Le Corbusier, in Scott, *Seeing Like a State*, p. 114.

24. Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. by Cecile Malaspina and John Rogove (Minneapolis, MN: Univocal, 2017), p. 16.

humans and machines. Specifically, Simondon problematises two attitudes and misconceptions in Western culture concerning the relation between humans and technology: The first reduces technology to a tool, with the human being as its bearer. Therefore, it has no signification in culture beyond its primitive function of utility. The second represents technology as a source of 'permanent danger of aggression and insurrection' against humans.[25] The machine here takes on the mystical and purely imaginary representation as robot, a duplicate of the human being with unconditional power. Therefore, placing the machine in the service of humans, as presented in the first, is considered a means to prevent the second, as Simondon writes: 'the belief that the reduction to slavery is a sure way to prevent any rebellion'.[26] This tendency to subjugate the machine is considered problematic in the way that it restricts human beings in return, hindering a free and exploratory approach.

Going to the origin of the human urge for determination and smoothness, Beatriz Colomina and Mark Wigley, in their book *are we human?*, similarly identify the role of the aesthetics of modern design as a 'shock absorber' and an 'anaesthetic' that eliminates friction, and thus any bodily and psychological sensations.[27] They reveal that in context of the 'shock environments' of war, modern technology and the metropolis that require attentiveness to unforeseeable threats, 'smoothness' reveals 'not simply an aesthetic choice but a neurological or even narcotic one'.[28] Moreover, they argue that 'design is defence. Most theories of design present the human as under some kind of threat that needs

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25. Ibid., p. 17.
26. Ibid.
27. Beatriz Colomina and Mark Wigley, *are we human? notes on an archaeology of design* (Zürich: Lars Müller Publishers, 2016), p. 96 and 89.
28. Ibid., p. 98.

to be urgently countered by design'.[29] The concept of modern design, with its mantra of 'good design', is revealed as a nineteenth-century product in response to the heightened insecurity of the relationship between humans and machines in an industrialised and globalised world. Like Simondon, they identify two extremes that are central to this argument: on the one hand the human being becoming superhuman and the machine as a new life-form, and on the other the machine as a successor to human beings. While the benefits of the machine were never questioned, the label of 'good design' was a means to 'hold back disturbing thoughts' by taming the machine.[30] The very idea of modern design, with the human as its 'main currency', is revealed as inseparable from human-centred design.[31] They argue: 'Modern design was itself designed as an instrument to engage with the biology of the machine world in a way that supposedly both affirms and protects the human'.[32] 'Good design', according to Colomina and Wigley, is a 'controlled aesthetics' in favour of humans – 'as if nerves themselves were the true clients of modern design'.[33] It directly supports the human ability to master 'the world of mechanisation that had so challenged humanity'.[34]

Conscious of the relation between humans' ability to understand and control and human emotions, the American design researcher Donald Norman finds that human-computer interaction cannot be concerned solely with utility or usability, but that 'pleasure, and fun play critically important roles'.[35]

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29. Ibid., p. 127.
30. Ibid., p. 83.
31. Ibid., p. 82.
32. Ibid., p. 76.
33. Ibid., p. 79 and 99.
34. Ibid., p. 96.
35. Donald Norman, *The Design of Everyday Things*, rev and expanded edn. (New

He observes that understanding and knowledge, as well as our ability to act and manipulate directly, are fundamental sources of pleasure. The opposite, that is, failing to engage with an object, experiencing a lack of understanding of its functioning or failing to retrieve a response can result in frustration and confusion. This account of pleasure paints a dualistic picture of pleasure and frustration, positioning the pleasure of understanding and clear causality as the polar opposite to the frustration at, and aversion to, the unfamiliar and unknown. Faced with 'the rapid rate of technology change [...], new applications, and new methods of interaction', Norman argues for a primary consideration of human needs, behaviour and capabilities in any design process.[36] Therefore, confronted with a gap between humans and machines, human-computer interaction's primary aim is to bridge such a gap, 'mov[ing] the system closer to the user'.[37] Agency is attributed to the human, emphasising their dominance over the computer.

Indeed, Chun's notion of causal pleasure not only concerns the pleasure of user interaction, but equally the power and thrill of programming. At the heart of the practice of coding lies a dichotomy between humans and machines, which the interface and the language of code seeks to bridge. Chun observes that in programming, 'seeing his or her code produce visible and largely predictable results creates pleasure'.[38] Programming language's simple rules, sequential

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York: Basic Books, 2013), p. xiii.

36. Ibid., p. 8.

37. Donald A. Norman, 'Cognitive Engineering', in *User-Centered System Design: New Perspectives on Human-Computer Interaction*, ed. by Donald A. Norman and Stephen W. Draper (Hillsdale, NJ; London: Lawrence Erlbaum Associates, 1986), p. 43.

38. Wendy Hui Kyong Chun, 'On Software or the Persistence of Visual

instructions and 'the magical transformation of words into things' makes programming a tool for empowerment and control: 'One's code causes an action to happen: cause and effect is clear'.[39] Chun refers to the ubiquitous 'Hello, World!' programme, usually the first programme a beginner learns, whose simplicity and immediately visible outcome further reinforce the fantasy of the almighty human: 'As a lawgiver more powerful than a playwright or emperor, the programmer can "say" "let there be light" and there is light'.[40] However, while higher-level programming languages 'offer the lure of visibility, readability, logical, if magical, cause and effect', Chun points to the way in which such ease of control simultaneously necessitates an abstraction, and thus obfuscation and 'blackboxing'.[41] It suggests power and control while 'paradoxically decreasing [the programmer's] real power over their machines'.[42] The abstraction of programming languages, then, is an 'erasure of difference in the service of likeness or equality,' that, as Chun argues, 'also erases, or "forgets," knowledge'.[43] Considered from this perspective, the gap between human and machine, rather than being bridged, on the contrary appears to be enlarged, compensated for and masked over by the programming language's ability to support the user's and programmer's sense of ability to navigate the machine's complexity.

Knowledge', *Grey Room,* 18 (Winter 2004), 26–51 (p. 39-40).

39. Wendy Hui Kyong Chun, *Programmed Visions: Software and Memory* (Cambridge, London: The MIT Press, 2011), p. 19.
Chun, 'On Software or the Persistence of Visual Knowledge', (p. 39-40).

40. Chun, *Programmed Visions,* p. 48 and p. 47.

41. Ibid., p. 48 and p. 45.

42. Ibid.

43. Ibid., p. 37.

This research project therefore begins by expanding on the view, outlined above, that instinctive as well as culturally and politically imposed rationales of universalisation and generalisation may lead to an ignorance about the contingency of nature and of human interaction. In addition to the human instinct to establish causal relations in order to render their actions, thought and knowledge legible, this disposition is further amplified by governmental, and thus human-made, systems of organisation and universalisation.

The exploration undertaken above further identified the way that human-computer interaction directly draws its power, pleasure, addictiveness and romance from the way it supports the illusion that the world is intelligible to human reason. Its functioning is not only based on such an assumption, but, as identified via Chun, further nurtures and emphasises the ability of humans to control, shape and master nature according to their needs. In a conflicted relationship between humans and the world, it may be argued that causality deepens, rather than bridges, their fundamental difference.

In each case, principles of causality, and thus intelligibility and legibility, should not be confused with true understanding and insight into the way phenomena function. Rather, it is suggested that such principles imply a selective and digestible section of a complex whole, an 'umbrella' in the face of a complex world. It may be argued that these principles, by excluding the new, the unfamiliar and unexperienced from the outset, not only distort reality but also reproduce this distorted reality and with it the human ability to become active and inventive. The critical perspective on notions of strict rationality, functionality, profit orientation and causal pleasure discussed above, in the context of this research, directly supports a line of investigation that favours the unexpected, the contingent, the unplanned and the nonsensical.

1.3. Uncausality

Asemic effect hints at a space beyond binary opposition, rationality and closure: therefore, this thesis needs to be contextualised according to alternative modes of thought, action and knowledge. Based on the initial exploration of the concepts of asemic effect and causal pleasure and supported by the thinkers referenced in the previous subchapter, this thesis proposes the concept of 'uncausality'.

In the context of this research, the practice of coding explores, tests and expands on the concept of uncausality by engaging in a process of programming visually abstract real-time human-computer interfaces.[44] It should be noted that my engagement in a practice of coding emerged from this research project rather than being planned to form the practice-based element of this research.
While my exploration of interactive type design and asemic writing during my MA involved the creation of several computer programmes, I was mostly dependent on other programmers who helped me implement my ideas.
My earliest practice-based experiments when starting this PhD research project explored analogue methods of copying, tracing and translating texts.[45]

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44. The words 'coding' and 'programming' in context of this thesis are used interchangeably to refer to programming in a higher-level language, or so- called 'automatic programming'. As Chun explains: 'Automatic pogramming is an abstraction that allows the production of computer-enabled human-readable code' (Chun, *Programmed Vision,* p. 41).
45. While these analogue explorations were part of the early exploratory phase of this research project, they represent another detour that was not pursued further and which, for reasons of narrative and scope, was not included in this thesis.

Expanding asemic writing's characteristic tension, these methods allowed for a shift in focus onto the gesture of the moving hand, rather than the semantic context of a text. It was only when I read about Chun's notion of 'causal pleasure' that I turned to programming.

Chun's term 'causal pleasure' immediately resonated with me. It appeared to capture most strikingly, but in an inverted way, the asemic effect I was so fascinated by. Considered through the logic of causal pleasure, the asemic effect, by inducing a deliberate discrepancy in causal inference and an unfulfilled desire for closure, would avert and frustrate interaction rather than encourage it. However, given my pleasurable fascination with asemic writing's oppositional dynamics, I wondered whether there was something that could be called 'uncausal pleasure', a term that will be expanded on in Chapter 2 of this thesis. If causality supported human beings in their habitual way of acting, thinking and knowing, I was curious to see what alternative modes of thought, action and knowledge could be opened up through a consideration of uncausality.

Using basic programming skills that resulted in the example that introduces this Chapter, I created a computer programme that contrasts asemic writing's and causal pleasure's opposing dynamics. More importantly though, I embarked on a process of learning to code myself. I chose the programming framework p5.js, which was developed to make coding accessible to people without a traditional computer science background.[46] Lauren McCarthy, artist and

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46. A full list of Java Script Libraries used in context of this research can be found at the end of this thesis. p5.js is a reinterpretation of another framework called Processing; p5.js is geared towards the web context, enabling an exploration of the specificity of the medium of the browser with its interactive and real-time qualities.

developer of p5.js, states: 'You don't have to be an expert or a pro or know exactly what you're doing or have a whole plan – you could maybe just start doing something and learn along the way'.[47]

Coding tutorials often demonstrate very simple coding examples or functions, followed by asking the learner to alter the programme by changing parameters in the code.[48] This process is intended to give a learner a feeling about the programme's logic – to help them understand and test the causal relation between the code as it has been and the computer's interpretation of it. The process of learning to code then proceeds through the creation of simple, playful, interactive 'sketches'. Here, the term 'sketch' already indicates the processual and iterative nature of the practice. In the context of this research, the process of learning to code, and the iterative process that is characteristic of a beginner's approach in programming became an essential element of the practice-based part of this thesis.

Engaging in simple programming exercises, rather than relying on the help of other programmers, led me to discover the practice of coding as a practice of continuous alteration and iteration of causality. Here, programming is not primarily a means to create a programme, but becomes about an immersion in a continuous mutation of the relation between cause and effect, action and reaction, between

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47. BocoupLLC, *LEARNING WHILE MAKING P5 JS Lauren McCarthy*, online video recoding, OpenVis Conference 2015 Boston, YouTube, 16 April 2015 <https://www.youtube.com/watch?v=1k3X4DLDHdc> [accessed 11 March 2021].

48. For my programmes, I mainly drew from examples and demonstration on the p5.js website, as well as Daniel Shiffman's YouTube channel 'The Coding Train'. A full list of source code references can be found at the end of this thesis.

a written code and the computer's interpretation of it, uncovering new potentialities for action and thought along the way.

The example that introduces this chapter therefore marks a decisive step in a new direction for this research. My endeavour to create a programme became an immersive process of exploring and manipulating causal processes. It was my engagement with the practice of programming that fully transformed my exploration of asemic writing into a transdisciplinary endeavour. Thus, if the practice of coding came to play a central role in context of this thesis, it should be considered as a process of discovery and immersion in continuous change, rather than determination. While the resulting programmes should not be overlooked, the process of programming itself forms a key element of the practice. Given this focus on the process of programming and the perspective of the designer and programmer rather than the user, it is a deliberate decision to position the reader of this thesis as a spectator, rather than as a user of the programmes.

The programmes shown and discussed via screenshots throughout this thesis are an exemplary rather than exhaustive representation of the body of practice created in context of this research. They drive the chapter's narrative, creating continuous encounters between practice and theory. A complete picture of all programmes created in the context of this PhD thesis, is available in the screen capture video (mov. file) that accompanies this written thesis, which should be viewed after the thesis has been read.

The iterative and dynamic nature of coding discussed above is not only characteristic of the process of learning to code. Rather, adapting code from existing programmes remains an essential part of the practice. Programmers rarely write code from scratch, but instead re-appropriate, re-organise, re-mix

and re-write code snippets for their own purposes and specific context. Even skilled programmers do not shy away from using and re-appropriating code created by other developers as a starting point for their own original project.

As Chun argues, coding is not a 'dead repetition' but 'a writing, open to alteration/iteration'.[49] Isolated from their initial surrounding code snippets become entry points for a new and original piece of work. Thus, coding is characterised not only by a constant process of iteration, but also by progression. It becomes less about recreating something that exists, but rather, taking what exists as a basis from which to expand, continuously pushing the discipline beyond the already known. While copying and appropriation in other disciplines might be associated with unoriginality, it proves essential for the progression, development and liveliness of a discipline that constantly adapts and shifts according to its contemporary context. Coding could therefore be described as a practice that is constantly pushing its own boundaries. The need for constant progression arises from the need to catch up with the speed of technological development. Or, perhaps, it is also, in reverse, the reason for the accelerated speed of technological development.

The way that the practice of coding in the context of this PhD thesis becomes a means for critical thinking may suggest an association with notions of 'creative coding', 'exploratory programming', 'aesthetic programming' or 'net art'.[50]

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49. Chun, *Programmed Visions,* p. 25.

50. John Maeda, Creative Code (London: Thames and Hudson, 2004).
Nick Montfort, Exploratory Programming for the Arts and Humanities (Cambridge, MA: MIT Press, 2016).
Winnie Soon and Geoff Cox, *Aesthetic Programming: a Handbook of Software Studies* (London, Open Humanities Press, 2020).

Approaches such as these emphasise the primacy of experience and expression as opposed to functionality and pragmatics in order to 'anticipate and respond to technological transformation in society', as Golan Levin and Tega Brain suggest in their book *Code as Creative Medium*.[51] They argue: 'Creative coding [...] should be an invitation to look at technology with fresh eyes: defamiliarised, decontextualised, and reinterpreted'.[52] In particular, because software increasingly permeates everyday life, they consider it essential to 'foster culturally enmeshed ways to contextualise it, question it, modify it, and develop shared understanding for working with it'.[53] However, the practice of coding in the context of this PhD research does not imply a situating of this research within computer science or the disciplines mentioned above.

Rather, following a transdisciplinary metamethodology after Félix Guattari via Gary Genosko, the practice of coding becomes another method through which to explore and expand on the concept of uncausality in its own terms. A transdisciplinary approach encourages experimental practices that overcome the aims and concerns of a particular discipline in order to collectively open up alternative debates and discourses. Here, the creation of a concept or metamodel facilitates a dissociation from specialisation, thus allowing the possibility of seeking alliance and drawing a 'new field of relations' across disciplines and modes of research.[54] For Guattari, an organisation of human culture by discipline

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The Art Happens Here: Net Art Anthology, eds. by Aria Dean, Dragan Espenschied, Michael Connor (New York: Rhizome, 2019).

51. Golan Levin and Tega Brain, *Code as Creative Medium: A Handbook for Computational Art and Design* (Cambridge, London: The MIT Press, 2021), p. 5.
52. Ibid., p. 7.
53. Ibid., p. 6.
54. Gary Genosko, 'Félix Guattari: Towards a Transdisciplinary Metamethodology',

no longer mirrors the 'interdependent hypercomplexity' of our current reality shaped by technological revolution.[55]

A transdisciplinary methodology therefore encourages research that is not strictly confined within a particular discipline's aims and concerns, nor within a particular mode of research. Therefore, practice-based work in the context of this research is not a means to test or illustrate theories previously explored in writing. Nor, vice versa, does theory seek to rationalise practice-based experiments. Rather, the metamodel of uncausality facilitates a discourse that develops and mutates across disciplines, practice and theory. This way, practice and theory come together to sketch out, define and expand the implications of the concept of uncausality on their own terms. It is thus through both practice and theory that new fields of enquiry and interest are revealed.

In transdisciplinary research, while a researcher's disciplinarity remains to an extent a necessary point of departure, they are encouraged to draw from beyond their territory of expertise. Therefore, drawing from other disciplines does not require specialism. Crucial to note here is that concepts and methods from one discipline are not uncritically employed and migrated to another discipline (as in interdisciplinary research). Rather, they must be integrated and developed further outside of their own context, specialism and problems, exploring how they can push disciplinary boundaries and create alternative practices.

This method of concept creation might initially appear to contradict the objective of eliminating generalisation and universalisation. Indeed, the previous exploration in this chapter revealed the prevailing problematics in the creation

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Angelaki: Journal of the Theoretical Humanities, 8.1, (April 2003), 129-140 (p. 134).

55. Ibid.

of terms, categories and disciplines, that naming something implies the danger of restricting something. To name something is to render it legible, but this simultaneously restricts a phenomenon to a selective section of reality that is not necessarily representative of its true nature. However, viewed through the lens of Deleuze and Guattari's thinking, the creation of concepts becomes an essential tool, not to confine and universalise but to open up a line of investigation and of continuous definition while conserving the inherent variability of a phenomenon. Unlike the common use of the word, 'concepts' in Deleuzo-Guattarian terms are not means for abstraction or explanation. On the contrary, the concept itself requires explanation. It is 'a proposition deprived of sense' — that is, without reference.[56] 'It is self-referential; it posits itself and its object at the same time as it is created'.[57]

If Deleuzian concepts may appear 'outlandish', 'flamboyant', 'pretentious' and 'excessive', as the authors of *The Deleuze and Guattari Dictionary* observe, they do so in order to 'provocatively […] draw our attention toward that which we are naturally inclined to neglect'.[58] Indeed, Deleuze mentions how he and Guattari were sometimes criticised for using 'complicated words "to be trendy"'.[59] He counters: 'That's not just malicious, it's stupid. A concept sometimes needs a new word to express it, sometimes it uses an everyday word that it gives a singular

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56. Gilles Deleuze and Félix Guattari, *What Is Philosophy?* (New York: Columbia University Press, 1994), p. 22.

57. Ibid., p. 22.

58. Eugene B. Young, Gary Genosko and Janell Watson, *The Deleuze and Guattari Dictionary* (London: Bloomsbury, 2013), p. 2.

59. Gilles Deleuze, *Negotiations* (1972-1990) (New York: Columbia University Press, 1995), p. 32.

sense'.[60] In fact, reading Deleuze confronts the reader with an overwhelming number of concepts that do not seem to explain something that is given, observed or represented but that instead initiate an 'act of thinking'. In reading his books, Deleuze argues, the question should not be: 'What exactly is a "body without organs"? What exactly do you mean by "desiring machines"?'[61]

In concepts, 'there's nothing to explain, nothing to understand, nothing to interpret', as Deleuze observes.[62] Instead, he refers to an 'intensive way of reading,' that implies questions such as 'what did you yourself do with it?' or 'how does it work for you?'[63] Just as Deleuze and Guattari construct concepts, 'steal concepts' and relate them to other areas, they invite the reader to do the same in order to explore concepts in their respective practice, context or medium:[64] 'This intensive way of reading [...] as a series of experiments for each reader in the midst of events that have nothing to do with books, as tearing the book into pieces, getting it to interact with other things, absolutely anything.'[65]

This emphasis on a positive culture of 'stealing' and appropriation as a means to expand on what exists draws a clear parallel with the practice of coding discussed above, in which an existing code snippet, isolated from its original purpose and

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60. Ibid.
61. Ibid., p. 7. Both 'abody without organs' and 'desiring machines' are Deleuzian concepts.
62. Ibid., p. 8.
63. Ibid., p. 8.
64. 'Translator's Foreword', Brian Massumi, Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. by Brian Massumi (London, New York: Bloomsbury, 2013), p. xiii.
65. Deleuze, *Negotiations*, p. 8.

context, becomes an entry point for the creation of a new original programme. Similar to the practice of programming, '*creating* concepts' leads to the constant challenging of, and expanding, disciplinary boundaries.[66] This thesis therefore suggests that the practice of coding should be considered as a transdisciplinary practice in itself.

Reading *A Thousand Plateaus*, as Brian Massumi explains in the foreword to the book, 'the reader is invited to lift a dynamism out of the book entirely, and incarnate it in a foreign medium, whether it be painting or politics'.[67] Rather than accepting and adapting existing concepts as a given, concepts have to remain subject to 'renewal, replacement, and mutation', as Deleuze and Guattari suggest.[68] Indeed, throughout Deleuze's body of literature, concepts never stay the same, nor are they ever fixed by definition. They constantly mutate, evolve, change and become: they never settle in definition, but 'extend to infinity'.[69] But after all, as Deleuze concludes, concepts are just an invitation for thought rather than an imposition: 'If it doesn't work, if nothing comes through, you try another book. [...] something comes through or it doesn't'.[70]

This PhD thesis does not only explore the uncausal through scholarship and the practice of programming. It further expands on this concept through the structure and writing styles of the thesis. Here, the act of writing itself becomes a transdisciplinary methodology: A means to explore spaces in-between and across disciplines and modes of research — an active and creative process, rather

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66. Deleuze and Guattari, *What Is Philosophy?*, p. 5.
67. Deleuze and Guattari, *A Thousand Plateaus*, p. xiii.
68. Deleuze and Guattari, *What Is Philosophy?*, p. 8.
69. Deleuze and Guattari, *What Is Philosophy?*, p. 19.
70. Deleuze, *Negotiations*, p. 8.

than a documentation of something already fully established. In Deleuzian terms, the act of writing this thesis may be said to become:

> an intensive way of [writing][...] as a series of experiments for [the writer] in the midst of events that have nothing to do with [the reference], as tearing [the reference] into pieces, getting it to interact with [my practice-based explorations].

As exemplified in the preceding paragraph, some references in the context of this thesis are lifted from their original context and collaged with my own words to open up new conversations and new explorations in creative and experimental alliance between theory and practice-based experiments. For example, in the original quote taken from Deleuze's book *Negotiations*, the author discusses an 'intensive way of reading', wherein the reader is encouraged to establish fresh connections based on their own context, experience and associations. In my amended quote, while maintaining the quote's original phrasing and structure, the words written in square brackets replace Deleuze's words with my own. They appropriate the quote to exemplify and describe my method of intensive writing employed in the context of this thesis. Set in the 'mingle' font (unmingled), these more poetic sequences and footnotes stand out from the rest of the text.

In addition, screenshots in this PhD thesis may be accompanied by footnotes set in the 'mingle' font. In these instances, the footnotes bypass their conventional function of marking references, comments and elaborations. Instead, the footnotes contain references originating from seemingly unrelated contexts. The juxtaposition of screenshots and references from differing contexts opens up a new conversation in their transdisciplinary connection, which is further explored in the course of the respective chapter using the method

of amended quotes exemplified above.

Sticking with Deleuzian terminology at this point, these amended quotes may be read as 'bastard children', a hybrid arising from a bringing together of two disparate, yet not entirely dissociated contexts.[71] As further expanded on in Chapter 1.4. of this thesis, Deleuze describes his philosophical practice as a 'philosophy of bastard line', that originates from both intersecting with and departing from a study of mainstream Western thinkers. Along the same lines, the amended quotes in the context of this thesis become a 'mutant offspring' born from a merging of an original quote and my own words and practice.[72] This method in no way intents to put words in the original author's mouth, nor to disrespect the original author or the value of their words written. Instead, this method seeks to take their words as an entry point to form transdisciplinary connections across fields, that may open up new connotations and new conversations outside of their original context.

If the 'un-' in uncausality remains unclear and ambiguous, this is completely intentional. Uncausality is not meant to be descriptive but rather engaging, self-reflective and self-referential, its meaning incapable of being pinned down. The prefix 'un-' initially seems to position the uncausal in binary opposition to the causal. In the English language, the prefix can be freely applied at will, usually in order to negate or indicate the absence or lack of a certain quality. It creates a new category, an extension of an original term that no longer appears able to describe the thing it designates. It is a neologism that hints at something lying beyond an initial category. It marks a disruption of the norm and of common sense. At the same time, it does not simply indicate a break with common order.

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71. Please refer to p. 65 of this PhD thesis for more information.

72. Deleuze and Guattari, *A Thousand Plateaus*, p. viii.

It is not a simple negation, but retains its reference to its positive counterpart, creating an oscillation and tension of being both and other. The 'un-' creates a neologism from a known word, displacing it from its original context, a change of order, in an attempt to simply shed light not only on its inversion, but also on the initial term itself. To invert, reject or negate something is a conscious choice to challenge and to generate tensions and slippages from an original term or concept.

The uncausal therefore should not be considered a polar opposition, but more as a derivation from the causal towards the uncausal. It points towards a dislocation, asymmetry and imbalance of the two binary extremes. Consequently, the uncausal does not simply deny or critique the very existence of the model of causality. As Massumi argues:

> Models criticised [...] do not need to be trashed. They are not just plain wrong. It's just their sphere of applicability must be recognised as limited to a particular mode of existence, or a particular dimension of the real. [...] Accurate, but only at a certain scale of things. [...] The issue is to demarcate their sphere of applicability – when the "ground" upon which they operate is continuously moving.[73]

Concepts in the Deleuzo-Guattarian sense seek to open up, rather than define, lines of investigation. The concept of uncausality in the context of this thesis should be understood in a similar way. It does not attempt to arrive at a definition of the same, nor to arrive at a definition of asemic writing. Instead, it becomes an important tool and method to transgress the boundaries of a discipline and

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73. Brian Massumi, *Parables for the Virtual: Movement, Affect, Sensation* (Durham, NC; London: Duke University Press, 2002), p. 7.

to engage in a constant process of definition. To say it in Deleuze's words:

> A theory of [uncausality] is not 'about' [uncausality], but about the concepts that [uncausality] gives rise to and which are themselves related to other concepts corresponding to other practices. [...] It is at the level of the interference of many practices that things happen, beings, images, concepts, kinds of events.[74]

To reiterate, the concept of uncausality establishes the scope of this research. As both a method of inquiry and a methodology, it becomes an essential tool for investigation. While my curiosity and interest in asemic writing is rooted in my perspective as a visual communicator and type designer, it may not be the destination of this research. Rather, the concept of uncausality detaches the characteristic tension identified in asemic writing from its immediate context in order to engage in its mutation across divergent disciplines as well as theory and practice. It supports research that is concerned less with the description of asemic writing as an object of concern and more with the instantiation of a process of thinking and acting that runs counter to the Western philosophy of causality.

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74. Gilles Deleuze, Cinema 2: The Time-Image (London: The Athlone Press, 1989), p. 280; The term 'cinema' in the original quotation was replaced by the term 'uncausality'. Please refer to p. 58-60 of this PhD thesis for more information.

1.4. Becoming Thought and Action

This thesis presents a line of exploration that has emerged from prolonged contact with the concept of uncausality, seeking 'resonances, common ground, with what other [thinkers and practitioners] are doing or trying to do, from which we can all derive greater strength or confidence', as Deleuze formulates it. [75] This research aims to encourage a practice of 'philosophical', or 'nomad', thinking, that is, according to Deleuze and Guattari, a way of thinking that runs counter to the Western philosophical tradition.

In discussing the opposition to mainstream or conventional Western philosophical frameworks, it is important to note how Deleuze's philosophical approach and concepts diverge from what he calls ‚state philosophy'. He is concerned with the 'collusion between philosophy and the State', in which philosophy is exploited or used as an instrument of social control and domination by the state or other institutions of power.[76] He writes: 'The exercise of their thought is in conformity with the aims of the real State, with the dominant significations, and with the requirements of an established order'.[77] Here, 'state philosophy' seeks to maintain the status quo, reinforcing dominant ideologies in favour of stability, order and predictability while inhibiting any possibility for change, discovery and creation.

Deleuze finds himself 'bludgeoned to death with the history of philosophy. The history of philosophy plays a patently repressive role in philosophy'.[78] Deleuze and Guattari suggest that '[w]hat is lacking is a Nomadology, the

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75. Deleuze, *Negotiations*, p. 27.
76. Deleuze and Guattari, *A Thousand Plateaus*, p. x.
77. Ibid., p. vii.
78. Deleuze, *Negotiations*, p. 5.

opposite of history'.[79] As the *doxa* contains thought and action, they are in pursuit of a 'philosophical obstinacy with no ally but the paradox'.[80] The paradox then, taken literally, means 'opposed to *doxa*'.[81] This is an effort to explore tendencies in thought that derive from common opinion, to establish something different from the established view. While 'people are constantly putting up an umbrella that shelters them', Deleuze and Guattari consider it as a primary responsibility of philosophy to 'make a slit in the umbrella [...] to let in a bit of free and windy chaos'.[82]

Nomad thought, according to Deleuze, pursues a violence or estrangement that will 'awaken thought from its natural stupor' so that thinking becomes active and creative rather than being confined to 'a ready-made thought'.[83] To make his argument, Deleuze distinguishes between an object of recognition and an object of encounter. The object of recognition is a static, reductionist model that does 'not disturb thought'.[84] Thought remains 'imprisoned' by principles of causality, representation, regularity and closure.[85] The object of encounter, by contrast – impossible to categorise in terms of representation or recognition – requires a

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79. Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. by Brian Massumi (London, New York: Bloomsbury, 2013), p. 24.

80. Deleuze, *Difference and Repetition*, p. 175.

81. Gilles Deleuze, *Logic of Sense* (1969), trans. by Constantin V. Boundas, Mark Lester and Charles J. Stivale (London, New York: Bloomsbury, 2015), p. 78.

82. Deleuze and Guattari, *What Is Philosophy?*, p. 203.

83. Deleuze, *Difference and Repetition*, p. 183.

Deleuze and Guattari, *What Is Philosophy?*, p. 51.

84. Deleuze, *Difference and Repetition*, p. 182.

85. Ibid., p. 178.

revaluation of thought: 'Something in the world forces us to think. This something is an object not of recognition but of a fundamental encounter'.[86] It is only the liberation 'from the constraints that seek to define and enclose creativity', that gives rise to the act of thinking.[87] In an encounter, thought becomes problematic and therefore creative, active and productive rather than passive, reactive, static and formed by predetermined universals: 'Becoming-active is affirming and affirmative, just as becoming-reactive is negating and nihilistic'.[88] In a world 'out of sync', where 'the link between man and the world is broken', nomad thought becomes about what Deleuze refers to as a 'belief in this world'.[89] Establishing belief consists in replacing knowledge by crafting conditions that allow for an encounter with the world anew, to reconnect the broken link between humans and the world and to bear witness to life as it is. It is in this sense that nomad thought is more affirmative than a critique or a simple negative: 'A belief as thought of the unthinkable'.[90]

At the same time, Deleuze's philosophy does not completely dissociate from the Western thought he was schooled in. He uses the term of a 'bastard child' to describe his philosophy as one that intersects with, yet diverges from, traditional Western thought. He writes: 'I imagined myself approaching an author from behind and giving him a child that would indeed be his but would nonetheless be

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86. Ibid., p. 183.

87. Deleuze and Guattari, *What Is Philosophy?*, p. viii.

88. Gilles Deleuze, *Nietzsche and Philosophy* (1962), trans. by Hugh Tomlinson (London, New York: Continuum, 1996), p. 68.

89. Ibid.;

Gilles Deleuze, *Cinema 2: The Time-Image*, trans. by Hugh Tomlinson arul Robert Galela (London: The Athlone Press, 1989), p. 171.

90. Ibid.

monstrous'.[91] He describes his philosophical practice as a 'flirtation with the greats', a philosophy of bastard line, that gives rise to a hybrid, a 'mutant offspring'.[92] Hence, even though Deleuze may be considered a Western philosopher himself, his explorations may be said to pose a significant departure from traditional Western philosophical frameworks.

Therefore, when challenging Western thought, the intention is not to present a binary opposite or a straightforward negation. Much like the concept of uncausality, it marks a displacement from an original order, a process of becoming and moving away, while still acknowledging its origin. While this PhD research solely relies on Western sources and culture, the selected references are united in the way that they try to introduce a new direction in Western thought. In this way, as Massumi writes, these explorations can be read 'less a critique than a positive exercise'. To 'break constraints and open new vistas'.[93] It is this field that this thesis moves in and adds to.

Being conducted from the perspective of a visual communicator, this research is necessary rooted in the Western educational and philosophical context it emerges from. The choice of sources included cannot be considered independent of the Western cultural and socio-economic context I grew up and was educated in, of my gender or of my training as a visual communicator. I acknowledge that where I write from does have consequences for favouring sources and dismissing others.

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91. Deleuze and Guattari, *A Thousand Plateaus*, p. vii.
92. Ibid., p. viii.
93. Ibid., p. xi.

The aim of this research to encourage a practice of philosophical thinking is not to be confused with situating this research within the discipline of philosophy. Philosophical thought should not be mistakenly conceived as confined to philosophy. Rather, as Massumi explains in the introduction to Deleuze and Guattari's *A Thousand Plateaus*, anybody who seeks to 'explore the potentials of their respective mediums and break away from the beaten paths' can be considered a philosophical thinker.[94] By this he means breaking free from the history and tradition of a discipline in order to engage in an open-ended process of exploration beyond a discipline's confines. Thus, in the context of this thesis, it is philosophical, or nomad, thinking that facilitates a way of thinking that does not seek to explain the paradoxical away, but to encounter it in an effort to expand disciplinary boundaries that define thought by categories of right and wrong.

Nietzsche, along the same lines, encourages 'saying yes to life even in its most strange and intractable problems, the will to life, celebrating its own inexhaustibility'.[95] He advocates becoming a learner rather than knower: that is, becoming active, patient and delaying judgement. This implies the necessity *'not* to react to a stimulus right away, but to keep in check the instinct to restrict and exclude'.[96] This is, as Nietzsche argues: 'Not in order to be released from terror and pity, not in order to purify oneself of a dangerous emotion through its vehement discharge'. It is rather to engage in the 'joy of becoming', that is, to experience the future and eternity of life.[97]

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94. Brian Massumi, in Deleuze and Guattari, *A Thousand Plateaus*, p. xii.
95. Nietzsche, *Twilight of the Idols*, p. 91.
96. Ibid., p. 48.
97. Ibid., p. 91.

In an attempt to counter the prevailing ignorance, Scott brings forth a 'few rules of thumb'.[98] The first, 'take small steps', implies a step-by-step consideration and observation of interventions and their consequences. The second, 'favour reversibility', implies a favouring of interventions that can be undone. The third, 'plan on surprises', implies a flexibility of plans to accommodate the unforeseen. And fourth and finally 'plan on human inventiveness', implies an incorporation of knowledge achieved through experience and insight. In opposition to the high modernist approach of standardisation and marginalising contingency and an individual ability to act, Scott advocates a reconsideration of the unexpected, the responsive, the collective and the improvisational with a reverence for life and the future. Inventiveness and unpredictability become essential tools for speculating about alternative futures and rationales for knowledge production that cannot be aligned with order and universalisation. With legibility as a condition of manipulation, illegibility (and thus the temporary, unplanned, informal, irrational, non-standardised and local) for Scott 'remains a reliable resource for political autonomy'.[99]

Simondon suggests that it is the responsibility of culture to reintroduce an awareness of the nature of machines and more specifically to establish a relation of equality between humans and technical objects. He argues that in such a relation, machines and technical objects are not reducible to a primitive tool with predetermined and specific functions, nor to a duplicate and enemy of human beings, with unconditional power. 'The prime condition for the incorporation of technical objects into culture would thus be for man to be

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98. Scott, p. 345.; A rule of thumb is not absolute. Scott appreciates that a "point-by-point reform" would miss his point. Like the uncausal, they need to remain fugitive to prevent them from becoming legible.

99. Ibid., p. 55.

neither inferior nor superior to technical objects, but rather that he would be capable of approaching and getting to know them through entertaining a relation of equality with them, that is, a reciprocity of exchanges; a social relation of sorts'.[100] Therefore, technology no longer exists in isolation, to be used passively and with a predetermined end product: the ensemble has to be understood as a process of elaboration and invention that integrates the activity of the user into its operational functioning. The alienation of humans from technology can only be eliminated by bringing 'the use of the body, and of the interaction of function back to the unity of technical activity'.[101] Thus, any difference between construction and use in technical objects no longer exists. The technical ensemble as a 'coupling of man and the world' does not carry definite information nor knowledge.[102] Rather, an ensemble allows for an expansion of knowledge through reciprocal action. Simondon advocates that culture should exist in its relation to technics, 'the bearer of freedom [liberté] and not alienation'.[103]

Chun's explorations point in a similar direction: she 'does not seek to condemn computers as simple neoliberal tools or top view user empowerment as a form of imprisonment'.[104] Rather, as she continues, working with a computer allows the human not only to 'negotiate the dangers and pleasures of the worlds they encapsulate and explode' but, further, to 'pleasurably create visions that go elsewhere [and] that reveal the limitations and possibilities of user and programmers'.[105] It is in this way that Chun's explorations are not a simple

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100. Simondon, p. 105.
101. Ibid., p. 341.
102. Ibid., p. 234.
103. Ibid., p. xii.
104. Chun, *Programmed Visions*, p. xii.
105. Ibid.

critique, but instead an affirmation, pointing to the pleasure of discovery. She suggests that not knowing should be considered as enabling and engaging rather than inhibiting: 'The fact that we cannot know software can be an enabling condition'.[106]

Conscious of the transformative nature of design, Colomina and Wigley consider the redefinition of the human as an essential contemporary role of design. Design does so not by solving problems or by servicing the routines of everyday life – 'it is precisely in challenging us – triggering the potential of new ways of seeing, thinking, grasping, and acting – that design plays its role in redefining the human'.[107] For Colomina and Wigley, design becomes an 'urgent call to reflect on what we and our companion species have become?'[108] On the one hand, 'human' remains a 'magic word' in modern design discourse, associated with positive qualities of responsiveness, sensitivity and protection in the context of the shock of modern industrialised life.[109] On the other-, the idea of human centricity is revealed as a market-driven concept, reducing the human body to a singular and stable entity – an ideal consumer, easy to manipulate, monitor and control. Colomina and Wigley argue that: 'human-centred design is ultimately not so interested in human well-being'.[110] The diversity, fluidity and transformation of the human body entangled within an environment is normalised and stabilised by multiple cultural disciplines and 'design codes' such as gender, sexuality or ethnicity.[111] The authors ask: 'What if design is precisely not human centred?

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106. Ibid., p. 54.
107. Colomina and Wigley, p. 17.
108. Ibid., p. 162-163.
109. Ibid., p. 127.
110. Ibid., p. 121-122.
111. Ibid., p. 220.

What if design is only design inasmuch as it challenges contemporary definitions of human?'[112]

In the context of this research, the thinking discussed above is drawn together to support the productive implications of a consideration of the uncausal, the illegible, the unplanned, the chaotic and the nonsensical. It indicates a realm of thought beyond the human desire to predict, determine and master. Based on the explorations above, the causal can be argued to restrict thought, knowledge and action to the already known, to fixed ideologies and to an anticipated future. The causal neglects the uncausal as an accident, a dream, an illusion. By contrast, this thesis suggests that a consideration of the uncausal may cultivate active engagement, attention and care. The uncausal is not an attempt to make life indeterminate. Rather, it is an appeal to resist the human instinctive desire for explanation, order and universalisation that compromises our ability to be responsive to the contemporary condition. Uncausality is a deliberate complication, a detour, a problematisation of the present as a means to embrace the contingency of the future.

Thus, the main contribution of this research is the creation of the concept, model and method of uncausality. At the same time, this thesis does not attempt to arrive at a definition of the uncausal. As suggested above, the concept of uncausality is deliberately unclear and unsettling. Its undefinedness activates a field of exploration between concepts, practices and disciplines. It should be noted at this point that this research does not attempt to review or refer to all the relevant existing scholarship. Rather, this thesis is the result of decisions that were made about which sources to include or omit, given the scope and endeavour of this research project. Taking this into account, this thesis hopes to reflect on and add

112. Ibid., p. 122.

to the above mentioned body of work at a crucial moment in time that prompts a reconsideration of power, agency, thought and pleasure.

Following and expanding on the work of the thinkers discussed above, this thesis will explore the potential of the concept of uncausality to shed light on what is habitually neglected. This PhD research approaches and contributes to their discussion from the perspective of a visual communicator. It reflects and expands on their ideas not simply in writing, but as a practitioner, as a designer, as a creator, prolonging their philosophical thought into a philosophical action. I become what Deleuze calls 'the conceptual persona', where the potentiality of a concept becomes inseparable from its creator.[113] The concept of uncausality becomes both a method and a methodology to 'make a slit in the umbrella', as Deleuze would say.[114] In the same ways, design here is not trying to compensate for the complexity of the world and serve our habitual ways of interacting with and being in it, but seeks to 'let in a bit of free and windy chaos'; to open up to discovery, creation and change.[115]

Drawing exemples from the body of practice created alongside this written thesis, the next chapters follow the notion of uncausality as it mutates and evolves in relation to other concepts and discourses. By exploring the 'irregular contour' of the concept of uncausality, the chapters intend to test the ability of the concept of uncausality to enable a way of thinking and acting that is not defined by the already known or the already experienced.[116] It does so in order to challenge the

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113. Deleuze and Guattari, *What Is Philosophy?*, p. 5.

114. Ibid., p. 203.

115. Ibid.

116. 'Every concept has an irregular contour defined by the sum of its components [...] The concept is a whole because it totalizes its components, but it

dominant logic of interactivity and to work towards an articulation of an alternative way of interacting with both technology and the world around us.

Chapter 2 elaborates on the concept of uncausality as a gap between expectation and encounter via the notion of bugs in programming. It presents the concept of uncausal pleasure to explore the potential implications of actively seeking out a confrontation with the dissonant.

Expanding on the dynamics explored in Chapter 2, Chapter 3 addresses the value of resisting the human desire for closure and resolution, maintaining thought and action in a state of physical and intellectual tension. Rather than positioning the uncausal in binary opposition to the causal, the uncausal is evaluated as a something that constantly and creatively moves away from the causal while maintaining its reference to it.

The fourth and final chapter concludes the thesis, reflecting on its findings as well as expanding on the paradox of writing up a concluding chapter that does not aim to conclude. It intends to highlight the ideas of this thesis, transitioning the reader back into their own context, their own discipline, their own practice.

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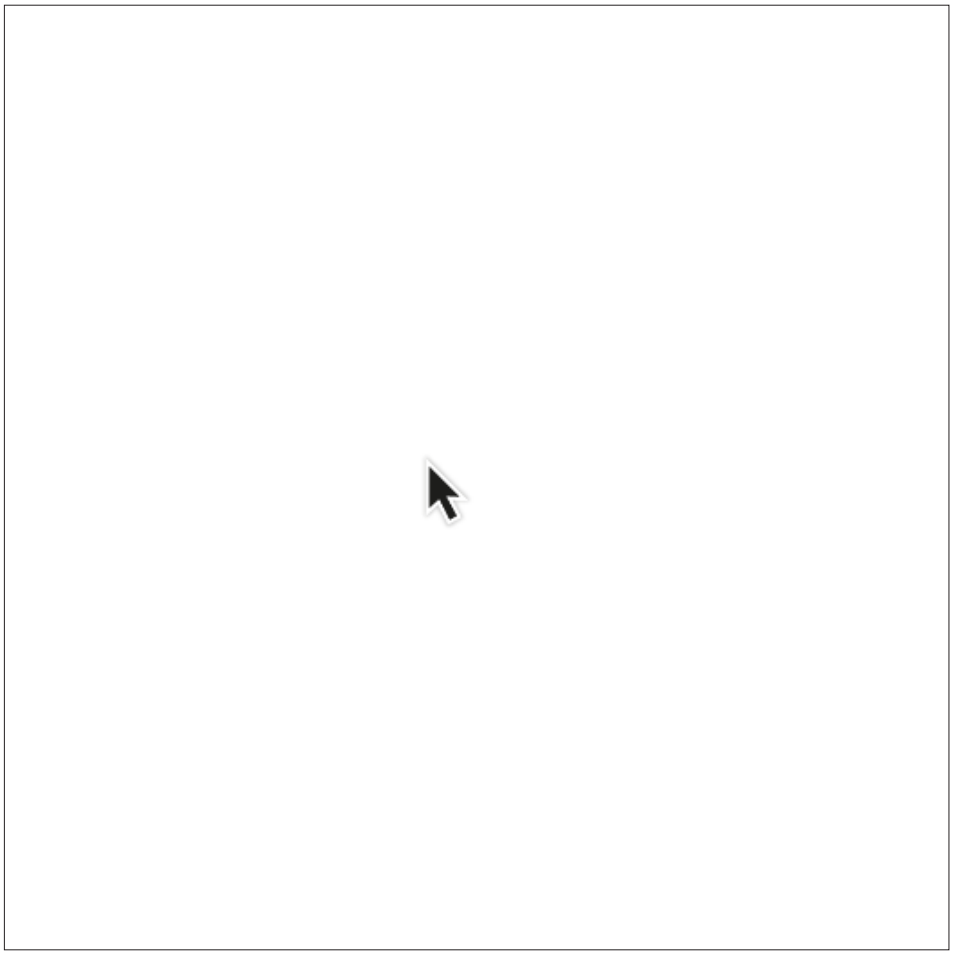
is a fragmentary whole' (Deleuze and Guattari, *What Is Philosophy?*, p. 15-16). 'The concept is defined by the inseparability [...] of heterogeneous components' (Ibid., p. 21).

Chapter 2

Debugging Pleasure



Screenshot 2022-11-14 at 8.53.26 cursorencounter1.png [1] [2]

1. 'In order for a human operator to readily change the displayed pattern, he must be provided with means for accurately indicating the exact position on the visual display at which he can make alterations' (Douglas C. Engelbart, Patent 'X-Y position indicator for a display system').

2. In the preceding footnote, the juxtaposition of a screenshot and a reference from differing contexts opens up a new conversation in their transdisciplinary connection, which will be further explored in the course of this chapter. Please refer to p. 58-60 of this PhD thesis for more information.

A cursor is displayed on the computer screen. It is an immediate symbol of human presence and agency. The movement of the physical mouse on the desktop is mirrored by the digital cursor's movement. Their motion is synchronised, they melt into a unity.

The computer mouse, as it is known today, is referred to in the American engineer Douglas Engelbart's 1967 patent for it as 'X-Y position indicator for a display system.'[3] The invention of the computer mouse was an outcome of Engelbart's research programme entitled 'Augmenting Human Intellect'. Observing that an individual's ability to act on the world is tied to her limited motor channels, Engelbart sought to 'augment' a subject by increasing their ability to gain control of, and consequently understand, complex situations and to expand their ability to act. As an 'augmentation artefact', the hand-held pointing device maps a user's hand x-y coordinates to a displayed mouse-cursor on the screen.[4] This enables them to point at and manipulate computer-stored information in the corresponding position on the screen in what appears to be real time. Essentially, the mouse provides the human operator 'with the means for accurately indicating the exact position on the visual display at which he can make alterations'.[5]
In contrast to the previous command-lines, interactive real-time interfaces render the interface transparent and rational, mapping the user's actions to the

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3. Douglas C. Engelbart, Patent 'X-Y position indicator for a display system', filed June 21, 1967 and granted January 17, 1970, *United States Patent and Trademark Office* <https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=03541541> [accessed 8 March 2021].
4. Douglas C. Engelbart, *Augmenting Human Intellect: a Conceptual Framework* (Stanford, CA: Stanford Research Institute, 1962), p. 126.
5. Engelbart, Patent 'X-Y position indicator for a display system'.

machine's reaction, thus making 'the user the "source" of action'.[6]

At the same time, this sensation of clear causality is simulated, programmed into the interface. Mapping the x-y coordinates of the computer mouse to the mouse cursor displayed on the screen not only overcomes the functional difference between human and machine, but furthermore eliminates the spatial distance between table-top and computer screen. The human and computer meet on the surface of the screen, without distance, without difference.[7] The mouse not only marks the beginning of human-centred human-computer interaction, but today remains the primary device for interacting with the computer.

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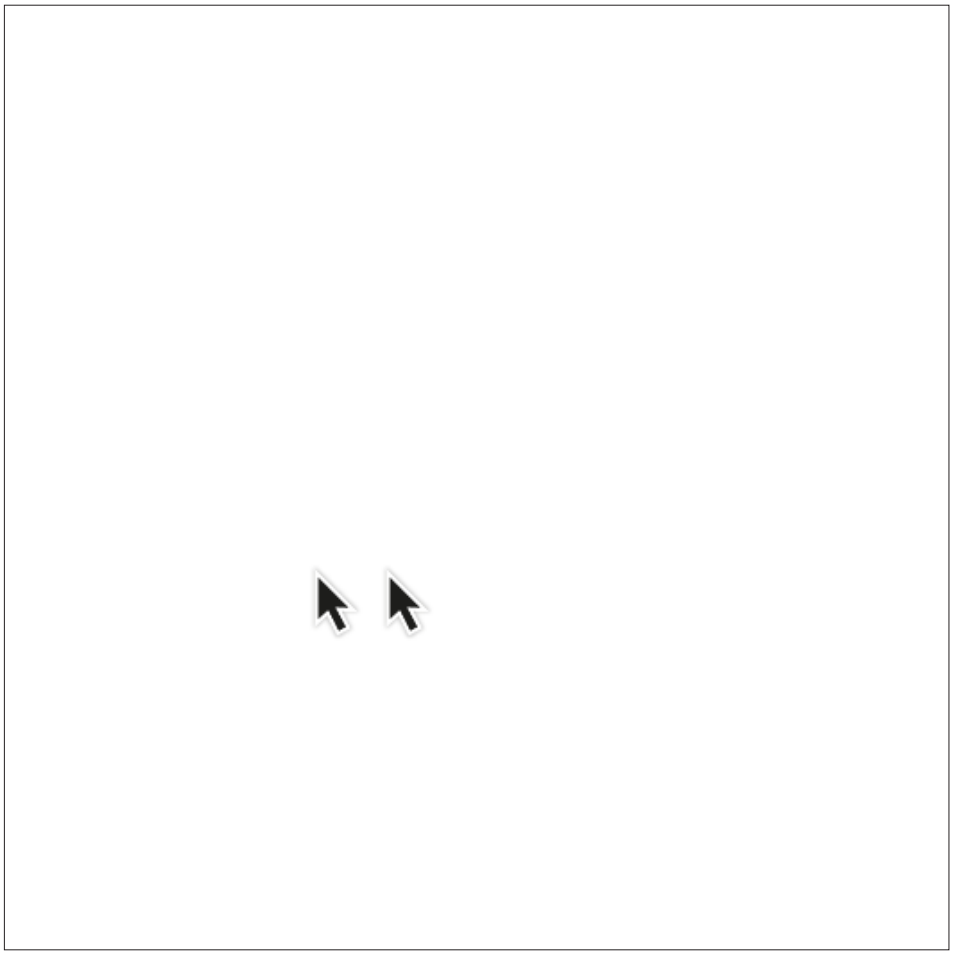
6. Wendy Hui Kyong Chun, *Programmed Visions: Software and Memory* (Cambridge, MA; London: The MIT Press, 2011), p. 89.

7. This erasure of distance appears even more literal in today's touch-screens, where the user's finger and the screen meet immediately.

'It is hard to walk away from a video game on which you could do better next time, it is hard to walk away from a computer program with an undiscovered "bug"'.
(Sherry Turkle, *The Second Self: Computers and the Human Spirit*)



Screenshot 2022-11-14 at 8.54.24 cursorencounter2.png [8]

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8. ‘Aomame leaned her head back and looked up at the sky for a time. [...] Soon, she began to sense that the night sky she saw above her was somehow different from the sky she was used to seeing. The strangeness of it was subtle but undeniable. Some time had to pass before she was able to grasp what the difference was. And even after she had grasped it, she had to work hard to accept it. What her vision had seized upon, her mind could not easily confirm. There were two moons in the sky [...] They were floating there side by side. [...] Aomame stared at the two moons with narrowed eyes. Then she closed her eyes, let a moment pass, took a deep breath, and opened her eyes again, expecting to find that everything had returned to normal

The main character in Haruki Murakami's novel *1Q84* encounters a dissonance between the world as she knows it and her observation of the night sky. Instead of the single moon she expected, she discovers two moons floating side by side. The event leads her to problematise an unexpected imbalance and gap between herself and the world – two entities that are no longer compatible with each other. There is a dissonance in her expectations of how the world looks and the apparent facts she is confronted with.

The following extract collages the words of Murakami's main character observing an anomaly in the night sky with my description of a computer programme that was created in the context of this practice-based PhD research in order to open up a new conversation in their transdisciplinary connection:

> Soon, [I] began to sense that [the computer screen] [I saw in front of me] was somehow different from the [screen] [I] was used to seeing. The strangeness of it was subtle but undeniable. Some time had to pass before [I] was able to grasp what the difference was. And even after [I] had grasped it, [I] had to work hard to accept it.

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and there was only one moon. But nothing had changed. [...] Something is happening, for sure, she thought. Her heartbeat sped up. Something's wrong with the world, or something's wrong with me: one or the other. The bottle and the cap don't fit: is the problem with the bottle or the cap?' (Haruki Murakami, 1Q84, p. 177); The juxtaposition of a screenshot and a reference from differing contexts opens up a new conversation in their transdisciplinary connection, which will be further explored in the course of this chapter. Please refer to p. 58-60 of this PhD thesis for more information.

> What [my] vision had seized upon, [my] mind could not easily confirm. There were two [cursors displayed on the screen — perfectly identical]. They were floating there side by side.[9]

The programme above implies a dissonance in a habitual interaction with the computer. The computer screen displays two cursors, instead of the familiar single cursor on the screen. This duplicity contradicts the cursor's purpose of functioning as a means to 'accurately indicat[e] the exact position' on the computer screen at which the human can act, as explored in the beginning of this chapter.[10] It creates a gap between the computer and the human.

Chapter 1 of this thesis identified the instinctive imposition of causality and regularity by humans as a mechanism of protection – an 'umbrella' – in the face of the world's complexity.[11] While it is their causal thinking that allows human beings to act intentionally, plan ahead, and thus think 'intelligently', the previous chapter found that habit, and thus generalisation, standardisation and uniformity, should not be confused with an intelligibility of the world and its processes. Rather, in excluding the new, the unfamiliar and unexperienced from the outset,

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9. Haruki Murakami, *1Q84* (New York: Alfred A. Knopf, 2011), p. 177; In his novel, Murakami describes the main character's inner conflict when she encounters the anomaly of there being two moons in the sky instead of one. The words written in square brackets replace Murakami's words with my own, appropriating the quote to recount my experience of witnessing two cursors on the computer screen in the process of programming. Please refer to p. 58-60 of this PhD thesis for more information.
10. Engelbart, Patent 'X-Y position indicator for a display system'.
11. Deleuze and Guattari, *What Is Philosophy?*, p. 202.

causal inference was explored to imply an 'ignorance' towards the contingency of nature and of human interaction.[12] Thought and action remain 'imprisoned' within rigid and repetitive patterns of the known, closing off any possibility of change and discovery.[13] Principles of causality become a mechanism to assert human power and agency in the face of a complex reality, while restricting thought and action to a state of passivity, based on past experience rather than present encounter. The previous chapter further expanded on the causal pleasure of human-computer interaction, that offers instantaneous and anticipated reactions to a human action. Bridging the dichotomy between human and machine in favour of the human not only affirms, but also reinforces and consolidates the human ability for causal inference and mastery.

Combining Schwenger's notion of asemic effect and Chun's notion of causal pleasure, Chapter 1 introduced the concept of uncausality. Having established that causality functions as a mechanism of protection in the face of a complex and disordered reality, the concept of uncausality was introduced as a means to engage in a line of exploration that opens up to, rather than retreat from, the 'chaos' of the world. As revealed via Deleuze, it is not in recognition of the known but in an encounter with the unknown, that thought is forced to abandon its repetitive and thus passive patterns to become active, creative and responsive to the world we live in.

In the introduction to this chapter, that compares Murakami's 'two moons' scenario with the 'two cursor' one, the scenarios are united in the way that they disappoint the human being in their habitual, and thus causal, way of thinking. A confrontation

12. Hume, p. 27.

13. Deleuze, *Difference and Repetition*, p. 178.

with a situation that contradicts the human expectation of regularity makes it impossible to respond to a present situation based on past experience.

The term ‘bug’ in programming denotes an unanticipated gap between the human and a computer. It describes a dissonance between what the programmer expects the computer to do and the actual reaction of the computer. Creating a gap between human and machine, bugs directly interfere with the primary concern of bridging a difference between the two entities in human-computer interaction and programming. Yet, it is specifically this gap that this chapter seeks to explore as an opportunity to renegotiate the uneasy relationship between humans and the computer, and, by extension, between humans and the world. Taking the concept of bugs as an entry point, this chapter explores how a consideration of dissonance, as opposed to an imposition of consonance, in programming may point towards an approach to action and thought that is about discovery and learning rather than human mastery and causal pleasure. The concept of a ‘bug’ in the context of this chapter will be used to refer to a dissonance between two interacting entities.

2.1. A Leaky Umbrella

The human desire for clear causality, as embodied in the computer mouse, for example, is, as Chun describes, a desire to negotiate the 'uneasy relationship between human agency and dependency' by establishing the human being 'as the sovereign subject, in control of what she sees: she controls technology'.[14] Indeed, Engelbart emphasises that increased human effectiveness is central for creating 'an enlightened society'.[15] The computer mouse directly supports neoliberal qualities of personal empowerment, consolidating the modernist dichotomies of the Enlightenment between subject and object, between 'human problem-solver and computer "clerk"'.[16] The computer scientist Ben Shneiderman describes how a user's action and the computer's response are no longer interrupted by a conversion into syntactical commands. Instead, 'physically obvious and intuitively clear' cursor movements and the instantaneously visible display of the result of cursor actions on visually represented objects move the functioning of the computer 'closer to innate human capabilities'.[17] Emphasising the power of human action — humans' ability to anticipate, navigate and control — real-time human-computer interaction transforms a user's initial 'grudging acceptance or outright, hostility' towards the computer into a 'a glowing enthusiasm' and a 'thrilling sense of power', as Shneiderman observes.[18]

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14. Chun, p. 87 and p. 89.
15. Engelbart, *Augmenting Human Intellect*, p. 1.
16. Ibid., p. 6.
17. Ben Shneiderman, 'The Future of Interactive Systems and the Emergence of Direct Manipulation', *Behaviour & Information Technology*, 1.3, (1982), 237-256 (p. 247 and p. 253), in *<http://dx.doi.org/10.1080/01449298208914450> [accessed 10 September 2020].*
18. Ibid., (p. 246 and p. 247).

Similarly, in programming, 'seeing his or her code produce visible and largely predictable results creates pleasure', as Chun observes.[19] Information history scholar Paul N. Edwards similarly thematises the pleasure of programming that results from programming language's simple rules and sequential instructions and the clear transformation of input into output. He argues that programming languages, reinforcing the 'conception of knowledge as an objective, achieved state rather than an ongoing, intersubjective process' act as 'fundamental paradigms of the rationalistic tradition in the modern West'.[20] The pleasure of programming is revealed as a rational pleasure, a dispassionate striving for power and control as a measure of success. The clear causality between a programmer's command and the computer's reaction reinforces an account of the machine as 'dumb' and obedient, and the human being, in contrast, as clever, knowledgeable and superior.[21] The programmer enjoys the affirmation of their agency and, as Chun argues, their 'absolute power'.[22]

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19. Wendy Hui Kyong Chun, 'On Software or the Persistence of Visual Knowledge', *Grey Room,* 18 (Winter 2004), 26–51 (p. 39-40).

20. Paul N. Edwards, 'The Army and the Microworld: Computers and the Politics of Gender Identity', *Signs*, 16.1, *From Hard Drive to Software: Gender, Computers, and Difference*, (Autumn, 1990), 102-127 (p. 107 and p. 108).

21. The machine is only doing what the programmer tells it to do. Sherry Turkle refers to the words of a professor teaching an introductory computer course: 'The machine is dumb, just a giant calculator.[…] Programming is a straightforward act of mechanical regurgitation. Garbage in, garbage out' (Turkle, *The Second Self*, p. 206). This 'dumb versus clever' binary consolidates human intelligence in the face of the threat of potentially intelligent machines (as in artificial intelligence, for instance).

22. Chun, 'On Software or the Persistence of Visual Knowledge', (p. 39).

At the same time, what Chun refers to as 'the magical transformation of words into things', is often not as straightforward as anticipated.[23] While programming languages entice the human with the pleasure of mastery, this promise is constantly frustrated and challenged by the appearance of bugs. Although programming consists of writing introductions for a computer, a code is often revised and edited several times before it results in a programme that works perfectly. The occurrence of bugs is not necessarily dependent on the expertise of a programmer. Bugs remain, at any level of programming skill, an unavoidable part of the practice. Edwards observes that 'the programmer is omnipotent, but she is not omniscient. Complex programs can lead to totally unanticipated results. Even a simple program may contain logical errors'.[24] Edwards is hinting at the fragility of programming language, wherein supposedly trivial mistakes in punctuation, syntax or spelling can easily lead to failures in the computer programme. Beyond this, bugs may emerge from a variety of sources, such server or software problems, among many others. The presumed omniscience of the programmer is constantly challenged rather than simply affirmed, suggesting that a programme has 'powers of its own'.[25]

Programmers find themselves pivoting between the computer's affirmation of, and challenge to, their power. Indeed, Chun not only addresses programming's causal pleasure but also 'the nagging doubts and frustrations experienced by programmers: the sense that we are slaves, rather than masters, clerks rather than managers'.[26]

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23. Chun, p. 19.
24. Edwards, (p. 110).
25. Ibid.
26. Chun, *Programmed Visions,* p. 19.

Bugs confront the human with what Sherry Turkle, via Bruno Bettelheim, refers to as an 'unspoken anxiety of our age'.[27] In the face of the uneasy relationship between human beings and machines, thematised via Simondon in the previous chapter of this thesis, bugs seem to evoke the human fear of the machine venturing off on its own path. I suggest that bugs momentarily invert the modernist dichotomies of the Enlightenment between subject and object, between 'human problem-solver and computer "clerk"', as Engelbart calls it.[28] Bugs challenge humans' ability to master the world around them, thus addressing the most enduring human fear: that of being out of control. In Deleuzo-Guattarian terms, it is bugs that 'make a slit in the umbrella [...] to let in a bit of free and windy chaos'.[29]

As a practice, programming is more about troubleshooting and defending than simply affirming the programmer's position of power. If a bug creates a gap between human and machine, debugging describes an effort to get to the core of the dissonance by searching for errors in the programme. It is a quest for knowledge and a reclaiming of control. Indeed, 'programmers [...] will often spend more time debugging than actually programming the application.'[30] Therefore, becoming a 'good programmer', according to the p5.js website, implies becoming a good detective, a 'good code sleuth': 'In order to close the gap,

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27. Sherry Turkle, *The Second Self: Computers and the Human Spirit* (Cambridge, MA; London: The MIT Press, 2005), p. 218.

28. Douglas C. Engelbart, *Augmenting Human Intellect: a Conceptual Framework* (Stanford, CA: Stanford Research Institute, 1962), p. 6.

29. Deleuze and Guattari, *What Is Philosophy?*, p. 203.

30. p5.js Education Working Group, 'A Field Guide to Debugging', *p5.js* May 2015 <https://p5js.org/learn/debugging.html> [accessed 10 May 2022].

you must investigate'.[31] Learning to be a master programmer is about becoming skilful in dealing with programming problems and correcting bugs that prevent the programme from working.

Debugging usually involves a step-by-step deconstruction and reconstruction of the code, trying to identify where, how and why the command and the anticipated effect are in dissonance. In order to resolve a bug, the programme is moulded to the preferences and anticipation of the programmer. If a bug creates a gap between the human and the computer, debugging describes the effort to bridge such difference in favour of the human. Bridging the difference by bringing the functioning of the computer closer to the human expectation of it, this research suggests that debugging may imply an amplification, rather than a weakening, of programming's human-centricity. Here, then, debugging may be described as a gesture of suppression rather than engagement. It becomes a way of reasserting mastery and of masking fears about the complexity of both the world and the computer.

Indeed, the previous chapter, via Simondon, identified the human tendency to dominate and suppress the machine that is rooted in a fear about the nature of the machine. Furthermore, Chapter 1, via Nietzsche, argued that humans tend to prioritise emotional appeal rather than true understanding in a confrontation with the unknown. Here, humans favour explanations that are already familiar, pleasurably re-establishing their position of mastery while closing themselves off to the possibility of gaining new understanding in a confrontation with the unknown. Nietzsche describes this tendency as the pleasure of 'purify[ing] oneself of a dangerous emotion through its vehement discharge'.[32]

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31. Ibid.
32. Nietzsche, p. 91.

Thus, the act of debugging could be seen as inhibiting not only any emergence of the new, but also human beings themselves, confining them in an attitude of defence while impeding any opportunity for curiosity and exploration. If bugs make a slit in the Deleuzo-Guattarian umbrella – offering a glimpse of a world beyond the repetitive constraints of causality – the programmer is quick to fix it, restoring the comfort of order. But what if bugs were opportunities to confront the chaos? Rather than threats to our control and knowledge, what if bugs were considered as chances to revaluate and expand our habitual way of thinking and acting? And, rather than a gesture of reclaiming power and of being relieved from a potential threat, what if debugging was a process of facing and embracing the unknown? An opportunity to leave the well-trodden path of causality, which, according to Deleuze, restricts action and thought.

2.2. MouseX, MindY

When she encounters a dissonance in her perception, the main character in Murakami's novel engages in attempts to find an explanation for the apparent anomaly by trying to connect the seemingly extraordinary event to the established laws of physics. She grows increasingly anxious, finding that neither the light nor her eyesight are the source of the second moon in the night sky. Unable to resolve the incongruity, and worried about the consequences of something being either wrong with her or wrong with the world, she is unable to ignore or let go of the situation of conflict.

Confronted with a 'world-with-a-question-mark', the character realises she is 'like an animal released into a new forest. In order to protect myself and survive, I have to learn the rules of this place and adapt myself to them'.[33] It is a bug that forces the main character to leave the known and habitual path and diverge into the unknown. Unable to react to the present event based on past experience, she has no choice but to adapt. Thus, the character can be said to 'debug' the gap between herself and the world by 'adapting' herself to the world's rules. She bridges the gap by moving closer to the world, rather than trying to mould the world to fit her expectation.

As expanded on earlier in this chapter, faced with the question of 'something's wrong with the world, or something's wrong with me', the programmer's answer is clear. Returning to the 'two cursor' scenario at the beginning of this chapter, the programmer is confronted with a situation that conflicts with the cursor's function to indicate the exact point of human agency. The programmer 'debugs' the programme by changing the code to match their expectation. The normal

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33. Haruki Murakami, *1Q84* (New York: Alfred A. Knopf, 2011), p. 104.

single cursor is displayed on the screen, indicating the exact position and location of human action, leaving the programmer pleasurably relieved.

Both of the scenarios described above address a bug that compromises human's ability to control, and thus navigate, the world around them. An unexpected gap between two interacting entities prompts a renegotiation of their relationship. Indeed, psychologists use the term 'intrinsic motivation' to describe the human desire and tendency to try and close the gap between expectation and encounter. When encountering a situation that derives from knowledge, the resulting emotional arousal intrinsically motivates a 'quest for knowledge and is relieved when knowledge is procured' – a quest that the psychologist Daniel E. Berlyne refers to as 'curiosity'.[34] This kind of motivation is said to be intrinsic, because here human action is not motivated by an external outcome or reward such as payment, or exam grades. Instead, it describes an activity that is pursued for its inherent enjoyment, because it is considered as 'an opportunity to explore, learn, and actualize our potentials', as noted by psychologists Dennis Coon and John O. Mitterer.[35]

Knowledge consists of habit, and thus the ability to act and react to present situations based on past experiences. Berlyne suggests that 'to say somebody knows something is, in other words, an abbreviation for a large, probably infinite, set of statements of the form: "Given situation A, behavior X is probable," "Given situation B, behavior Y is probable," etc. […]'.[36] For example, Berlyne

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34. Daniel E. Berlyne, *Conflict, Arousal, and Curiosity* (New York, Toronto, London: McGraw-Hill Book Company, 1960), p. 274.

35. Dennis Coon and John O. Mitterer, *Introduction to Psychology: Gateways to Mind and Behavior*, 12th edn (Wadsworth, CT: Cengage Learning, 2008), p. 339.

36. Berlyne, p. 263.

observes that children's 'eagerness to know why', stems from their desire to resolve conflict by gaining an answer.[37] The unknown motivates a quest for knowledge that is resolved upon the acquisition of knowledge. Therefore, in intrinsic motivation a bug is not a frustrating situation that threatens human knowledge or abilities. On the contrary, it provides a pleasurable opportunity to learn, discover and expand human knowledge.

While Berlyne acknowledges that human beings may flee 'from extremely weird or overwhelming complex situations', the novel, conflictual or complex 'will continue to haunt the nervous system' and will not be relieved until it is explored and resolved.[38] When there is a dissonance in the relation between two elements, 'this dissonance can be eliminated by changing one of those elements', as psychologist Leon Festinger writes.[39] Intrinsic motivation consequently opens up an approach to debugging that does not merely change the context or situation to suit humans' action and expectation. There is, instead, the alternative option of changing one's behaviour, action or expectation to suit the environment.

The beginning of this subchapter describes these two possible approaches to bridging an unexpected dissonance and resolving the conflict that results from it. Uncertain about the origin of the dissonance, and having no control over changing her environment, Murakami's character's first instinct is to look for the fault within herself. This contrasts with the instinct of the programmer – the term 'bug' itself already suggests that something other than human fault is

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37. Ibid., p. 267.

38. Ibid., p. 194.

39. Leon Festinger, *A Theory of Cognitive Dissonance* (Stanford, CA: Stanford University Press, 1957), p. 19.

the cause of the software error – a pesky insect that needs to be eliminated.[40]

For a programmer, moving in a world of their own making, changing the code may appear more comfortable than having to give up their expectations and bow to the power of the programme. However, because bugs refer to a dissonance in the expectation of the human rather than the system, it appears contradictory that bugs in programming are considered technical, rather than human, errors. Because the error is in the mind and perception of the human rather than in the machine, why do we tend to debug the computer rather than debugging our thinking and acting?

In the example that introduces this chapter, rather than giving in to their impulse to change the code in order to match the programme to their expectations, a programmer might equally try to understand the nature of the second cursor through random hand/mouse movements. The second cursor initially seems like a strange extension, a foreign body attached to the mouse cursor. However, it can be discovered that the two cursors move perfectly in sync with each other, holding their position at a steady distance. Like Murakami's main character, released into a new environment the programmer can learn the rules of this new place and adapt to them. The dissonance is only temporary and can be removed via 'exploratory behaviour'.[41] The difference between the human and the computer

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40. The term 'bug' in programming has its origin in an incident involving a literal insect. The computer scientist Grace Hopper reported an error caused by a moth trapped between the relay contacts of her computer.

41. Berlyne describes how exploratory or investigatory behaviour mostly happens through trial and error or through thought processes. Alternatively it might also imply demonstration, description and explanation from another individual who is familiar with the object in question. Berlyne observes that an

is bridged by the human, who adapts to the context.

If a bug creates a gap between two interacting entities, this chapter suggests that there are always two ways, rather than merely one, of debugging, and thus bridging this gap. At the same time, the predominantly negative connotation of bugs in programming leads the programmer into a defensive attitude. A programmer usually overlooks the role of a gap such as this as an opportunity to revaluate their knowledge, instead considering it as a provocation to their position of power. By contrast, a positive connotation of the notion of the bug plants the seed for developing a theory wherein the dissonant bears the possibility of change and discovery. Dissonance is thus not necessarily frustrating or endangering but may become an opportunity to open up action and thought to their potential difference: an opportunity to learn in an encounter with the immediate interactive context and in conversation with the computer. Human expectations and knowledge are not static or unchallengeable, but may be revised in their immediate interactive context. Thus, if debugging usually consists of moulding the programme to the preferences of the programmer, this chapter explores debugging as a process of revaluation, engagement and mutual modulation.

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inspective locomotor exploration is most common, in which a novel stimulus object is approached to intensify and supplement visual, olfactory, auditory or tactual stimulation. Beyond changing one's own posture or location, this sort of inspective exploration might also involve manipulatory investigation which implies the manipulation, use or control of an object or its surroundings 'and it ill have the function of wresting further stimuli from the same object' (Berlyne, p. 136-137). The acquisition of a definitive motor or verbal response remove the novelty and therefore the conflict and arousal.

Conscious of the omnipresence and unavoidability of bugs, I discovered programming more as a careful step-by-step approximation, keeping the computer's reaction in check and less as an omniscient practice of mastery. Writing some lines of code is followed by a review of the computer's implementation of it, writing another line, checking again, constantly ready for amendment and alteration. This is only partially due to my level of programming skill as a beginner. As previously discussed, bugs, at any level of programming skill, remain an unavoidable part of the practice. In programming, a change in code, is furthermore, not immediately visible in the programme. Rather, the code written in a code editor (in my case *Visual Studio code*) and the computer's interpretation of this code in the browser are disconnected by their individual software environment. Any change in the code is only visible in the browser after the code has been saved in the code editor and the browser has been refreshed to include any alterations. Consequently, the causal relation between the written code and the computer's interpretation of it in the form of a programme rarely happens in real time.[42] In contrast to the instantaneously visible causality of real-time human-computer interfaces, in programming there is always a gap between the code and the code's effect: this creates the potential for bugs.

The ubiquity of bugs, regardless of the programmer's expertise, also demands a certain degree of flexibility, responsiveness and improvisation on the part of the programmer. While a programmer usually comes to a project with a plan,

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42. P5.js introduced a web editor, placing the code editor and a preview of the computer's interpretation of the code within a single browser window. There is also an 'auto-refresh' option that intends to minimise the timely disconnection between the written code and the computer's interpretation (https://editor.p5js.org). Visual Studio Code also offers e.g. a web view plugin serving the same purpose.

this plan needs to always accommodate the unexpected, the unforeseen, the surprising. The iterative nature of the process of coding, as observed in Chapter 1 of this thesis, is characteristic not only of the actions of the beginner programmer. The p5.js website even offers strategies for 'good coding practice and how to prevent bugs', involving a step-by-step approach to programming that implies a testing and documentation of changes to allow for easy traceability and the undoing of potential errors.[43] In contrast to the initial anticipation, programming does not consist of a linear process of writing down the code followed by enjoying the result of a perfectly working programme. The practice of coding is as much about exploring, discovering and testing the code's functioning as it is about writing code. The way that programming becomes a careful step-by-step process seems to draw a clear parallel with Scott's explorations, as discussed in the previous chapter. Seeking to counter the high modernist aversion to the contingency of nature and of human interaction, Scott suggests a few rules of thumb. He advocates the adoption of more flexibility and an accommodation of the unforeseen and surprising by taking small steps, observing the consequences, and favouring reversibility.[44]

Following this argument, it could be suggested that a programmer not only takes on the dominating role of an almighty command-giver, but also has to take a subordinate role when encountering and testing how a programme functions. In programming, the role of the master always coexists with the role of the learner. The programmer's role is active in the act of writing code, and passive in the act of testing and encountering the computer's interpretation of the code.

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43. p5.js Education Working Group, 'A Field Guide to Debugging', *p5.js* May 2015 <https://p5js.org/learn/debugging.html> [accessed 10 May 2022].

44. Scott, p. 345.

By challenging the programmer's position of power, bugs offer opportunities to extend the practice beyond a linear and affirmative command-response relationship. The relation between human and computer constantly shifts back and forth between positions of mastery and subversion, consonance and dissonance, between adaption and modification, active and passive: between writing code and adapting to the code's functioning. It continuously shifts the action away from its automated action-reaction circuit and the protective umbrella of causality and regularity.

```
setup(){

}

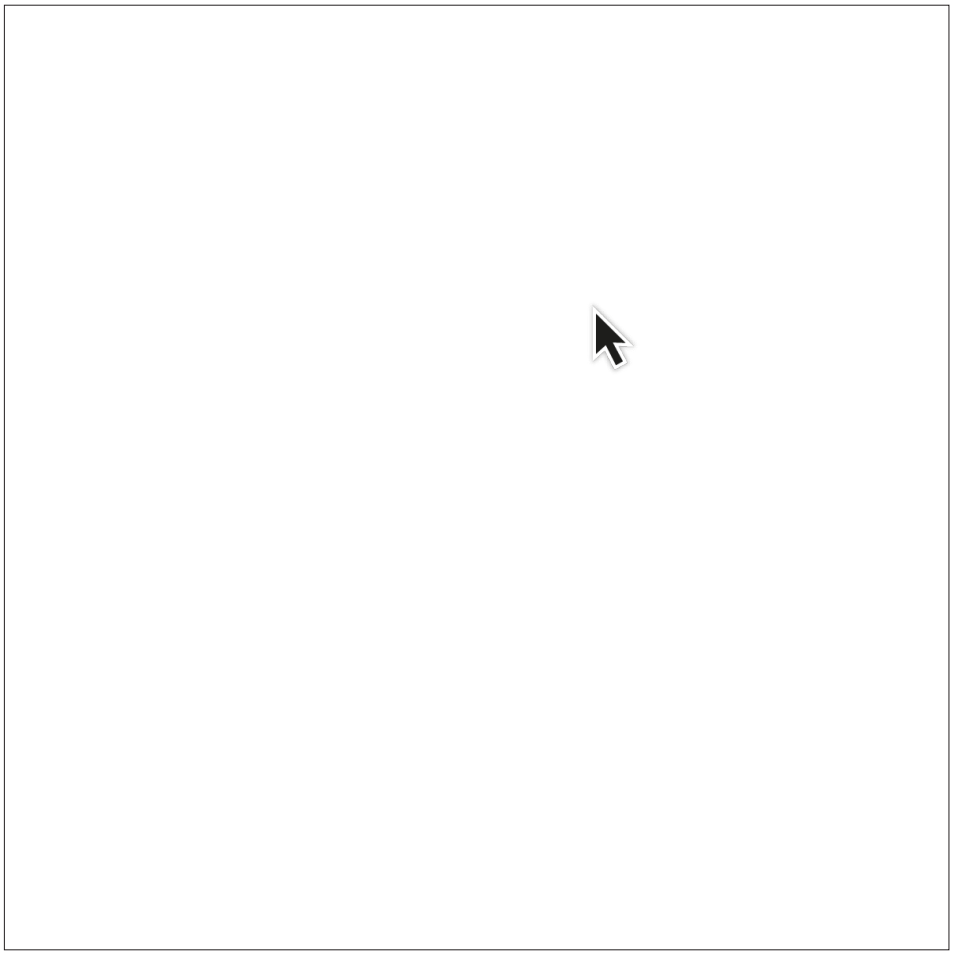
draw(){
     background(255);
     cursor(mouseX, mouseY);
} 45 46 47
```

---

45. I instruct the computer to draw a background in the colour white (255) followed by a cursor in the mouse's x and y position.

46. The presented code is simplified for readers unfamiliar with the practice of coding.

47. A page turn on the following pages of this thesis indicates the disconnection and the switching back and forth between changing the code and encountering the resulting change in the programme.



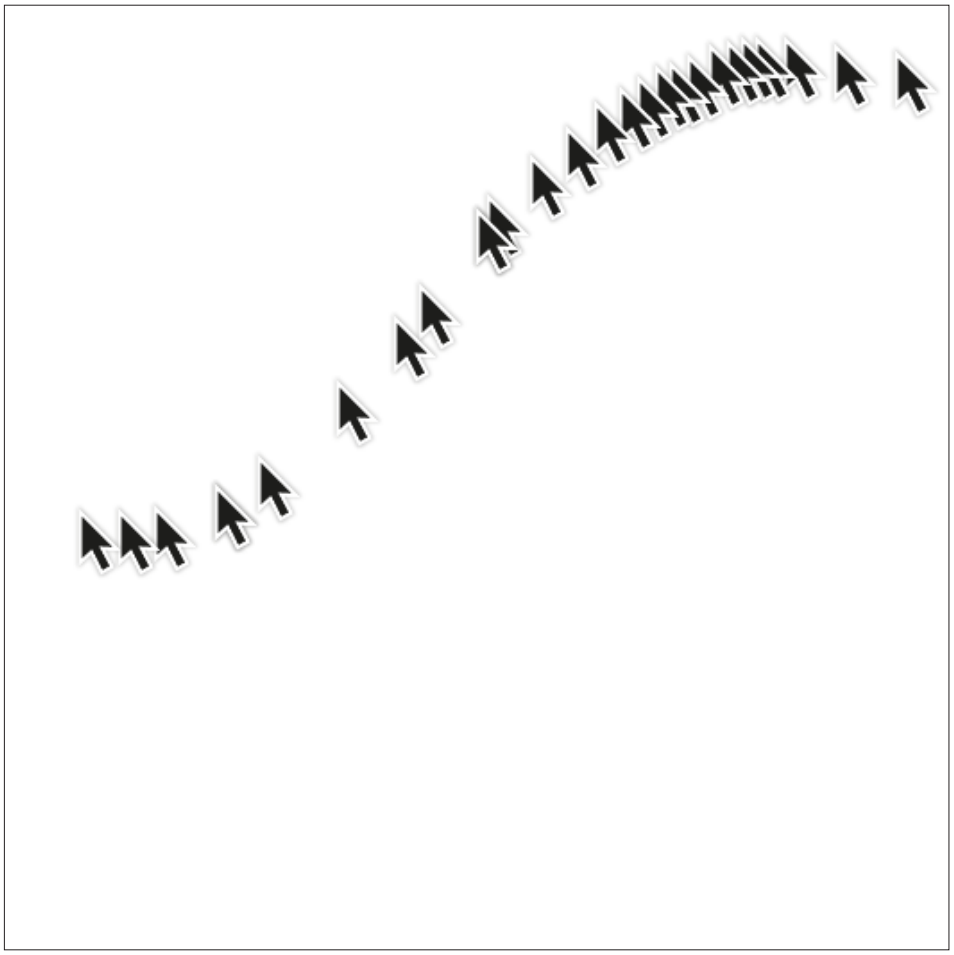
Screenshot 2022-11-14 at 8.55.16 cursorencounter1.png [48]

48. The computer displays a white background with a mouse cursor that moves in sync with the mouse's x and y position.

```
setup(){
     background(255);
}

draw(){
     cursor(mouseX, mouseY);
} [49]
```

49. Returning to the code, I move the background from the draw() function into the setup() function.



Screenshot 2022-11-14 at 8.56.43 cursorencounter3.png [50] [51]

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50. The computer displays a white background with a mouse cursor, that moves in sync with the mouse's x and y position. However, in contrast to the previous version of the programme, the cursor not only follows the mouse's x and y position, but furthermore the mouse's position remains as a trail of multiple cursors along the mouse's path.

51. Placing the code in the 'wrong' position within a programme is a common source of bugs. In p5.js the way code is executed by the computer is dependent on the respective function they are written in. 'The code inside the draw() function runs continuously from top to bottom until the program is stopped. The code in setup() is run once when the program starts' (https://p5js.org/examples/structure-

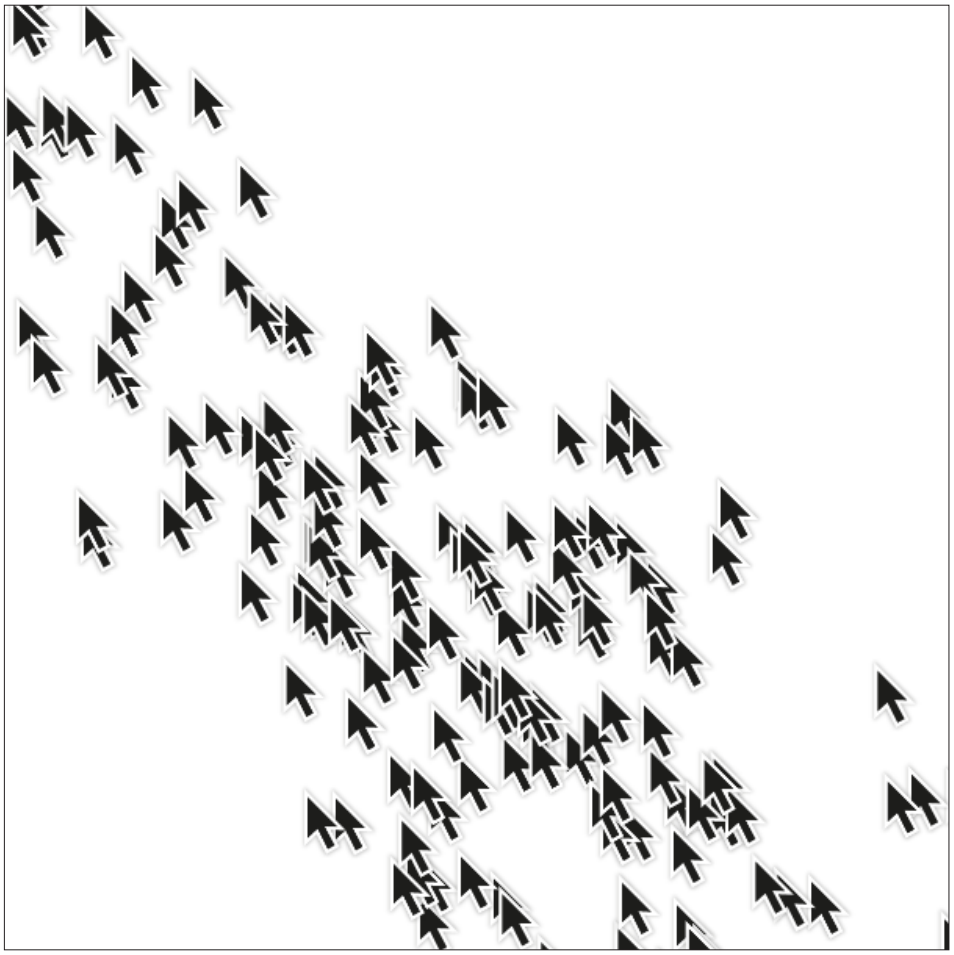
```
setup(){
     background(255);
}

draw(){
     cursor(mouseX+random X, mouseY+random Y);
} [52]
```

---

setup-and-draw.html). Therefore, placing the background() function in setup() the background is only displayed once upon starting the programme. By contrast, placing the background in draw(), the computer will continuously repeat the execution of the background. This fundamentally impacts what is displayed and what is hidden by the background.

52. `Returning to the code, I add a random value to the mouse's x and y position.`



Screenshot 2022-11-14 at 8.57.26 cursorencounter5.png [53]

53. The computer displays a white background with multiple cursors that increase incessantly in random positions on the screen. A movement of the mouse cursor reveals a spatial relation between the agglomeration of the cursors and the mouse's x and y position. At the same time, the mouse's exact position is not discernible.

The direct juxtaposition of the written code and the computer's interpretation of it on the previous pages is intended to support a consideration of the practice of programming as a practice of switching back and forth between positions of power and subservience. In the screenshots above, slight variations and changes in code do not just alter the programme: they may also change the interaction with, and navigation of, the programme. The practice of coding turns into a practice of immersion in continuous change: a practice that is no longer about determination, about creating a programme, but about engaging with programming's continuous variability.

In my practice of coding, it was this conscious shifting back and forth between mastery and encounter that led me to discover not only the variability of coding, but also my own — my ability to be flexible, to adapt, to be dynamic and to leave my habitual and predetermined patterns of acting and thinking. I discovered that bugs could be spaces that challenged my knowledge, rather than affirming it: as moments of encounter that pushed me out of my comfortable position of control, urging me to revaluate the known; moments that detached action from determination and mastery to open up to the indeterminate, to discovery and potentiality. For me, the practice of programming turned from a practice of mastery into a practice of entering into a conversation with the computer, a practice of interacting with the computer and; of exposing myself to the conflicted relation between my own empowerment as a programmer and bugs that constantly forced me out of that position.

A consideration of the computer's own powers through a relation of reciprocity and equality rather than superiority and inferiority is supported by Sherry Turkle's notion of 'soft mastery'. Turkle distinguishes between two distinctive styles of mastery in programming: 'hard' and 'soft' mastery. Here, she reveals parallels in the style in which people interact with a computer, in programming for instance,

and the way they face the world, and cope with problems and defend themselves from potential danger.

For 'hard masters', both the computer and the world are seen as something to be brought under control. Any action is a goal-oriented one, emphasising an imposition of will and absolute power. 'Soft masters' by contrast, express a relational attitude towards the computer as well as towards the world. 'Soft mastery is more interactive', as Turkle argues.[54] Programming here is considered a process of engagement, accommodation and contemplation: 'Try this, wait for a response, try something else, let the overall shape emerge from an interaction with the medium. It is more like a conversation than a monologue'. In the same way, Turkle suggests that soft masters 'are more likely to see the world as something they need to accommodate to, something beyond their direct control'.[55] Ideas evolve and shape in a give-and-take, revealing new and surprising results, beyond the planned.

Turkle thus reveals an approach to mastery that is about engagement and discovery rather than dominance and control. Indeed, Turkle's soft mastery shows a clear parallel to Simondon's claim to consider humans as 'neither inferior nor superior to technical objects', instead suggesting the need for 'approaching and getting to know them through entertaining a relation of equality with them, that is, a reciprocity of exchanges; a social relation of sorts'.[56] Like Simondon, conscious of the relation between technology and culture, Turkle emphasises that the way we deal with technology may catalyse changes in the way we think about ourselves and about our relationship with the world. Thus, in contrast to prevailing notions

54. Turkle, p. 101.
55. Ibid., p. 103.
56. Simondon, p. 105.

of the computer as instrumental, effective, rational, uniform and constrained by logic, Turkle's explorations support a conception of the computer 'as an evocative object, an object that fascinates, disturbs equanimity, and precipitates thought'.[57]

57. Turkle, p. 19.

2.3. Uncausal Pleasure

The previous subchapter explored how a confrontation with a situation that is dissonant from past experience intrinsically motivates a quest for knowledge, that is pleasurably relieved upon its acquisition. This may lead to the assumption, that situations that moderate dissonance are favoured and those that aggravate dissonance are avoided, as Festinger argues, for example. Indeed, Festinger suggests that human beings are led to activity and motivated to gain new information only if confronted with a situation that is dissonant with past experience. This implies, vice versa, that 'where no dissonance exists there should be a relative absence of motivation to seek […] new information at all'.[58]

In contrast, according to Berlyne, human beings do not simply strive for the reduction or avoidance of conflict or tension, but equally tend to seek out situations that increase uncertainty, or that are surprising. 'Human beings […] spend most of their time in a state of high arousal and […] often expose themselves to arousing stimuli with great eagerness', he writes.[59] Indeed, Berlyne reveals a relation between a 'lack of novelty', surprise or uncertainty and the occurrence of boredom, 'when life is […] highly predictable'.[60] He refers to an experiment in which 'sensory deprivation' was used to induce boredom, which led subjects to 'resort […] to desperate and far-fetched measures for providing themselves with increased stimulation'.[61]

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58. Festinger, p. 30.
59. Berlyne, p. 170.
60. Ibid.
61. Ibid.

In contrast to causal pleasure, human beings are shown to be unfulfilled in inactivity and predictability, and instead, flourish through challenge, growth and discovery when they are offered scope for their curiosity.

Further, Berlyne finds that sensory deprivation is not only boring and 'unpleasant in the extreme', but that it may lead to 'a deterioration in intellectual abilities'.[62] This draws a clear parallel with Scott's argument, referred to in Chapter 1, comparing bland, monotonous and controlled environments to 'sensory-deprivation tanks' that are 'ultimately stupefying' inhibiting humans' ability for initiative, innovation and responsiveness.[63] By contrast, as Scott suggests via Jacobs, 'complex, diverse, animated environments contribute […] to producing a resilient, flexible, adept population that has more experience in confronting novel challenges and taking initiative'.[64]

In programming, similarly, bugs initially appear to be undesirable but unavoidable by-products of programming. However, for software engineer Linus Torvalds it is not the computer's obedience, but rather the possibility of its disobedience, that creates the beauty and pleasure of programming. He explains that 'blind obedience on its own, while initially fascinating, obviously does not make for a very likeable companion. In fact, that part gets pretty boring fairly quickly'.[65] Here, Torvalds is hinting at the power of the conflictual to maintain his interest and trigger emotional and intellectual involvement. It is the disruption, the confusion,

62. Ibid.

63. Scott, p. 349.

64. Ibid.

65. Linus Torvalds, *Just for Fun: the Story of an Accidental Revolutionary* (New York; London; Toronto; Sydney: Harper, 2001), p. 73.

the challenge, as opposed to an assertion of his knowledge and power that makes him mull over a bug for days: 'It's still hard to explain what can be so fascinating about beating your head against the wall for three days, not knowing how to solve something […]. But once you find that way, it's the greatest feeling in the world'.[66] Torvalds' attention and pleasure is maintained by the seemingly irreconcilable tendencies to seek for conflict whilst desiring the resolution of conflict. For Torvalds, the 'greatest feeling in the world' does not arise from causal pleasure — from witnessing the computer's instantaneous and causally plausible reactions to his commands. Instead, he points to the pleasure of resolution following an enduring, and at times frustrating, or even painful, phase of perplexity and conflict.

Such tension in programming between seeking conflict whilst desiring the resolution of conflict finds its most extreme form in hacker culture. While, as outlined above, becoming a master programmer involves developing effective strategies to avoid or minimise bugs, hackers pursue an approach to programming that seeks out and maintains conflicts and dissonance. The hacker's pleasure does not arise from the affirmation of already known capabilities. Instead, their addiction to the activity is rooted in a continuous challenging of, and playing with, the issue of control and power, 'constantly walking that narrow line between having it and losing it', as Turkle observes.[67]

The activity of hacking suggests the potential of working productively with coding's tension, in which the computer's deviousness might be pleasurable and enabling rather than simply frustrating. Hackers themselves refer to such play as 'sport death': 'Computer hacking is kind of masochistic. You see how far you can push your mind and body […] The essence of sport death is to see how

66. Ibid., p. 76.

67. Turkle, p. 193-194.

far you can push things, to see how much you can get away with'.[68] The hacker's addiction is not to computer programming as a means to create a product, but with programming's ability to challenge and push their mind and body beyond their limits. Indeed, the pleasure of the resolution of conflict presupposes that there is a conflict in the first place. 'Winning', in hacker aesthetics, requires 'flirt[ing] with losing', a continuous act of changing systems and making them more complex.[69] Here, 'winning' is never an end, but always only the beginning of a new challenge with the prospect 'of winning over ever more complex systems'.[70]

The way that bugs nurture the logic of 'winning' and of 'finding a solution', thus presenting a danger that amplifies the human desire for mastery and control, has been specifically critiqued by Weizenbaum. In his book *Computer Power and Human Reason,* Weizenbaum describes programmers' confrontation with bugs as a 'pleasureless drive for reassurance'.[71] Success here consists of having shown the computer who its master is. Weizenbaum thus sees programming's tension between challenge and reward as sustaining and amplifying a rationalistic view of society and the human's 'megalomaniac fantasy': 'the compulsive programmer is convinced that life is nothing but a program running on an enormous computer, and that therefore every aspect of life can ultimately be explained in programming terms'.[72]

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68. Anthony (MIT senior), cited in Turkle, p. 194.
69. Turkle, p. 193.
70. Ibid., p. 173.
71. Joseph Weizenbaum, *Computer Power and Human Reason: From Judgment to Calculation* (New York, San Francisco, CA: W. H. Freeman and Company, 1976), p. 121.
72. Ibid., p. 130 and p. 126.

At the same time, the exploration above involves the programmer's willingness to leave their comfort zone, to risk losing control, to engage with the new, to be challenged, to learn, rather than simply comfortably master. Indeed, Torvalds' confrontation with bugs, described above, does not appear to be simply motivated by the pursuit of a pleasure of triumph over the computer, nor by the prospect of a pleasurable relief from terror and fear. Indeed, Torvalds describes the computer's disobedience not as a threat, but as a feature of a 'likeable companion', whose disobedience is invigorating rather than frustrating. Debugging here becomes a process that overcomes frustration and fear in favour of the pleasure of an intellectual challenge with the computer on an equal basis. The computer is not something to dominate, but to learn from. While Torvalds' desire for 'the greatest feeling in the world' keeps 'holding' his attention, it also creates the condition for something new to happen along the way: not to affirm, but to expand, his knowledge and capability.

The dissonant is not a source of danger, but of curiosity towards the nature of the machine. Indeed, for the hacker, 'the fascination is with the machine itself', as Turkle observes.[73] Finding a solution appears less important than maintaining a continuous engagement with the medium. In contrast to the engineer who talks about the machine as a tool, for the hacker, 'the mean-end relationship is dropped'.[74] Indeed, for the hacker, resolving a bug does not deflate their interest. Instead, solutions become provisional, rather than absolute. In hacking, debugging becomes a gerund — a continuous, recurring and iterative process of exploration, rather than a means to an end. It entails a conception of knowledge that is always contestable rather than absolute.

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73. Turkle, p. 187.

74. Ibid.

It appears that it is specifically the tension in the programmer-computer relation between affirming the power of the programmer and continuously evidencing the programmer's failures, thus challenging their power, that drives the compulsion to programme and the 'holding power' of the computer.[75] The computer's 'hold' seems to stimulate an ambivalence and 'extravagance of description', avoiding any dualism of pleasure and frustration.[76] Here, the obvious sexual connotations in the discussion of debugging cannot be ignored. For example, Sherry Turkle finds that:

> For some, the 'hold' is a source of puzzled amusement. […] For others, the feelings are more intense, even threatening. They speak of being grabbed in a more compelling, even more intimate way than by almost anything else they have ever known. […] A variety of people, […] compare their experiences with computers to sex, to drugs, or to transcendental meditation.[77]

The discussion of debugging seems highly charged with emotions, as well as basic human instincts and sexual drives and their pleasures and frustrations. Like Turkle, Chun refers to the ambivalence of coding's tension, describing it as 'a fetish: something endless that always leads us pleasurably, as well as anxiously, astray'.[78] Here, she is identifying the benefits and possibilities that arise from respecting and appreciating software's 'ability to surprise and to move'.[79] Chun observes the

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75. Turkle, p.22.; Turkle uses the term 'holding power' to refer to the computer's ability to fascinate and to maintain the human's attention.
76. Ibid.
77. Ibid.
78. Ibid., p. 49.
79. Ibid., p. 20.

ways in which code's 'possibility of deviousness' and 'the fact that we cannot know software can be an enabling condition'.[80]

This exploration of the pleasure of debugging points to the dissolution of the pleasure-frustration dualism that positions the frustration and aversion evoked by the new or unfamiliar as the polar opposite of the pleasure of the known, familiar or straightforward. Indeed, it seems to reveal a gradual replacement of causal pleasure by what could be referred to as causal boredom. Here, the causal, the regular, the expected is no longer pleasurable, but rather, as argued via Torvalds, it is 'boring' – or, as Berlyne describes, 'unpleasant in the extreme'.[81]

Chapter 1 introduced the notion of causal pleasure as the pleasure of an immediate and anticipated response to an action. It reaffirms human knowledge and agency. This chapter, by contrast, presents the notion of uncausal pleasure, describing the pleasure of curiosity, challenge and discovery. Dissonance between an action and its expected response urges the human being to leave the safety of the known in order to rediscover their ability to learn and change in an encounter with the world around them. In uncausal pleasure, pleasure and frustration are not mutually exclusive – 'winning' requires 'flirt[ing] with losing'. Indeed, even in uncausal pleasure, the desire for resolution and closure remains a key motivation. At the same time, the pleasure of closure, unlike causal pleasure, is not the pleasure of affirming the already known, nor of regaining mastery, but rather indicates the pleasure of discovery and of expanding human knowledge in

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80. Chun, *Programmed Visions*, p. 25 and p. 54. Chun's term 'enabling condition' parallels Erin Manning and Brian Massumi's term 'enabling constraints', discussed in Chapter 3 of this thesis.

81. Torvalds, p. 73.

Berlyne, p. 170.

an encounter with the unknown: a pleasure that was referred to in Chapter 1, via Nietzsche, as the 'joy of becoming': that is, the pleasure of experiencing the future and eternity of life as an alternative to a joy of 'purify[ing] oneself of a dangerous emotion through its vehement discharge'.[82]

Thus, while causal pleasure describes the pleasure of the affirmation of the already known, uncausal pleasure is the pleasure of an expansion of knowledge. The pleasure of revealing unimagined possibilities beyond causality and habit. A pleasure of potentiality rather than mastery. Causal pleasure is static and passive; uncausal pleasure is dynamic and active.

82. Nietzsche, p. 91.

2.4. A Bad Coding Practice

While 'good coding practices' commonly aim to prevent or minimise the occurrence of bugs, the practice of coding in the context of this chapter deliberately seeks out and creates bugs.[83]

In electronic and digital art, artist have embraced bugs and glitches as valuable elements in their creative process to provoke thought about the fragility of digital systems, giving a glimpse into the machine's underlying nature.

For example, the Dutch-Belgian artist duo Jodi (Joan Heemskerk and Dirk Paesmans) deliberately seek out glitches to disrupt the slick graphical user interface of the computer. Jodi often work with existing and popular code from computer software or games, which they subject to a formalist exploration of reduction and deconstruction. Paesman explains: 'It has been the most important task for Jodi to do everything wrong on the internet that can be done wrong. That's the core of all our work'.[84] Their website wwwwwwwww.jodi.org navigates the user through a maze of interlinked webpages made from basic HTML code, exposing them to the true nature of the computer and the specificity of the digital material beneath the universal machine and its intended function.

In Alexei Shulgin's 'Form Art', basic HTML elements like buttons, checkboxes, menus and dialogue boxes are no longer used in a functional way but are

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83. p5.js Education Working Group, 'A Field Guide to Debugging', *p5.js* May 2015 <https://p5js.org/learn/debugging.html> [accessed 10 May 2022].

84. Tilman Baumgärtel, *net.art 2.0: Neue Materialien zur Netzkunst/ New Materials towards Net art* (Nürnberg: Verlag für moderne Kunst Nürnberg, 2001), p. 166-167.

collaged into what Shulgin describes as 'absurdist mega-interfaces'.[85]
The Russian artist challenges and disrupts the behavioural expectations and the default functionality of graphical user interfaces, hinting towards the way in which technology restricts and contains our ability to think and act. He suggests: 'A computer interface is not a transparent invisible layer to be taken for granted, but something that defines the way we are forced to work and even think'.[86]

The way in which software can constrain or automate a user's creative process is similarly critiqued in the work of the British software artist Adrian Ward. His artwork 'Auto-Illustrator' is modelled as a parody of Adobe's vector graphics programme 'Illustrator'. The tools in the software defy a habitual user interaction and appear to carry out tasks on their own, raising questions about authorship and the authenticity of digital art.

The terms 'bug' and 'glitch' in this discourse are often used interchangeably to describe unexpected or undesired behaviour in a computer programme. Confronting the human with a situation wherein the computer behaves contrary to its normal functioning, both revives the human fear of loss of control and the hostility towards a machine that refuses full legibility. The terms 'glitch' and 'bug' have slightly different connotations and origins. A glitch describes a temporary defect in the system, such as an electrical interference or timing error; a defect usually caused by external factors. Originally, the term 'glitch' was used in a more literal sense; it referred to a spike or change in voltage.

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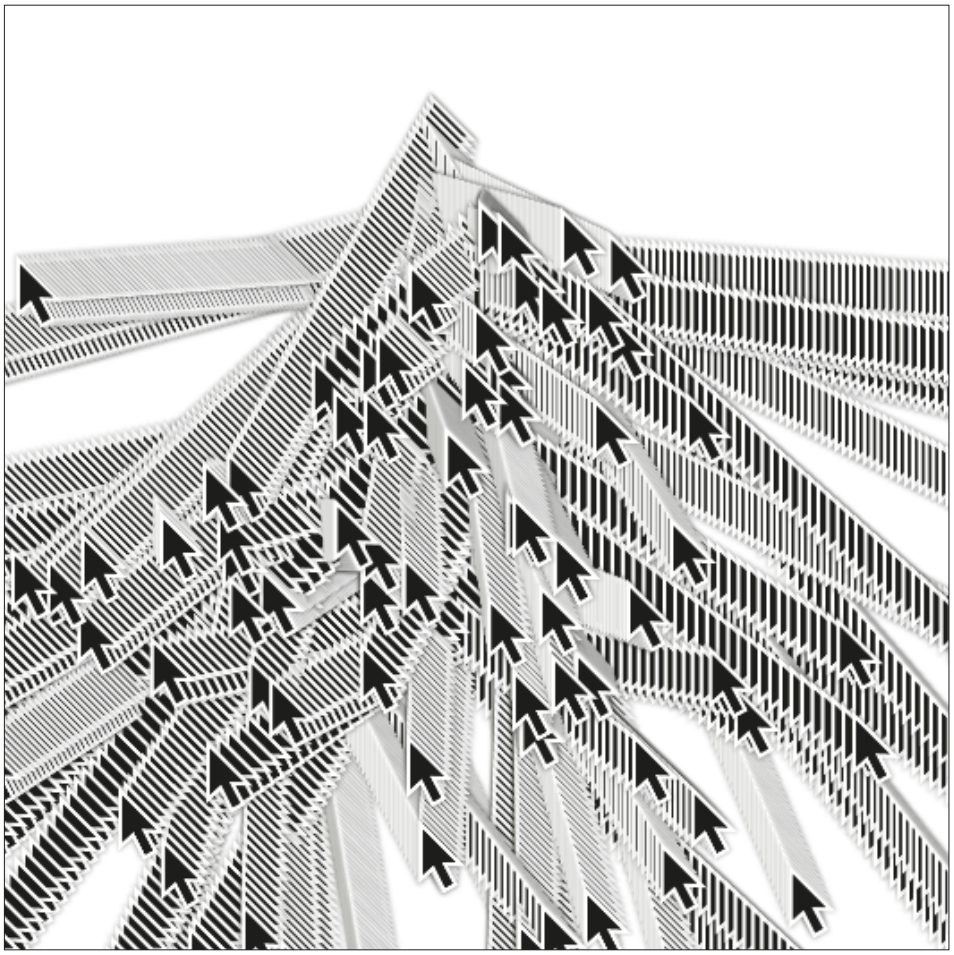
85. Josephine Bosma, 'A Net Artist Named Google: Alexei Shulgin and Josephine Bosma in Conversation' (12 Jan 2017), *Rhizome*, <https://rhizome.org/editorial/2017/jan/12/a-net-artist-named-google-1/> [accessed 01 January 2022].
86. Ibid.

A glitch is therefore mostly independent of the human, and more concerned with the inner functioning of the machine beyond direct control. On the other hand, a bug is a flaw or error in the programme's code, resulting from a logical mistake, syntax error, or incorrect expectations attributed to the programme by the programmer. Therefore, it is a deliberate decision to use the term bug in context of this thesis to focus on the human tendency to generalise rather than an emphasis on the machine's underlying nature.

Unlike the common understanding of the term, a bug in the context of this PhD research is not limited to designating an accidental and undesirable by-product of programming. Rather, the term is used to refer equally to deliberately placed and carefully choreographed dissonances in human-computer interaction that require a renegotiation of human action and thought.



Screenshot 2022-11-14 at 8.58.8 cursorencounter28.png [87] [88]

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87. 'If a person were standing in the rain and yet could see no evidence that he was getting wet, these two cognitions would be dissonant with one another because he knows from experience that getting wet follows from being out in the rain. If one can imagine a person who had never had any experience with rain, these two cognitions would probably not be dissonant' (Festinger, p. 14).

88. In the preceding footnote, the juxtaposition of a screenshot and a reference from differing contexts opens up a new conversation in their transdisciplinary connection, which will be further explored in the course of this chapter. Please refer to p. 58-60 of this PhD thesis for more information.

Festinger's quote in the footnote above describes how someone who is unfamiliar with rain might not experience any cognitive dissonance when standing in the rain without feeling or seeing any evidence of getting wet. A dissonance in cognition presupposes an expectation and requires a certain degree of familiarity or experience with an action and its effects. In the following excerpt, Festinger's words are collaged with a description of my experience of encountering the programme above in order to expand on his observation in a transdisciplinary context:

> If a person [moves the mouse] and yet could see no evidence [of a corresponding reaction on the screen], these two conditions would be dissonant with one another because [they know from experience that an effect follows from a mouse movement]. If one can imagine a person who had never had any experience with [mouse interaction], these two cognitions would probably not be dissonant.[89]

Berlyne attributes specific motivational qualities, not to novelty more broadly but to an intermediate degree of novelty in comparison to previous experiences: 'We are indifferent to things that are either too remote from our experience or 'too familiar. A relatively slight variation in a familiar pattern has a unique piquancy'.[90] Thus, the occurrence of dissonance requires not merely a confrontation with the novel, but a combination of a 'differing from, yet having components in common

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89. Ibid.; The words written in square brackets replace Festinger's words with my own, appropriating the quote to describing my programme above. Please refer to p. 58-60 of this PhD thesis for more information.

90. Berlyne, p. 21.

with' a person's experience.[91] A dissonance between what is encountered, and what is expected. A situation, that 'contradicts expectations aroused by the whole mass of past experience', as Berlyne suggests.[92] Returning to the example that introduces this chapter, the encounter with the two cursors appears disruptive only because of the previous experience of seeing only a single cursor.

In the context of this chapter, the deliberate creation of bugs, and thus of disappointing human expectation, presupposes the existence of expectation in the first place. Bugs require a careful choreographing of building up and disappointing expectations. The discrepancy can be created either between a present situation and a person's expectations based on past experience, or alternatively by establishing and then changing an expectation in the same interactive context.

For anybody familiar with human-computer interaction, the mouse cursor becomes a symbol attributed with a set of expectations, fixed qualities that are taken for granted, independently of their specific software context or digital environment.[93] The earlier exploration in this chapter described how spatial and timely matches between mouse action and computer response turn the mouse into a symbol of a bridged gap between human and computer, of human and machine moving in sync. It is those expectations, automatically projected onto the

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91. Festinger, p. 25.

92. Berlyne, p. 25.

93. Criteria that usually allow for a successful and pleasurable human-computer interaction: include direct action on graphically represented objects via physical, incremental and reversible actions (Shneiderman); rapid feedback, continuous representation of input and output expression (Hutchins, Hollan, Norman), clear causality and continuous representation (Chun).

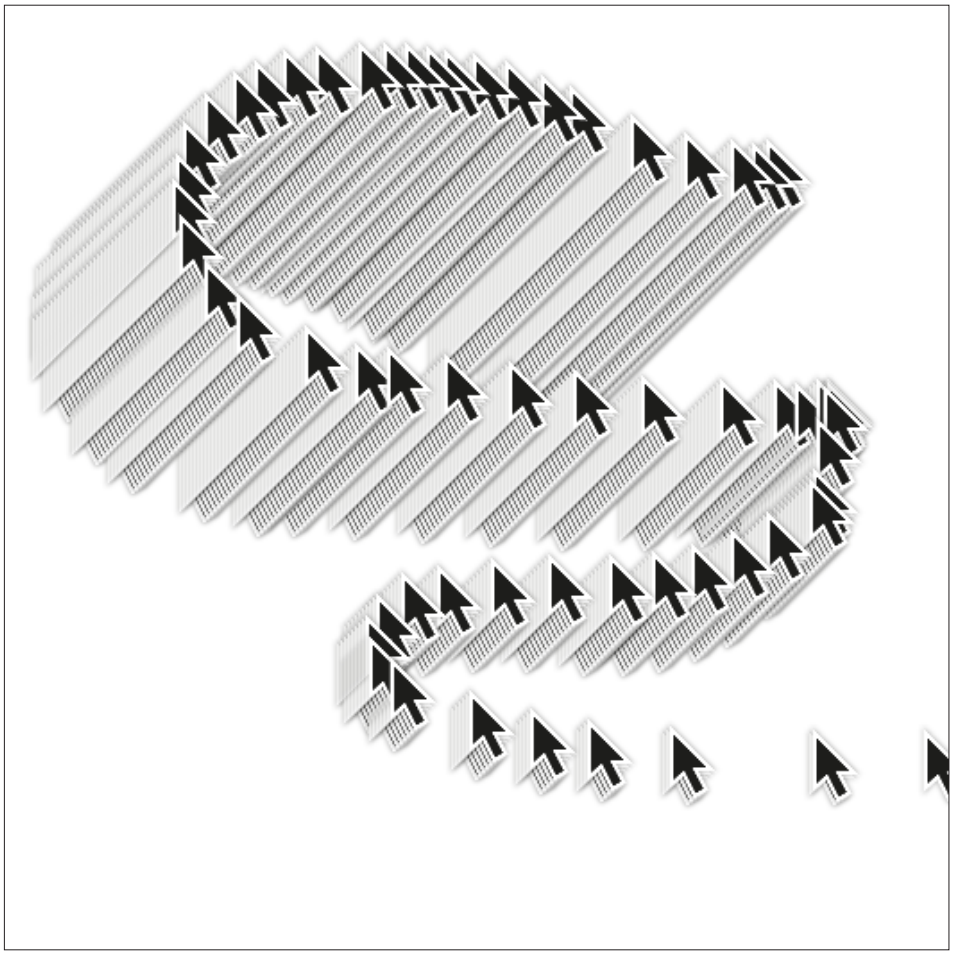
mouse cursor, that this chapter takes advantage of in its efforts to induce bugs in the tension between raising and disappointing human expectations.

In p5.js, these expectations and causal relations between mouse action and computer reaction are pre-programmed in the form of functions in the programming framework. For example, as pointed out earlier in this chapter, mouseX and mouseY are system variables that contain the current horizontal and vertical position of the mouse. They allow the programmer to map the x-y coordinates of the physical mouse to the x-y coordinates of an object or event on the screen. Similarly, mousePressed() or mouseReleased() are functions that connect a mouse action, such as a pressing or release of a mouse button, with a computer reaction in real time.

Therefore, my practice of coding in the context of this chapter is not solely a means to create a programme. Rather, it becomes a practice to a-synchronise, challenge and disrupt the relation between the physical mouse movement or action on the desktop and the mouse cursor on the screen. Here, the programmer's position of mastery is not exploited as a tool to affirm them in their position of power, but instead is employed only to engage in situations that challenge their own expectations of regularity and causality that engage with a negotiation between mastery and subversion, expectation and encounter, pleasure and frustration. Even slight changes or twists in a code may cause the cursor's position and behaviour to change, thus disrupting the 'usual' interaction with the computer.

A relatable scenario may be a situation where the computer mouse is accidentally placed upside down on the desktop, so that a moving up action becomes a moving down one. X and y coordinates are confused. Moving the physical mouse up causes the cursor on the screen to move down and the other way round. However, again, if the user moves the mouse up and sees the cursor on the screen

move in the opposite direction, the dissonance is not in the relation between the mouse and the cursor that is displayed but in the expectations the user habitually attributes to the mouse. Bugs do not preclude the existence of causal processes, but rather imply a discrepancy between a cause — that is, a mouse movement — and the anticipated effect of this action on the screen. Another example that may be familiar is when the tacking speed setting of the mouse is slower or faster than the usual one.



Screenshot 2022-11-14 at 9.0.5 cursorencounter30.png [94] [95]

94. 'Something in the world forces us to think. This something is an object not of recognition but of a fundamental encounter' (Deleuze, Difference and Repetition, p. 183).

95. In the preceding footnote, the juxtaposition of a screenshot and a reference from differing contexts opens up a new conversation in their transdisciplinary connection, which will be further explored in the course of this chapter. Please refer to p. 58-60 of this PhD thesis for more information.

In the programmes created in the context of this chapter, the mouse cursor ceases to be a symbol of stability – what Deleuze refers to as an 'object of recognition' – and becomes an element of discovery and flexibility – an 'object of encounter'. As discussed in the previous chapter via Deleuze, the object of recognition does 'not disturb thought', retaining action and thought within passive and repetitive patterns of causality.[96] By contrast, as an object of encounter, the cursor pushes thought and action out of habit and automated execution, prompting an active consideration of the situation.

It is by enlarging, distorting and manipulating the gap between the hand that moves on the tabletop and the mouse cursor on the screen that the human and the computer are able to reconsider their difference as invigorating. In dealing with bugs, the programmer is unable to act based on habit – that is, based on what a present situation has in common with a past situation – but needs to revaluate their action according to the specific context they are confronted with.[97] In reference to Deleuze's 'object of encounter', the programmes in context of this chapter are titled with the screenshot's timestamp followed by the word 'cursorencounter'.[98]

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96. Deleuze, *Difference and Repetition*, p. 182.

97. According to Lucy A Suchman, it is only when 'actions [are] taken in the context of particular, concrete circumstances' (p. 71) rather than based on past experience, that we 'actually act' (p. 71). (Lucy A. Suchman, *Human-Machine Reconfigurations: Plans and Situated Actions*, 2nd edn (Cambridge: Cambridge University Press, 2007). It is in this way that bugs are seen to provoke an approach to interactivity that is about 'actually acting' and 'actually thinking'.

98. This thesis largely refrains from categorising the programmes created in context of this research. The written thesis refers to individual programmes only to point towards a particular idea by example, which does not necessarily apply exclusively to the programmes shown. Nonetheless, a form of categorisation was

While blind obedience does not disturb thought, bugs require a revaluation of thought. In addressing bugs, thought becomes nomadic, problematic and therefore creative and active rather than being confined by what was referred to in Chapter 1, via Deleuze, as 'a ready-made thought', automatically executed below the level of conscious awareness.[99] Here, 'problematic' should not be understood in a negative sense, but simply to mean that an object is 'outside [of] experience', as Deleuze writes.[100] He argues that while 'representation is already mediation [...] it is a question of producing [...] a movement capable of affecting the mind outside of all representation [...] of inventing vibrations, rotations, whirlings, gravitations, dances or leaps which directly touch the mind'.[101] Thus, it is in the problematic that thought and action are no longer pre-established by their anticipated consequences or with respect to a desired and preconceived outcome. They are no longer purposeful, defined by efficiency, determination and anticipation.

It is bugs that disturb human action and thought from becoming too settled in their ways.[102] Here, the action of the programmer deviates from what, in our

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required considering the number of programmes created – one more moment where the desire for regularity was indispensable.

99. Deleuze and Guattari, *What Is Philosophy?*, p. 51.

100. Deleuze, *Difference and Repetition*, p. 169.

101. Ibid., p. 8.

102. Henri Bergson, in his book *Laughter,* explores how laughter keeps humans' behaviour elastic, keeping them from becoming too settled in their own ways: 'The rigid, the ready-made, the mechanical, in contrast with the supple, the ever-changing and the living, absentmindedness in contrast with attention, in a word, automatism in contrast with free activity, such are the defects that laughter singles out and would fain correct' (Bergson, Henri, *Laughter: An Essay on the Meaning*

culture, is valued as intelligent behaviour. Bugs engage thought to the point where people are 'beating [their] head against the wall', as the previous subchapter expanded on, via Torvalds. In uncausal pleasure the human is reminded about, and can improve on, their capacity to cope with future contingencies. Provoking a break away from the beaten path, making a slit in the protective and affirmative umbrella of habit, debugging becomes a practice of 'philosophical thinking'.

To conclude this chapter, while bugs confront humans with their desire to know, and thus generalise, they equally reveal the way in which this desire tends to push humans into a defensive attitude. The human chooses to be in control, to become the cause, thus avoiding being exposed to the effects of the world around them. However, the fear of losing control tends to overshadow and repress the human willingness and ability to be open to change and to learn. An imposition of causality and regularity does not protect the human, but rather keeps human action and thought in a state of obsessive repetition, thus depriving them of their ability to become active and creative. It does not offer a challenge, or scope to expand, but simply reaffirms the human ability to act and think. Therefore, it fosters an ignorance — not only towards the machine, but equally towards humans themselves.

While the practice of coding is usually quick to reconstruct the protective umbrella of causality and expectation, my practice of coding in the context of this chapter embraces, rather than represses, the dissonant. It suggests that bugs can be considered not as threats to human control and knowledge, but as a welcome escape from the impasse of habit, thus offering an opportunity for humans to

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of the Comic (1912) (USA: Martino Publishing, 2014), p. 41a). 'TENSION and ELASTICITY are two forces, mutually complementary, which life brings into play' (Bergson, Laughter, p. 8b).

rediscover action beyond the passive and automated action circuit of reaction. Here, the process of debugging ceases to be an act of defence and protection against the indeterminate and becomes a means to engage and learn in a confrontation with the new. A gap between human and machine becomes an opportunity to overcome the restrictive boundaries of repetition and causality in order to reveal and rediscover the human ability to change rather than trying to change the other.

Thus, a closer consideration of the concept of bugs facilitates an approach to programming that overcomes the pleasure of mastery. Instead, it is an active engagement with a tension between affirming and simultaneously disappointing human power that makes programming not only pleasurable but also creative. This tension opens up a space of exploration that offers the potential for learning about and exploring the abilities of both the machine and oneself. It is in this way that the practice of coding can be seen not simply as enforcing a causal line of thinking and acting, but as challenging causal inference through a direct engagement with a tension between affirmation and refusal, the known and the unknown.

If the computer's 'hold' and tension between obedience and disobedience stimulates an ambivalence and extravagance of description, I suggest that it is specifically such properties that harbour the potential to challenge action and thought. The discussion above explored the way in which bugs do not simply lead to frustration, but also enable the consideration of a potent approach to interactivity, revealing alternative routes for action and thought beyond the anticipated and already experienced. This chapter has suggested that if bugs widen the gap between two interacting entities, it is precisely this distance that enables a rapprochement through a 'relation of equality'. Bugs do not alienate humans from the world, but rather create conditions that allow them to encounter

the world anew and to become active, rather than 'nihilistic'.[103] They provide opportunities not simply to mould the computer to suit human expectation, but instead to rediscover the human ability to adapt, to be flexible, to revaluate their action, to leave the comforting and protected space of the causal, the regular, the anticipated. In this approach to interactivity, control and subversion, pleasure and frustration do not exist in binary opposition, and thus mutual exclusion. Rather, they are interdependent, intertwining in complex, and at times contradictory, ways. Neither the practice of coding nor the writing in the context of this chapter seeks to resolve but rather reveal and dwell on this contradiction.

Expanding on the human desire for resolution and the dynamics of bugs, the next chapter will discuss the value of resisting closure, the potential of dwelling in the conflictual. Conscious of the productivity and creativity of the dissonant, how can we maintain a state of heightened engagement without arriving at a resolution? And is it possible to find pleasure and potential in resisting closure?

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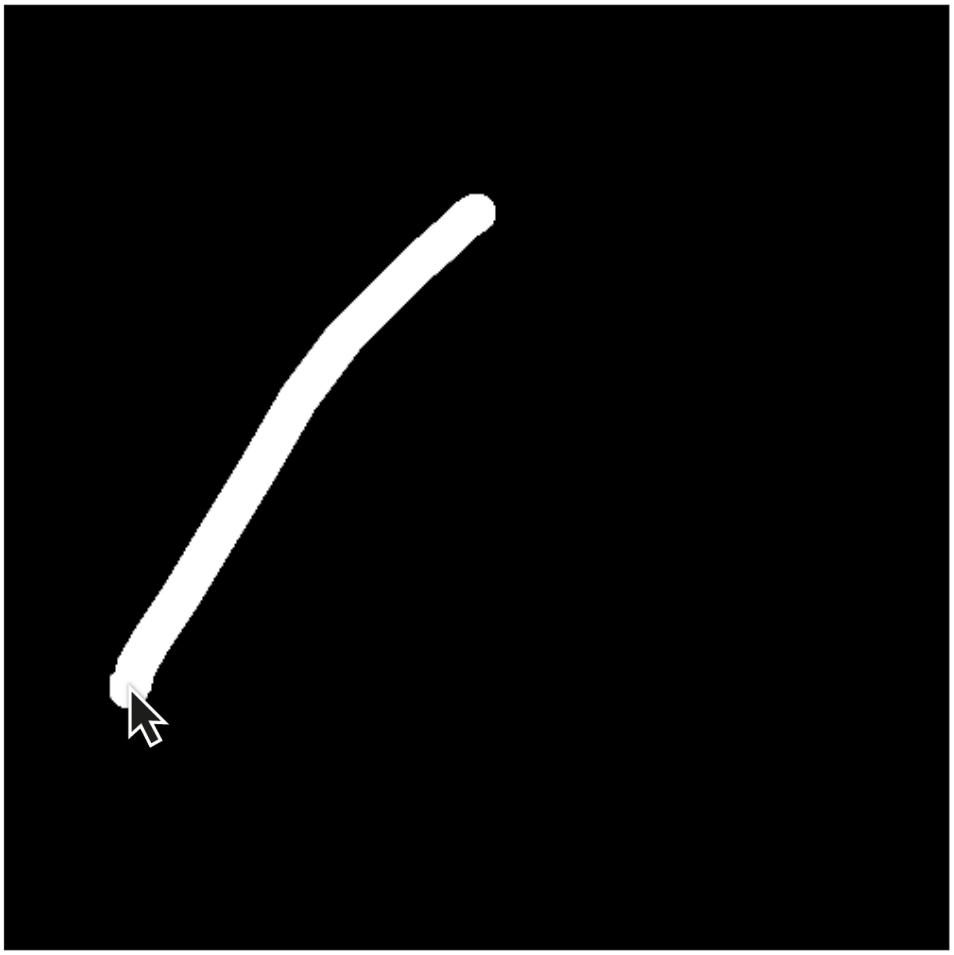
103. Gilles Deleuze, *Nietzsche and Philosophy* (1962), trans. by Hugh Tomlinson (London, New York: Continuum, 1996), p. 68.

Chapter 3

Taking a Cursor for a Walk

'To disobey form. […] What is a resemblance without dissemblance? A drawing with no fight in it is a bore.' (Henri Michaux, *Stroke by Stroke*)

'[A] stable equilibrium, in which all potential would be actualised, would correspond to the death of any possibility of further transformation.' (Gilbert Simondon, *On the Mode of Existence of Technical Objects*)



Screenshot 2022-7-21 at 13.27.4 undraw1.png [1] [2] [3]

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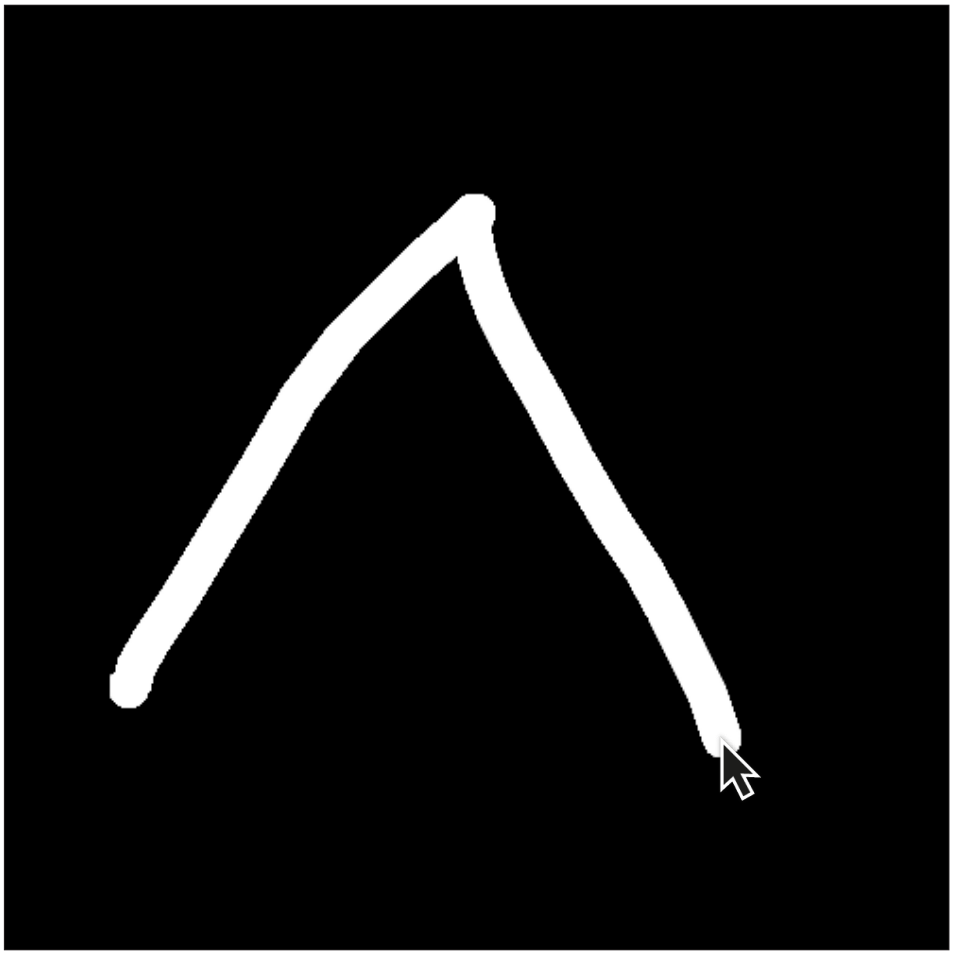
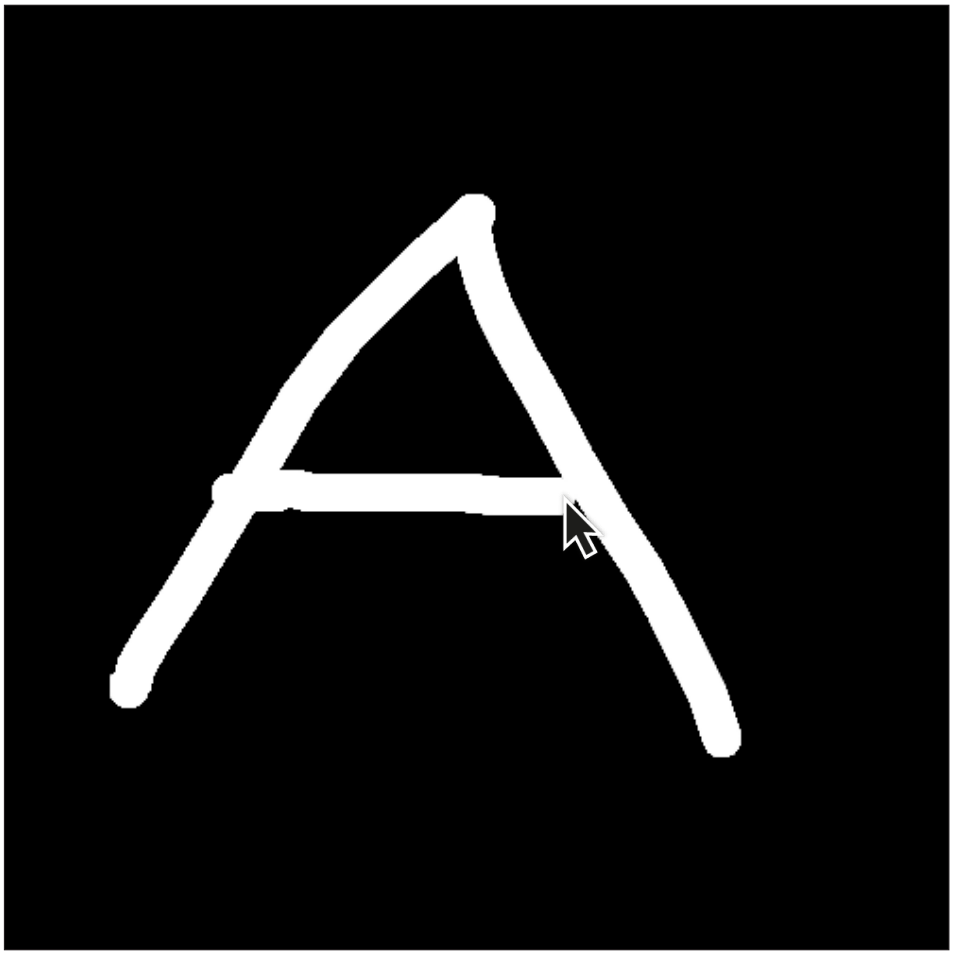
1. The mouse action is initiated by the aim of writing an 'A'. The mouse pressed leaves behind a trace. The mouse released puts an end to such process.
2. The cursor indicates the position of the cursor upon a mouse-released.
3. Turning the following pages of this thesis should be considered the equivalent of the sequential playing out of the mouse action in the same interactive programme.



Screenshot 2022-7-21 at 13.27.7 undraw1.png [4]

4. The mouse pressed acts on the screen. The mouse released puts an end to action.



Screenshot 2022-7-21 at 13.27.9 undraw1.png [5]

5. The mouse pressed leaves behind a trace. The mouse released puts an end to such process. Mouse pressed. Mouse released. Act. Stop Action. Pressed. Released.

In the screenshots that introduce this chapter, pressing the mouse leaves behind a line on the screen that gradually increases along the mouse's path until the mouse is released and the line ends. An object passing over a surface leaving a mark may initially evoke an association with drawing or writing.[6] Indeed, these screenshots explicitly refer to writing the letterform 'A'. However, the focus here is not on the signifying qualities of the mark that is made. Instead, the line should be considered as visual evidence of an action that has been made, a trace of the moving cursor. In the screenshot above, it is the causal relation between the mouse and the computer, moving in sync, that brings about the creation of matter.[7]

In reverse, the line enables the mouse's action that gave rise to it to be inferred. In handwriting, the hand's motor activity is guided and prescribed by the specified task of recreating the standardised shape of the letter visually.[8]

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6. The experimental psychologist Albert Michotte describes an experiment in which a red square [...] passes from left to right over the screen with a black strip gradually increasing towards the right at the same speed. He observes that 'many of the subjects spontaneously indicated a parallel with writing or the use of marking-ink, or made a comparison with a paint-brush. When they were then asked whether there was any causal influence, they replied without any hesitation that they saw [the red square] actually "produce" the trace' (Albert Michotte, *The Perception of Causality* (New York: Basic Books, 1963), p. 291.)
7. Michotte identifies an object passing over a surface leaving a mark on it as a case in which 'the causal influence [brings] about the creation [...] of matter' (Michotte, p. 289.).
8. At the same time, this intention is countered by the motor factor of the moving hand. In handwriting, the letterform results from a tension between the intention to recreate the letterform visually and the contribution of the moving hand that

For example, in writing an upper-case 'A', the hand follows a protocol of execution, a gymnastics, dictated by the letter's shape.[9] Three lines: two diagonals, one towards the bottom left, the other beginning at the first line's origin, moving towards the bottom right and ending parallel to the first line's end; and finally, one horizontal line connecting the two diagonals somewhat in their middle. The movement of the letterform becomes the body's movement:

> 'And again!' 'Two diagonals, one to the bottom left, one to the bottom right, and connect horizontally'. 'One more round!' 'To the left,

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tilts the letters in the direction of the movement, abstracts shapes in the service of speed and thus may compromise the legibility of letterforms. Indeed, Arnheim describes how 'the graphologist indirectly gauges the strength of temperament and vital impulses in their relation to the controlling will, which tends to guide activity in accordance with the prescribed task' (Rudolf Arnheim, *Art and Visual Perception: A Psychology of the Creative Eye* (Berkeley, Los Angeles, London: University of California Press, 1974), p. 419-420). Thus in reverse, the action of the writing hand can be inferred from the trace's form. The act and circumstance of creation are directly visible in the letterform's appearance. Though, the focus of this thesis is different: In writing, the motion is directed by an intended outcome, whereas in a child's first drawings, for example, the drawing is a result of motor exploration.

9. The letter 'A' is simply used as an example and could be replaced by any other letter or by a representational drawing. The focus is on an action as an intentional gesture, guided and defined by the goal of producing a determinate outcome. While this thesis is dissociated from the discipline of type design, it remains a necessary point of reference, given my background.

> to the right, connect'. 'One last time!' 'Left, right, connect'.[10]

With the mouse movement and the line displayed on the screen in sync, the computer becomes a tool, extending and imitating Western human gymnastics. The human intention to write an 'A' is supported and affirmed by the computer. The line on the screen becomes a testament of agency, of the ability to control and manipulate the computer.[11]

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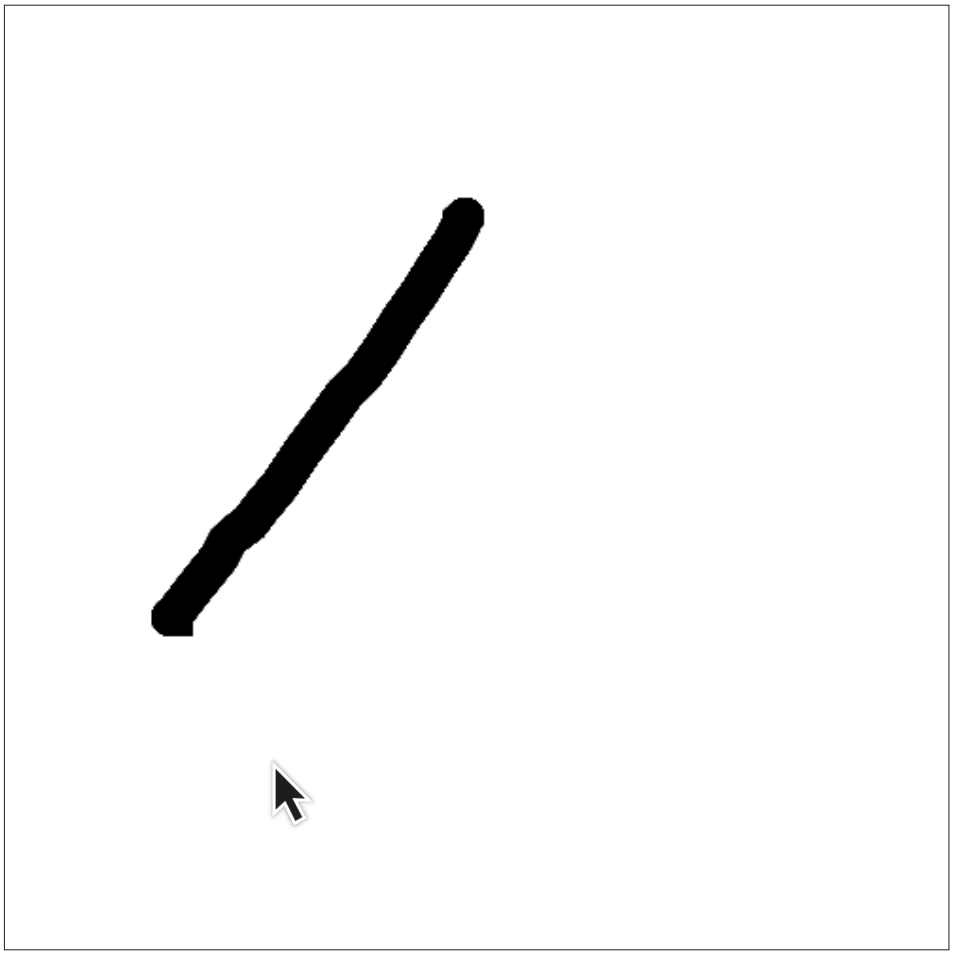
10. Here, the format of direct speech that imitates a fitness instructor seeks to emphasise the point made earlier about the 'gymnastics of the body'.

11. Sherry Turkle observes that making computer graphics is experienced as a 'source of great power' (Turkle., p. 136). Papert's 'Logo', is a programming language specifically designed to be accessible for children. Children learned basic programming skills by giving commands to a turtle, 'a triangular-shaped penpoint that responds to commands to move around the screen and leaves a trace as it goes. […] Thus the turtle becomes the instrument for a kind of TV screen doodling' (Ibid., p. 133). Using 'Logo', pictures are drawn on a screen by giving commands to a turtle – children learn to understand the computer as something they can control, 'examine, reflect on, manipulate' (Ibid., p. 137). Furthermore, Rudolf Arnheim in his book *Art and Visual Perception* discovers that a child's first scribbles do not seek to represent, but are rather an 'enjoyable motor activity in which the child exercises his limbs, with the added pleasure of having visible traces produced' (Arnheim, p. 171-172). The pleasurable and 'exciting experience to bring about something visible that was not there before […] remains undiminished even in the adult' (Ibid., p. 171).



Screenshot 2022-7-21 at 13.47.35 undraw2.png [12] [13]

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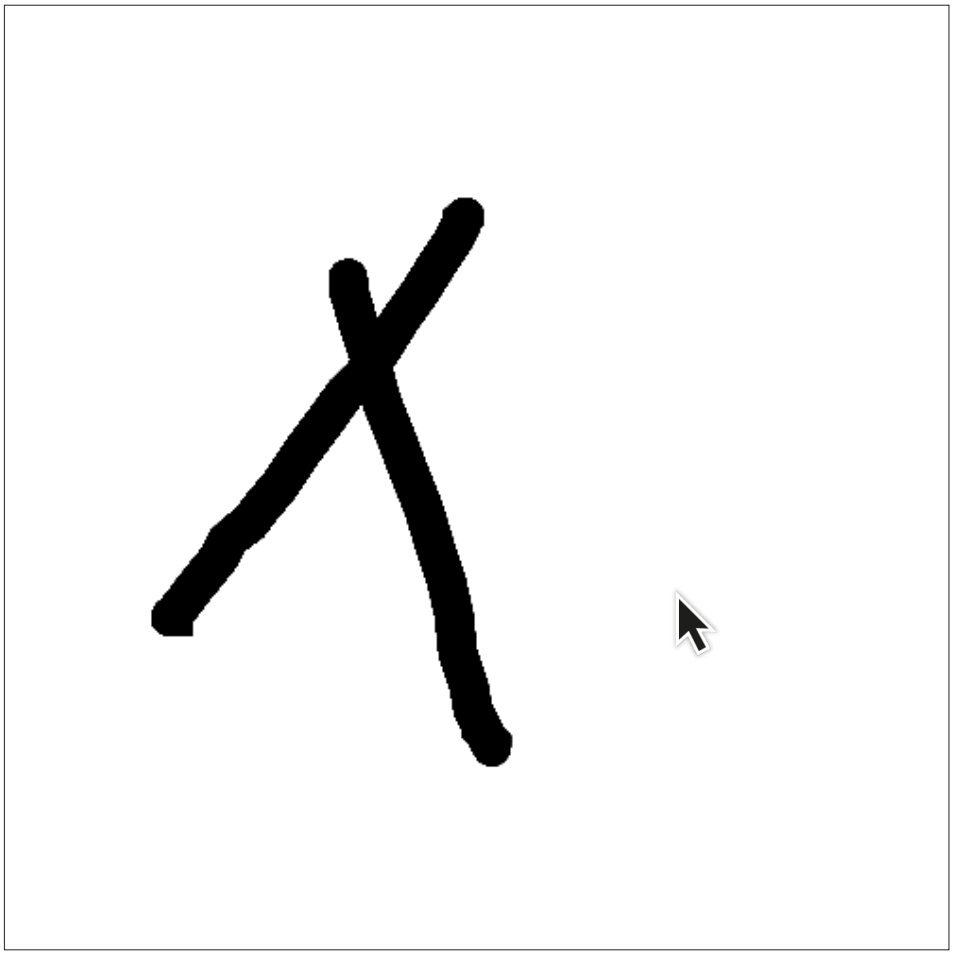
12. 'The more I was determined to draw an animal the more I would refuse it. My desire to "render" these animals worked at cross-purposes with a whole series of refusals - refusal of representation, refusal to make them resemble[…] All these impulses to capture, alternating with all these rejections. […] I gave myself over now to one, now to the other, and the animals […] were chaotically submitted to my conflicted representation[…]' (Michaux, Stroke by Stroke, n.p.).

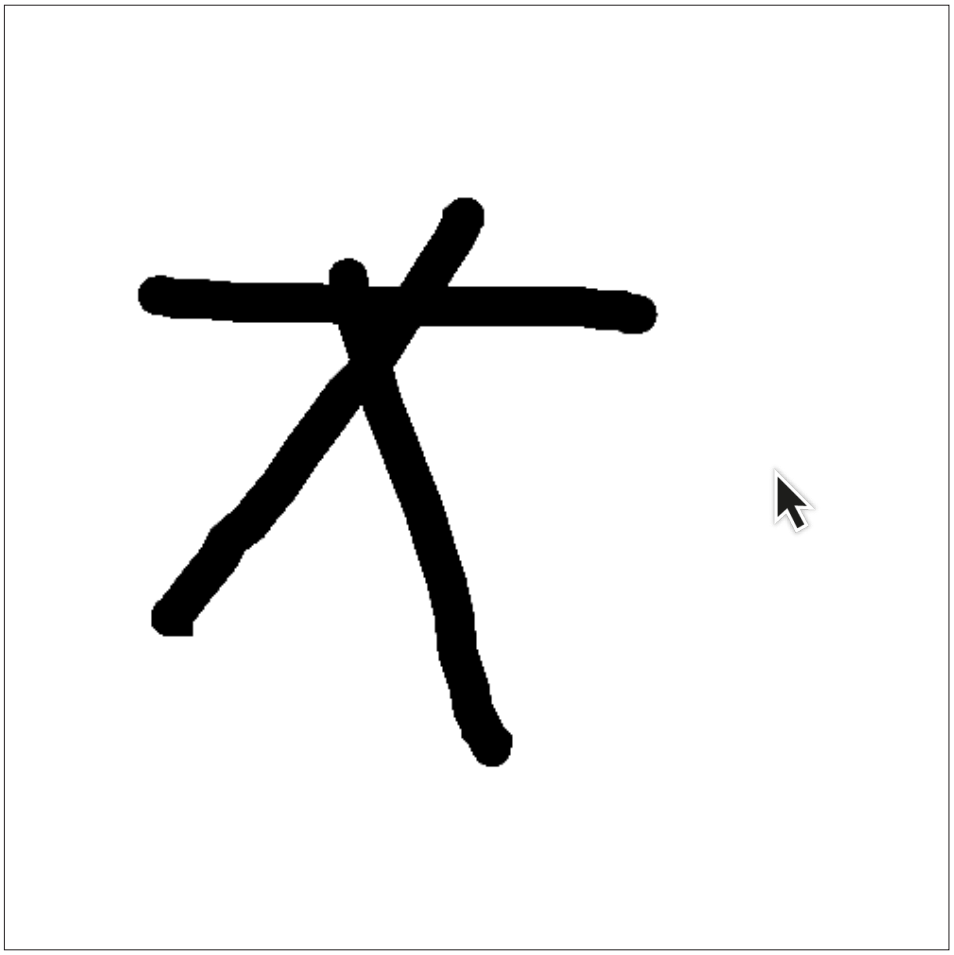
13. In the preceding footnote, the juxtaposition of a screenshot and a reference from differing contexts opens up a new conversation in their transdisciplinary connection, which will be further explored in the course of this chapter. Please



Screenshot 2022-7-21 at 13.47.37 undraw2.png [14]

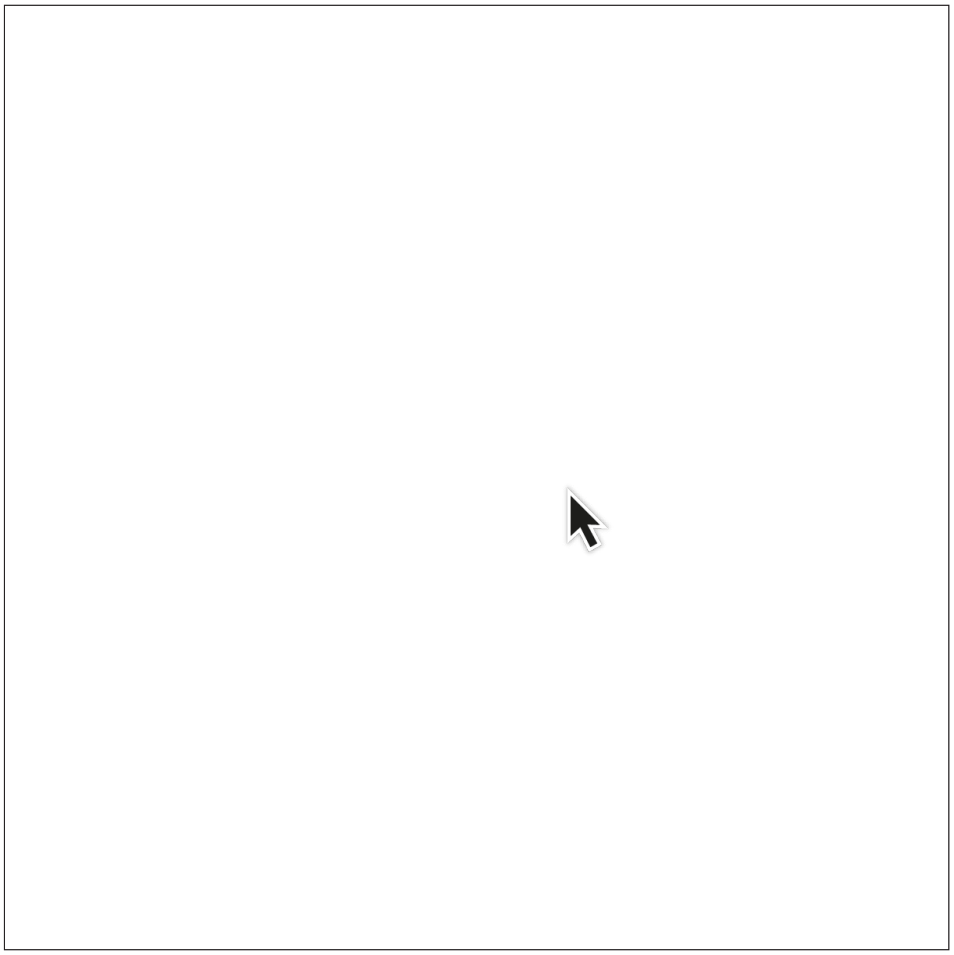
refer to p. 58-60 of this PhD thesis for more information; A page turn on the following pages of this PhD thesis should be considered as the sequential playing out of the mouse action in the same interactive programme.

14. Mouse pressed, mouse moved, mouse released.



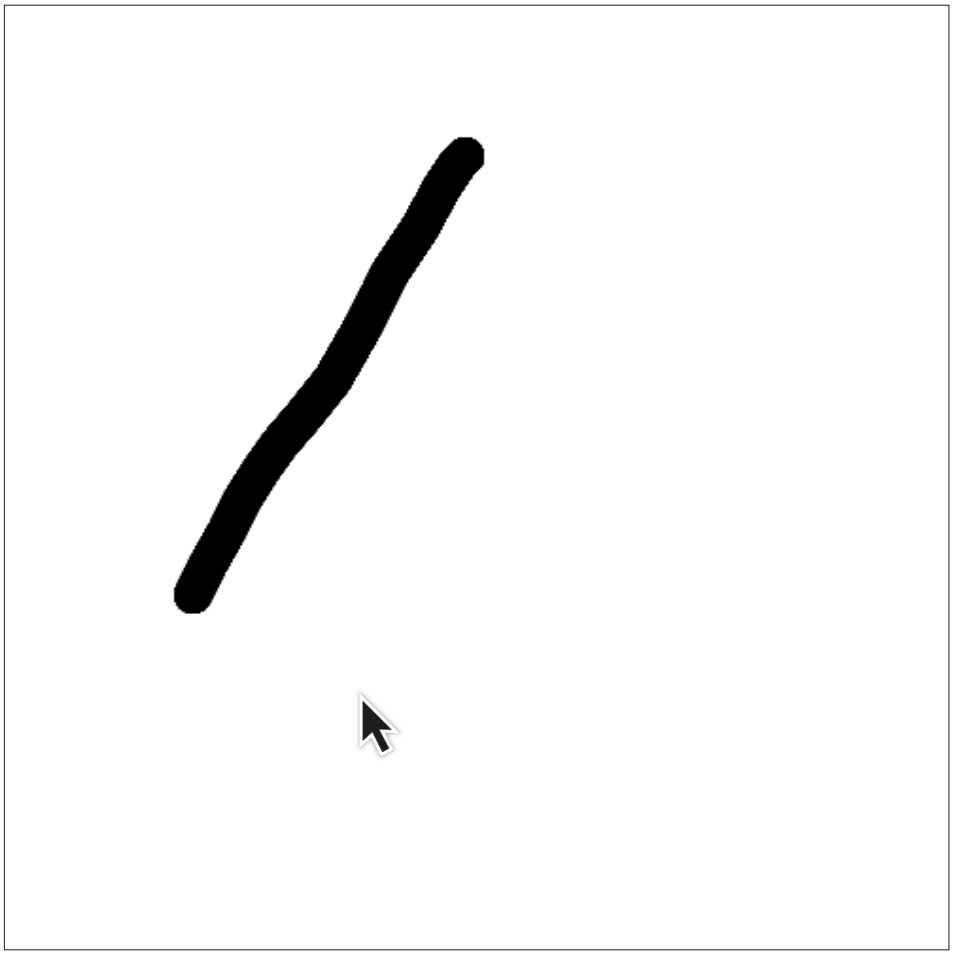
Screenshot 2022-7-21 at 13.47.39 undraw2.png [15]

15. Mouse pressed, mouse moved, mouse released.



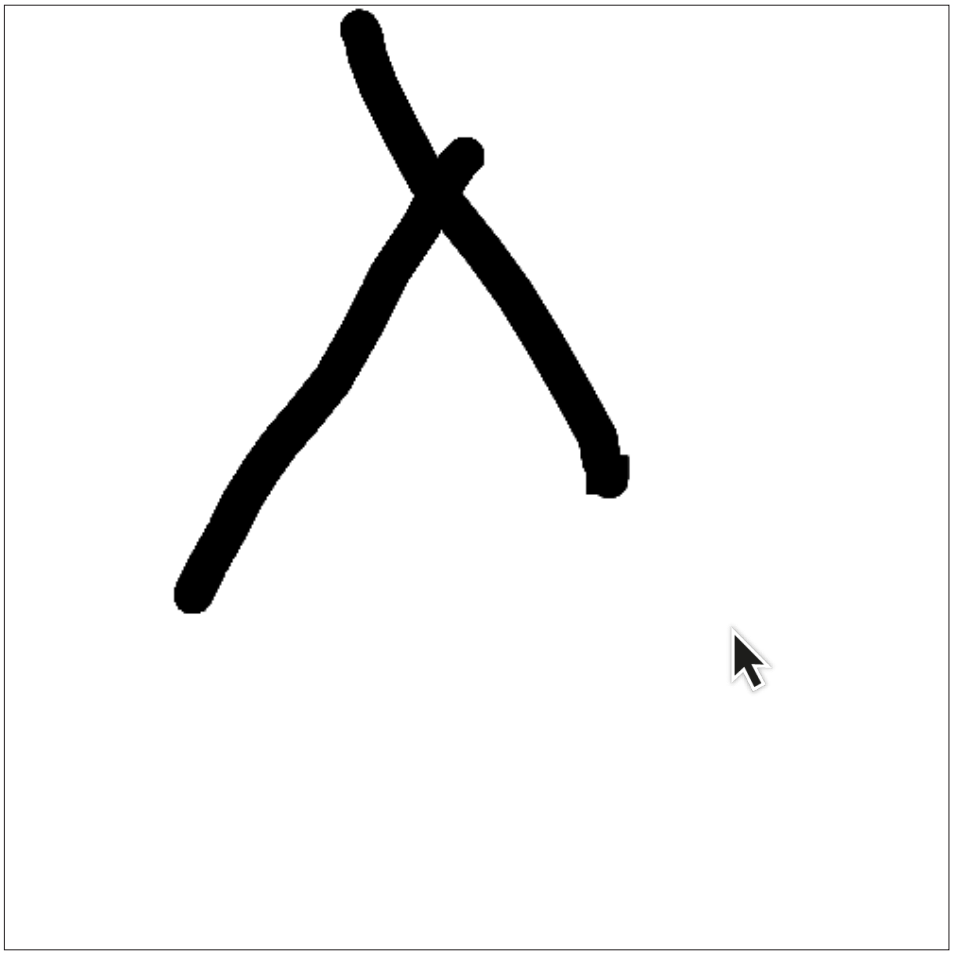
Screenshot 2022-7-21 at 13.48.50 undraw2.png [16]

16. The programme is reloaded to restart with an empty canvas.



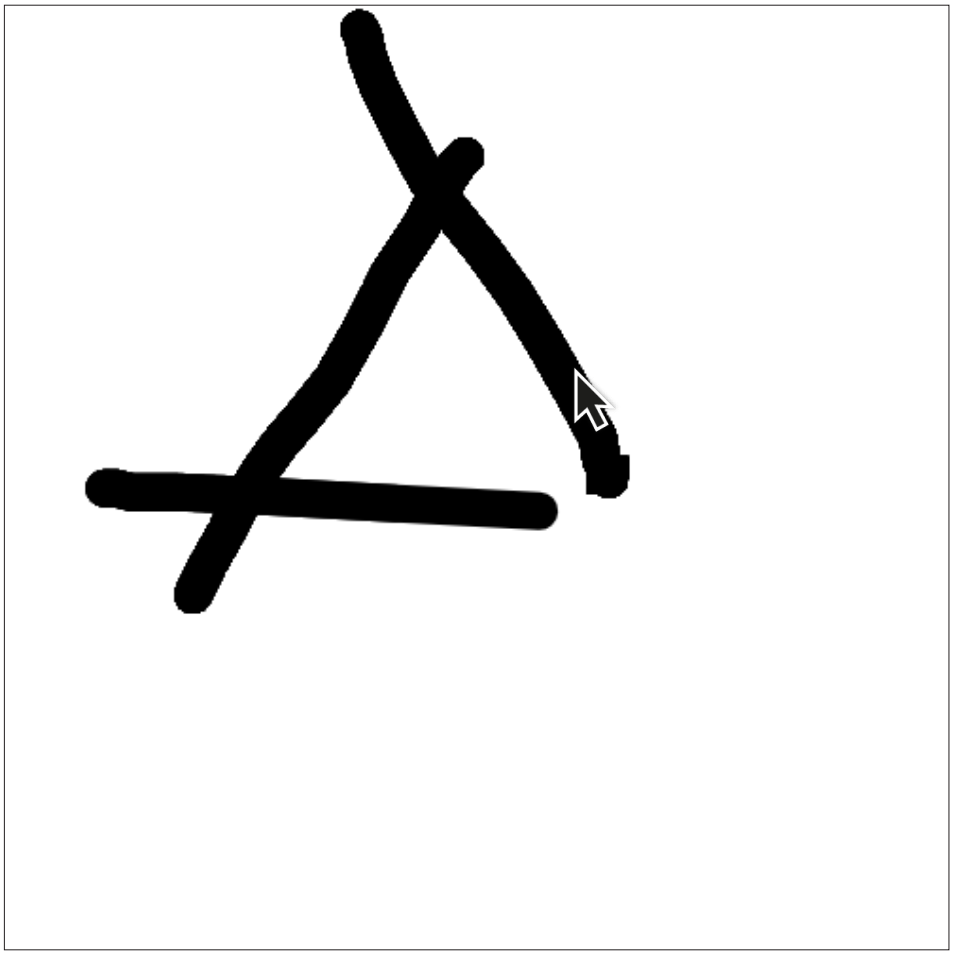
Screenshot 2022-7-21 at 13.48.53 undraw2.png [17]

17. Mouse pressed, mouse moved, mouse released.



Screenshot 2022-7-21 at 13.48.55 undraw2.png [18]

18. Mouse pressed, mouse moved, mouse released.



Screenshot 2022-7-21 at 13.48.56 undraw2.png [19]

19. Mouse pressed, mouse moved, mouse released.

In the previous footnote, the artist Henri Michaux describes his effort to draw, whilst simultaneously refusing to draw, an animal. His black ink marks on white paper are testament to his inner conflict, resisting the desire for representation and signification whilst constantly being drawn back into learned and conditioned patterns. Divided in two, he finds himself at times more diligent and focused, and at others more recalcitrant: 'Against the passing desire to "assimilate", against the impulse to maintain form there inevitably arises in me the instinct to do exactly the opposite [...] to escape from likeness [...] to disobey form'.[20] Michaux's marks, sometimes more and sometimes less, allude to a spider; a dog; a human. One limb? Two limbs? No head? Michaux writes: 'If I forced things the resistance would reach such pitch that certain animals [...] lacked even half a body to show [...] depriving them of their basics'.[21]

The following extract collages Michaux's description of his effort to draw an animal with a recollection of my experience of encountering the programme on the previous pages:

> The more I was determined to [write an A] the more [the computer] would refuse it. My desire to "render" these [letters] worked at cross-purposes with a whole series of refusals — refusal of [assimilation], refusal to make them [correspond] [...] All these impulses to [act], alternating with all these rejections. [...] I gave myself over now to one, now to the other, and the [letterforms]

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20. Henri Michaux, *Stroke by Stroke*, trans. by Richard Sieburth (New York: Archipelago Books, 2006), n.p.

21. Ibid., n.p.

> [...] were chaotically submitted to my conflicted representation[...].[22]

In the programme above, the mouse action is initiated by the aim of writing an 'A'. The mouse, when pressed, leaves a mark on the screen that corresponds in length and direction to the mouse's movement. However, the origin of the mark does not match the mouse's position. Instead, it appears out of line from its position, maintaining a steady distance. The mouse, when released, ends the stroke. Keeping the aim of writing an 'A' in mind, the next stroke requires a repositioning of the mouse in relation to the first line that was made. Having started with a vertical downward stroke, the consecutive mouse action aims at the creation of a vertical downward stroke, starting at the beginning of the first stroke and moving vertically down to the right, ending up parallel to the end of the first stroke. Again, the trace of the mouse is out of line from its position. This time, the distance between the cursor and its trace is even slightly bigger. The action appears trapped in a tension between reference and dissonance.

The previous chapter explored how a gap between human expectation and machine reaction – i.e. a bug – can motivate the human desire for assimilation and closure. Human-computer interaction is careful to avoid the frustration of the conflictual and unexpected by mapping human action to computer reaction, affirming the human in their ability to understand, and thus control, the world around them. While Chun's notion of 'causal pleasure' suggests that pleasure is primarily experienced in the anticipated, and thus already known, the term

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22. Ibid.; The words written in square brackets replace Michaux's words with my own, appropriating the quote to describing my programme above. Please refer to p. 58-60 of this PhD thesis for more information.

'uncausal pleasure' was introduced to highlight the pleasure of challenge, curiosity and learning. Indeed, the human desire for resolution and closure reveals the human tendency not only to favour the causal and comfortable and to avoid the conflictual, but also to actively seek out a confrontation with the dissonant. Human beings are not lazy, motivated into activity only to suppress danger or if their ability to control is compromised, but they seek out challenge, a confrontation with their fears, in order to expand their knowledge rather than being affirmed in the already known. It is bugs that offer opportunities for humans to leave their habitual, and thus passive, way of thinking and acting to become active and creative. In uncausal pleasure, a bug is no longer a threat to knowledge, but becomes an opportunity to revaluate human action and thought in a relation of equality, rather than rivalry, with the computer.

The examples that introduce this chapter do not primarily have in common the way that they both deal with line-making. Nor are they united by their discipline – Michaux engages in the analogue act of applying ink to paper; the programmes, in contrast, deal with the relation between human action and computer reaction. Rather, the two examples are united by the way, each on their own terms, they create spaces that actively resist the human desire for resolution. In his marks, Michaux dwells in a self-imposed internal conflict between a desire to represent and a simultaneous refusal to do so. In the programme above, by contrast, this conflict between the desire for, and the refusal of, representation arises from a dissonance between human action and computer reaction. Expanding on the dynamics of bugs explored in the previous chapter, this chapter investigates an approach to interactivity that maintains and dwells in the conflictual, rather than seeking to assimilate the dissonant. Thus, while the previous chapter expanded on the human desire for resolution, this chapter explores the value of resisting closure, the potential of dwelling in the conflictual. Rather than giving in to the human desire for closure, the programmes in this chapter seek to maintain

a dissonance between human and computer, continuously opening up new and divergent ways of acting beyond that which is anticipated.

3.1. A Formula of Perversion

Feeling alienated by 'Western gymnastics with its mechanical gestures', Michaux seeks to 'decondition' himself from the culture in which he was brought up and educated.[23] A sign, for Michaux, is 'a stop sign' that 'waylays, halts, puts to sleep'.[24] By contrast, Michaux's effort 'to insignify' is about 'waking up' the sign-making body.[25] At the same time, his 'kinetic desire (*envie cinétique*)' does not lead him to completely dissociate the practices of writing and drawing[26] — 'to insignify' is not a simple negation of 'to signify'. Rather, the term implies a tension, referring to, while moving away from, the practice of sign-making, creating an in-between space. Michaux's gestural exploration evolves from within the tension between his conditioned body, the disciplining properties of writing and drawing conventions and gestural freedom beyond routines, habit and recognisable signs.

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23. Henri Michaux, *Passages* [my translation] (Paris: Gallimard, 1963), p. 91.
Henri Michaux, *Emergences-Résurgences* [my translation] (Geneva: Skira, 1972), p. 8.

24. Michaux, *Emergences-Résurgences*, p. 13.
Michaux, *Stroke by Stroke*, n.p.; 'Languages forming, limiting, grouping. Establishing a society, a nation, locking it up. Everything placed under arrest, each word with its own way of appropriating the world'.

25. Michaux, *Stroke by Stroke*, n.p.
Michaux, *Passages*, p. 51.

26. Henri Michaux, *Mouvements* [my translation] (Paris: Éditions Gallimard, 1951), n.p.

Indeed, it might be argued that in his practice, trapped in the tension between his conditioned body and his effort to decondition it, Michaux failed to resolve this conflict:[27] that he failed to escape the limited space of the page in order to arrive at a free bodily expression. In contrast to this prevailing critique, Carrie Noland suggests that if Michaux wanted a purely free gestural exploration, he wouldn't have emphasised the constraints of the page and of writing conventions: 'If he wanted to invent a language true to his own body, why did he discipline this body to perform within such a tight space?'[28] She observes how Michaux's 'marking hand […] oscillates between two poles of attraction […]. The artist's hand […] is freed from the necessity to make recognisable signs […] and yet at the same time, the scope of the artist's movement is tightly restrained by a gestural routine'.[29] Michaux, as Nolan puts it, engages in a 'citational practice'. He 'mimes signing,' approximating both the visual as well as kinetic properties of the sign and of sign-making, 'suggest[ing] sign-ness (without actually signing)'[30]. He deliberately exposes himself to tension, not in pursuit of the satisfaction of resolution, but for the mere purpose of maintaining and dwelling within conflict. 'It would be a mistake to ascribe to Michaux the intention to resolve the struggle', Noland argues.[31] Michaux's effort to 'insignify', then, does not imply a desire to free himself

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27. Noland writes that other critics insisted on Michaux's aim of arriving at a purely bodily expression (Noland, p. 152).

28. Carrie Noland, 'Miming Signing: Henri Michaux and the Writing Body', in Carrie Noland and Sally Ann Ness, *Migrations of Gesture* (Minneapolis, MN: University of Minnesota Press 2008), p. 133-183, (p. 152).

29. Ibid., (p. 141-142).

30. Ibid. (p. 169).

31. Ibid., (p. 145). Michaux's marks cannot be compared to the unconditioned gestured of a child. The focus in Michaux's work is on a continuous process of deconditioning, rather than on the unconditioned.

entirely from signs. Instead, it maintains its reference to signs, exposing Michaux to simultaneous tensions of 'push[ing] away from [himself]' whilst 'bring[ing] back to [himself]': 'To detach oneself, reattach oneself, redetach oneself', as Michaux writes.[32] He is challenging himself in attending to both the conflicting tendencies, torn between them.[33] It becomes obvious that Michaux has to actively resist his instinctive tendency towards resolving the conflict.[34] For Michaux, it is such tension, rather than free exploration, that is the condition for spontaneity and creation: 'A growing tension. A tension that never ends. An emerging need for expansion'.[35]

Michaux then, in resisting the desire for resolution and closure, engages in a dynamics that appears contradictory to what Deleuze and Guattari refer to as the

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32. Ibid., n.p.

33. For example, in *Emergences-Résurgences,* Michaux expands on his experiments with mescaline, immersing himself in an up to eight-hour-long 'spectacle/show of drawing' resulting in his 'Dessin mescalinien.' He describes his experience as a 'veritable, formidable optical spectacle' in which he felt 'more inflicted than offered' and 'overwhelmed and inundated' (p. 79).

34. The importance of this instinctive desire for closure should not be denied. The previous chapter revealed that it is indeed the prospect of resolution that is an essential driving force and motivation for activity and engagement in the first place. Hume argues that without the human urge to generalise and universalise 'there would be an end at once of all action,' (Hume, *An Enquiry Concerning Human Understanding*, p. 23.) since we would not be able to adjust a means to an end, and thus to act, plan, complete tasks and solve problems at all. Thus, while the desire for resolution remains an essential driving force in the conflictual, this chapter seeks to attend not to the moment of resolution, but to the process.

35. Michaux, *Emergences-Résurgences*, p. 72-73.

'orgasmic' orientation of Western thought: 'It is a regrettable characteristic of the Western mind to relate [...] actions to exterior or transcendent ends.'[36] Indeed, the previous chapter briefly touched on the obvious sexual connotations in the discussion of programming and bugs. As discussed via Turkle, the computer's complexity not only stimulates an extravagance of description, but furthermore 'a lot of the drives that cause hacking and sex are the same'.[37] Thus, while the previous chapter expanded on the human desire for closure and resolution, this chapter explores the value of resisting closure.

Maintaining rather than resolving the conflictual, Michaux's concept 'to insignify' could be said to create what Deleuze and Guattari refer to as a 'plateau'. Borrowing the term from Gregory Bateson, Deleuze and Guattari apply the term to describe 'a continuous, self-vibrating region of intensities whose development avoids any orientation toward a culmination point or external end'.[38] Indeed, Michaux explicitly thematises an 'intense, sudden ardent concentration from which the blow will proceed, rather than the blow's arrival at its destination'.[39]

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36. Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. by Brian Massumi (London, New York: Bloomsbury, 2013), p. 23.

37. Sherry Turkle, *The Second Self: Computers and the Human Spirit* (Cambridge, MA; London: The MIT Press, 2005), p. 200.

38. 'Bateson cites Balinese culture as an example: mother-child sexual games, and even quarrels among men, undergo this bizarre intensive stabilization. "Some sort of continuing plateau of intensity is substituted for [sexual] climax," war, or a culmination point' (Deleuze and Guattari, *A Thousand Plateaus*, p. 22-23).

39. Michaux, *Stroke by Stroke*, n.p.

Michaux appears to make use of a dynamics that Roland Barthes, in his description of Saul Steinberg's indecipherable characters, calls a 'formula of perversion'.[40] Steinberg's 'simili-writings,' imitating the object of writing while refusing legibility, 'engages a reading that is very much like *coitus reservatus',* as Barthes writes:[41] a 'torment of illegible writing' that leaves the human unsatisfied in their instinctive desire for resolution, as discussed in the previous chapter.[42] Indeed, the term 'perversion' not only hints at a 'sexual behaviour that is considered abnormal and unacceptable', but in context of this chapter should be understood according to a dictionary definition, as a 'distortion or corruption of the original course, meaning, or state of something'.[43]

The programmer's pursuit of 'the greatest feeling in the world', expanded on in Chapter 2 via Torvalds, could be compared to Schwenger's description of the cryptographer's compulsion, that is driven by a 'pleasure [that] will top all others' – that is, the pleasure of cracking the code.[44] However, Schwenger suggests

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40. Roland Barthes, *all except you: Saul Steinberg* [my translation] (France: repères édition d'art, 1983), p. 22. However, Barthes refers to his experience of encountering Steinberg's work, as opposed to Steinberg's process of creating his simili-writings.

41. Ibid.; 'Coitus reservatus' describes the practice of delaying an orgasm, maintaining a plateau phase of sexual intercourse for as long as possible. However, Barthes refers to the dynamics he experiences when encountering Steinberg's work, as opposed to Steinberg's process of creating his 'simili-writings'.

42. Ibid.

43. 'Perversion', *Oxford Languages* <https://languages.oup.com/google-dictionary-en/> [accessed 16 September 2022].

44. Linus Torvalds, *Just for Fun: the Story of an Accidental Revolutionary* (New York; London; Toronto; Sydney: Harper, 2001), p. 76.

that what would be gained would be 'nothing more than the pleasure of getting it'. Instead, Schwenger brings forth the concept of a 'pleasure in not getting it', wherein the undecodable becomes not simply frustrating, but 'offers itself as an endless source of speculation'.[45] In this account, what the cryptographer Kane X. Faucher describes, for example, as 'colossal failures', 'idle speculations, negative results, and plenty of dead-ends' become, as this thesis suggests, opportunities for creation and invention.[46] However, like Steinberg, Schwenger refers to a dynamics that arises from an attempt to decode the undecodable. Further, the previous chapter did not deny the pleasure of closure. Rather, closure remains an essential driving force and motivation, creating a space for the the 'idle speculations' in the first place. Thus, as the previous chapter explored, the 'pleasure of not getting it' remains dependent on the human desire to 'get it.'

It might be argued that failing to resolve the tension would leave Michaux unsatisfied. However, for Michaux it is not 'the static, the fixed, the everyday, the "expected"' that fulfils him.[47] A reproduction or preservation of something that already exists is 'quickly annoying', and 'a drawing with no fight in it is a bore', he argues.[48] Again, Michaux reveals a relation between causality and boredom,

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Peter Schwenger, 'Codex Seraphinianus: Hallucinatory Encyclopedia', *SCRIPTjr.nl*, 8 December 2012 <https://scriptjr.nl/special-sections/cryptotexts/codex-seraphinianus-hallucinatory-encyclopedia-peter-schwenger#.YFC3DKeZOhc> [accessed 16 March 2021].

45. Ibid.

46. Kane X. Faucher, 'On the Codex Seraphinianus' (8 December 2012) <https://scriptjr.nl/special-sections/cryptotexts/on-the-codex-seraphinianus-kane-x-faucher#.YHWMQqeQ2hc> [accessed 13 April 2021].

47. Michaux, *Emergences-Résurgences*, p. 43.

48. Ibid., p. 43.

rather than pleasure, thematised in the previous chapter. As Michaux suggests: 'It is the obstacle […] that will give me my speed of liberation. […] in order to reach this point […] one moves […] towards a state of maximum momentum, which is the maximum of density, the maximum of being, the maximum of actualisation'.[49] It is the conflicted, rather than the affirmative, that maintains Michaux's interest and engagement. However, in contrast to the previous chapter, Michaux's energy is directed not towards seeking to resolve a conflict, but towards actively resisting his desire for resolution. Michaux does not in pursue the pleasure of closure, but, as he states: 'My pleasure is to make it come, to make it appear, then to make it disappear'.[50] In a never-ending continuum between resistance and reference, display and erasure, Michaux finds not only his satisfaction and pleasure, but also an ability to 'be open to the world': 'against that which waylays, halts, puts to sleep/ […] Against the enemy disguised as dailiness/ […]Against the endless repetition/ […] Against the servility of the everyday/ Against predestination'.[51] To be in 'semblance' with the world is, for Michaux, not about assimilation, but rather about maintaining the difference between entities.

Through his practice Michaux appears to establish what Deleuze describes as a 'belief in this world', that, as discussed in Chapter 1 of this thesis, allows himself to continuously encounter life and the world anew.[52] To stay curious and open

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Michaux, *Stroke by Stroke*, n.p.; Chapter 2 revealed that boredom marks a lack of arousal: that is, a lack of dissonance. Furthermore, Torvalds was hinting towards the holding power of the conflictual, arguing that 'blind obedience on its own […] gets pretty boring fairly quickly' (Torvalds, p. 73.)

49. Michaux, *Emergences-Résurgences*, p. 64.
50. Ibid., p. 21.
51. Ibid., n.p.; Michaux, *Stroke by Stroke*, n.p.
52. Gilles Deleuze, *Cinema 2: The Time-Image*, trans. by Hugh Tomlinson and

to change, rather than giving in to his desire for causality and closure – and thus restricting himself – opens up the possibility of experiencing and affirming life in its inexhaustibility.

Whitehead's term of 'self-enjoyment' refers to the pleasure of belonging to a continuous process of creative change rather than seeking causality and closure. 'The universe is not a museum with its specimens in glass cases', Whitehead writes critically in *Modes of Thought*.[53] He acknowledges that stability and order are essential for experience and that 'complete confusion can be equated with complete frustration'.[54] At the same time, he finds that it is 'vibrant novelty which elicits the excitement of life. The essence of life is to be found in the frustration of established order [...] we enjoy no rationality of experience'.[55] In self-enjoyment, then, as Whitehead continues, 'the enjoyment belongs to the process and is not a characteristic of any static result'.[56] An enjoyment not of closure but of being part of and belonging to a creative process of discovery, of a 'transformation of the potential into the actual', as Whitehead suggests.[57] In contrast to the apparent connotation of self-centredness or self-indulgence in Whitehead's term, 'self-enjoyment' points towards the pleasure and joy, not of self-fulfilment, but of being open to a changing world.

Robert Galela (London: The Athlone Press, 1989), p. 171.

53. Alfred North Whitehead, *Modes of Thought* (New York: Capricorn Books, 1958), p. 123.
54. Ibid., p. 119.
55. Ibid.
56. Ibid., p. 208.
57. Ibid., p. 207.

The programme above creates a conflict between the mouse action and the lines displayed. The lines, sometimes matching, sometimes diverting from the mouse's position, constantly push against the body's expectation of continuity and regularity, making any compositional control impossible. At the same time, the lines remain indexical of the mouse's gestures (two diagonal strokes, one moving to the left, the other to the right, and one horizontal). Thus, the programme never completely dissociates from the habitual while keeping it at a steady distance.

Rather than affirming human action and agency, the programme interrupts and estranges the repetitive routine of the moving body, pushing it into new and diverging directions. In constant variation and deviation, action needs to be continuously renegotiated. It no longer follows an if-then logic, executed based on past experience, thus playing out the already known. Instead, it evolves from a co-involvement of human and computer, from a dwelling in and maintaining of their difference that never harmonises. Interaction, here, is not seen as a means to support the human body and its possibilities, but rather as an opportunity to explore how action can become active and creative, actualising the potential of a movement.

Indeed, Simondon's plea for a 'relation of equality' between humans and technical objects does not simply imply a reduction of the difference between the entities through adaptation.[58] He suggests that adaptation implies 'a quest for a stable equilibrium of the system through a reduction of the gap'.[59] While a tension and incompatibility in the relationship between differential elements leads to a striving

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58. Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. by Cecile Malaspina and John Rogove (Minneapolis, MN: Univocal, 2017), p. 105.
59. Ibid,, p. 168.

for compatibility, as discussed in the previous chapter of this thesis, Simondon problematises that arriving at a stable equilibrium entails the notion of finality, 'in which all potential would be actualised, would correspond to the death of any possibility of further transformation'.[60] An approach such as this therefore inhibits technical progress: 'If [the technical object] is only used, employed, and consequently enslaved, then it cannot bring any information, any more than a book that would be used as a wedge or pedestal'.[61] Instead, he offers the notion of a 'metastable equilibrium', in which any modification is always only 'a provisional resolution of incompatibilities, but it is not the destruction of potentials; the system continues to live and evolve; [...] it remains under tension and capable of modifying itself'.[62] According to Simondon, it is only in a metastable equilibrium that humans and machines maintain a reciprocity of exchange, without resolving their difference.

The focus, then, is not on bridging the difference between entities, but instead on the in-between, on maintaining their difference in the form of an 'energising tension', as Brian Massumi writes.[63] Indeed, Massumi notes critically that interactivity in media theory commonly describes a bridging over of an 'actual discontinuity' between entities through a use-oriented focus on causal efficacy, instrumentality and affordance.[64] The two-way flow of action, as suggested by

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60. Ibid., p. 177.

61. Ibid., p. 337.

62. Ibid., p. 177.

63. Brian Massumi, *Semblance and Event: Activist Philosophy and the Occurent Arts* (Cambridge, MA; London: The MIT Press, 2013), p. 20.

64. Brian Massumi, 'The Thinking Feeling of What Happens', Inflexions, 1.1, *How is Research-Creation?* (May 2008), (p. 25) <www.inflexions.org> [accessed 18 February 2020].

the term 'interactivity', is reduced to a 'back and forth of action-*re*action across the gaps'.[65] Interactivity activates a simple, passive, functionally prescribed, linear and reproductive causation. Massumi raises the concern that by taking this approach, nothing new can develop within an interaction: 'It limits possibilities and boxes in the potential'.[66] Massumi argues: 'They might interact, but they would not creatively relate. There would be no gap in the chain of connection for anything new to emerge from and pass contagiously across. There'd be no margin of creative indeterminacy. No wriggle room'.[67] Interaction is 'just a setup', confined in determination. The in-between, the 'inter-' in 'interaction', is fundamentally neglected. Thus, if new media and technology have been careful to emphasise a 'rhetoric of connectivity' in an attempt to smooth over a fundamental difference or discontinuity, Massumi argues for an active consideration of the 'inter': 'It is in those gaps that the "reality" of the situation is to be found'.[68]

Similarly, the researcher and media artist Anna Munster suggests we should 'take the "inter" seriously"'.[69] Munster suggests that the 'inter' is a 'betweenness', 'a generative field', as opposed to a mere point of contact between two pre-constituted endpoints such as sender and receiver, or user and computer.[70] She asks: '[…]What happens when the "inter" shifts from this to and from set of flows

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65. Ibid.; emphasis taken from p. 7.
66. Centro de Estudos de Comunicação e Linguagens, 'Entrevista a Brian Massumi para a Interact #08', YouTube video (26 Feb 2014) <https://www.youtube.com/watch?v=YdgDF9bP8z0> [accessed 14 April 2021].
67. Brian Massumi, 'The Thinking Feeling of What Happens', (p. 23).
68. Ibid., (p. 24).
69. Anna Munster, 'Into "Inter": The Between in Interaction', *Rivista di estetica*, 63.3, (2016), 56-67 (p. 56).
70. Ibid.

toward a shifting topology of betweenness?'[71] Here, the in-between is 'not an occupiable space but rather a dynamic and moving register of tendencies'.[72] Collaborating with twelve other artists and writers in 2006, Munster moved away from considering media as tools for interaction, and explored ways in which to 'conjoin' with media, 'and to be invigorated as a result of our engagement'.[73] She describes the group's process of real-time mixing and remixing, downloading, reformatting of video, sound, text and image as a 'machinic assemblage' in the Deleuzo-Guattarian sense. Here a machine does not necessarily refer to a technical machine, but to 'a generative arrangement of heterogeneous components — people, affects, socialities, economics, technical elements, nonhuman organic and inorganic contributors all constitute the relational assemblage'.[74] The focus here is on heterogeneity, meaning that the human and the nonhuman do not homogenise in their coming together, but engage in a continuous and 'joyful' process of engagement.[75] 'To dwell in the middle, to dwell in relation', as opposed to 'resolv[ing] out toward the origin or endpoints of the flows', as Munster writes.[76]

More specifically, Massumi's concept and paradox of a 'relation-of-nonrelation' appears to capture the dynamics of this tension most strikingly. Here, elements are not connected in the sense of adaptation or assimilation. Rather, as Massumi argues, elements 'may be said to "come together" only in the sense of being mutually enveloped in a more encompassing event'.[77] In their coming together,

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71. Ibid., (p. 59).
72. Ibid.
73. Ibid., (p. 56).
74. Ibid., (p. 57).
75. Ibid., (p. 59).
76. Ibid.
77. Brian Massumi, 'The Thinking Feeling of What Happens', (p. 23).

the differences and distance between the entities is never equalised, erased or harmonised, but maintained. A relation-of-nonrelation thus concerns the 'activity *between'* coincident differences.[78] 'Between is no longer the external distance separating two things. It is co-involvement, a participation that brings things together in change. "Between" is [...] being in the midst of a shared becoming', Massumi writes.[79] An activity 'across the intervals actually separating them'.[80]

It is in their difference that elements 'come into effect' – that is, they 'co-compose a singular effect of unity resulting from how it is that they come differently together'.[81] Thus, activity is not caused – that is, passive – but becomes 'co-causal', arising from the condition of elements coming together: 'It self-causes, given its conditions'.[82] Thus, a 'relation-of-nonrelation' does not imply a general suspension of causal processes, but of causality as determined and pre-constituted. The focus is on what Massumi describes as 'interaction-in-the-making'.[83] Objects or bodies do not come to a space with settled definitions. In fact, they do not exist ahead of a relation, but they are defined and redefined in relation. As such, 'the participation yields something different from either acting alone', and further, 'entering into the relation changes their (participants') natures'.[84] A relation does

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78. Massumi, *Semblance and Event*, p. 5.

79. Brian Massumi, 'Immediation Unlimited', in Immediation II, ed. by Erin Manning, Anna Munster, Bodil Marie Stavning Thomsen(London: Open Humanities Press, 2019), p. 508.

80. Ibid., p. 22.

81. Massumi, *Semblance and Event*, p. 20 and p. 5.

82. Ibid. p.5 and p. 22.

83. Brian Massumi, Parables for the Virtual: Movement, Affect, Sensation (Durnham, NC; London: Duke University Press, 2002), p. 9.

84. Erin Manning and Brian Massumi, *Thought in the Act: Passages in the Ecology*

not act out what is already implicit within an entity or what is considered to be possible, but actualises unimagined possibilities that would otherwise be trapped in the virtual. Manning and Massumi's notion of relation-of-nonrelation is closely associated with Deleuze and Guattari's term of 'disjunctive synthesis', emphasising a middle, a 'collecting difference' wherein 'the either–or is held fast together in passing contrast. […] The differential is sustained [...] suspended in disjunctive synthesis'.[85] The middle is no longer a compromise, an average, 'but an excess', 'a stream without beginning or end'.[86]

Thus, if Michaux engages in what Noland describes as an 'augmentation of choreographic possibilities',[87] the conception of augmentation differs from Engelbart's attempt at human augmentation, as described in the previous chapter, via his invention of the artefact of the computer mouse. Augmentation in Michaux's works does not seek to reinforce neoliberal qualities of personal empowerment and human effectiveness and ability to act and control the world. Instead, it concerns a process of becoming aware of and of challenging the body's kinetic, cultural, and discursive conditioning with the goal of expanding a practice that appears confined by habit. Breaking with habitual and automated processes of execution, then, is not about relying on spontaneous impulses for creation beyond habit and condition. Instead, it becomes about a careful setting-up of a tension that does not settle in resolution, but that maintains a space for action and thought.

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of Experience (Minneapolis, MN; London: University of Minnesota Press, 2014), p. 93.

Massumi, 'Immediation Unlimited', p. 508.

85. Manning and Massumi, *Thought in the Act*, p. 33.
86. Deleuze and Guattari, *A Thousand Plateaus*, p. 27.
87. Noland, (p. 169-170).

3.2. Click by Click

Michaux's percussive and chant-like verses that accompany his marks mirror the artist's ink lines that interweave, stray, and vary in an endeavour to 'insignify stroke by stroke'.[88] A stroke-by-stroke 'departure', an 'awakening'. A 'release' that 'undoes', 'deflects', 'dematerialises', 'transforms'. His rhythmically recurring brushstrokes are simultaneously constructive and deconstructive, created and erased. Sometimes more aggressive when they 'pierce/push/[…] to burst into pieces' sometimes more carefully 'seeking/[…] to release/to loosen/to drain'. A continuous, rhythmic 'negation, subtraction' but with the positive mission to 'explore', 'to change.'[89] Clearly inspired by Paul Klee, Michaux writes, in *Emergences-Résurgences*:

> I have a desire […] to participate in the world through lines. A line rather than lines. So I begin, letting myself be led by one, just one, letting it run without lifting the pencil from the paper [...] Like me, the line seeks without knowing what it is looking for, refuses the immediate finds, the easy solutions, the instinctive temptations. Guarding itself against 'arriving', a line of blind investigation.[90]

The page opposite this text in Michaux's book shows lines of black ink on a white page. The lines spread out, squiggle and become denser, convening in a linear arrangement of five rows positioned horizontally one below the other, making an association with writing appear almost inevitable.

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88. Henri Michaux, *Stroke by Stroke*, trans. by Richard Sieburth (New York: Archipelago Books, 2006), n.p.
89. Ibid., n.p.
90. Michaux, *Emergences-Résurgences*, p. 11.

Like Michaux's strokes, Klee's *Pedagogical Sketchbook* takes the concept and image of a line as an entry point. Following the line as it visually alludes to a range of intellectual and physical concepts, Klee guides the viewer along an 'adventure in seeing'.[91] 'An active line on a walk, moving freely, without goal. A walk for a walk's sake. The mobility agent is a point, shifting its position forward', Klee writes.[92] What begins as a point shifts its position to form a line on paper, gradually twisting, bisecting, circumscribing itself, complemented by other lines and forms.

Going on 'a walk for a walk's sake' changes the focus from product to process. Walking is no longer a means to an end, i.e., the arrival at a destination, but an activity that is undertaken for the pleasure of the act of walking itself. More than that, the act of walking becomes the product. If the destination is secondary, a person might be willing to respond to the world around her, to take detours, to risk getting lost. But she might also discover new routes, encounter new neighbourhoods. The concept of taking the line on a walk seems to reappear in form of Klee's line of thought through his sketchbook, moving freely for its own sake, without goal. A walk for a walk's sake resists any destination in favour of possibility.

In the screenshots shown in this chapter:
`'the mobility agent is a [mouse cursor], shifting its position forward'.`[93]

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91. Moholy-Nagy, in Paul Klee, *Pedagogical Sketchbook*, trans. by Sibyl Moholy-Nagy (New York: Praeger Publishers, 1972), p. 17.
92. Paul Klee, *Pedagogical Sketchbook*, trans. by Sibyl Moholy-Nagy (New York: Praeger Publishers, 1972), p. 17.
93. Ibid.; The 'point' in the original quotation was replaced by the word 'mouse cursor', appropriating the quote to describing the programmes created in the

Resulting in lines or marks on the screen, the programmes may initially appear to be inscriptive or generative. Though similar to Michaux's lines, they should be considered as traces of a process rather than according to their outcome or signifying qualities. The line becomes an element of sheer process, with no other purpose than a continuous exploratory journey. They do not aim to aim, they do not seek for closure, they 'refuse [...] the instinctive temptations'.[94]

Indeed, Michaux describes his strokes as 'gestures rather than signs', as 'movement that breaks the inertia, that confuses the lines, that undoes the alignments, that gets rid of the constructions. Movement, as disobedience, as reworking'.[95] His ink strokes are testament to an engagement with a tension, of 'gestures of defiance, and of retaliation and escape from the bottlenecks'.[96] Michaux writes: 'I have another desire [...] I would like a continuum. A continuum like a murmur, which does not end, like life [...] I want my traces to be the very phrasing of life, but flexible, but deformable, sinuous'.[97]

Unlike the introductory screenshot to this chapter, the lines on the screen are no longer testament to the human ability to manipulate the computer, but instead, remain as evidence of an interaction between competing tendencies between figuration and disfiguration, forming and deforming. As such, the lines, in the context of this chapter, should not to be confused with what Massumi describes as

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context of this PhD research. Please refer to p. 58-60 of this PhD thesis for more information.

94. Michaux, *Emergences-Résurgences*, p. 11.

95. Michaux, *Stroke by Stroke*, n.p.;
Michaux, *Emergences-Résurgences*, p. 65.

96. Michaux, *Mouvements,* n.p.

97. Michaux, *Emergences-Résurgences,* p. 13.

an 'object-oriented idea of the new', complicit with the capitalist and neoliberalist 'speed addiction and the-more-the-better productivity glut'.[98] Instead, the lines should be considered according to a 'process-oriented new', in which creation is not about 'another added thing', but about acknowledging 'qualitatively differing modes of the relational playing-out of potential'.[99]

Taking the cursor for a walk becomes about action itself, rather than action as a means to generate an outcome. The moving mouse leaving behind a path is both a reference and a point of deviation. What is foregrounded is not the generative nature of the programmes, but the way in which the programmes continuously challenge and question expectations of action, and thus thought. The tension between the computer and the human affects how a course of action takes shape. In the programmes, body and programme come together, they enter into conversation. They do so without bias, without intention, without determination. Unformed. Ready to be guided, but also to guide. Sometimes constraining, sometimes guiding, sometimes pushing the human body out of its habitual action, the programmes create spaces that enable a renegotiation of action and thought in co-constitution with the computer. Interacting with the programmes reveals the way that action unfolds in a cloud of possibilities. A screenshot is a remnant of such process of engagement, a potentiality that the process of interacting with the programmes gives rise to. Extending the explorations of the mouse cursor in the previous chapter, this chapter continuously varies and deviates from the act of the mouse's movement, leaving behind a line.

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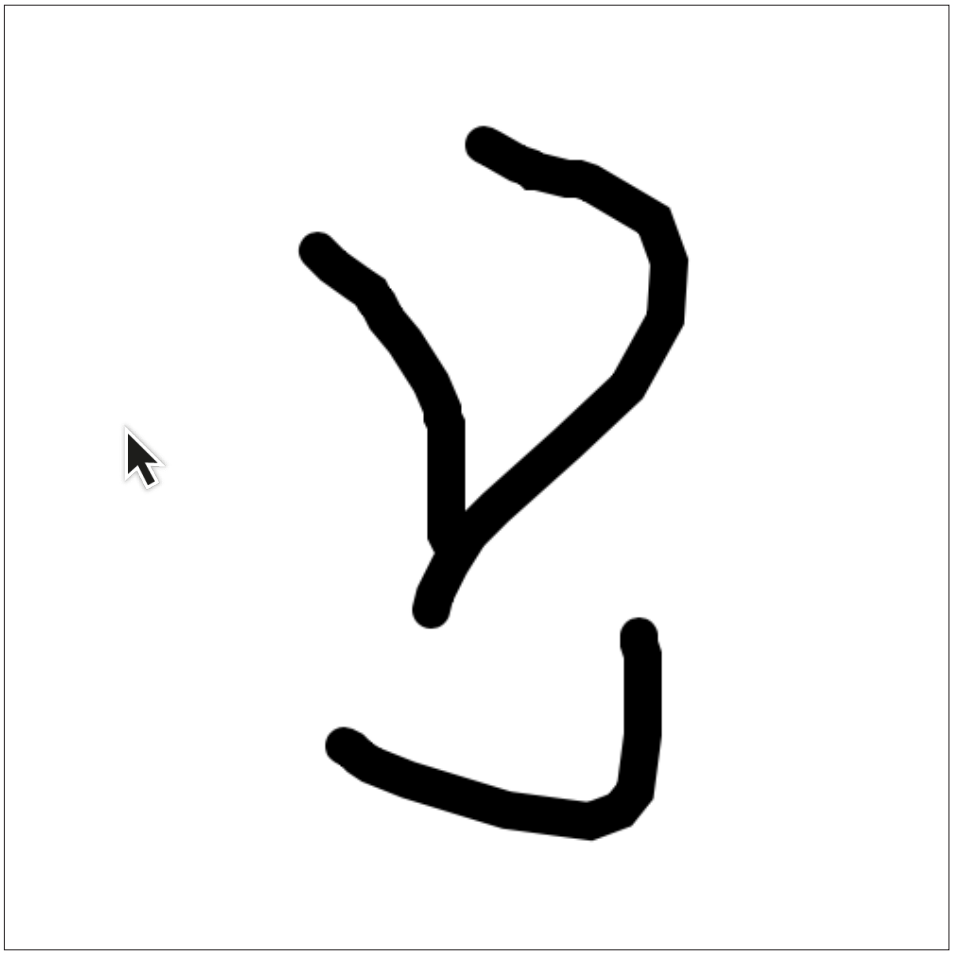
98. Massumi, Parables for the Virtual, p. xix.

99. Ibid.



Screenshot 2022-7-21 at 13.55.48 undraw8.png [100] [101]

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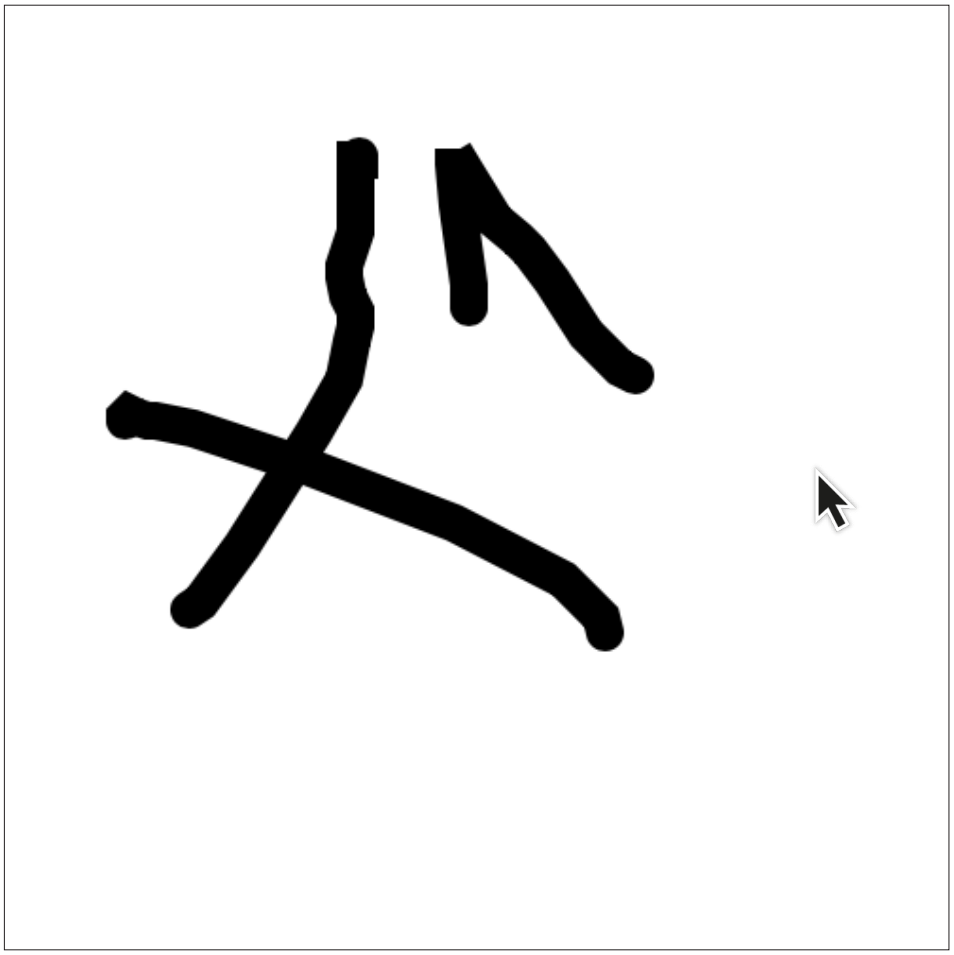
100. 'In classical ballet there is an interior that is not often acknowledged, which is a number of relationships between points of the body. So if you have a simple "tendu position", for example, you have a lot of relationships available. You have between the elbows and the knees, for example. That makes a kind of triangle. Or between the two elbows, you have a straight line. Or between the two wrists you have a straight line. Between the fingertips and the knee you have a curved line or a straight line' (GrandpaSafari, Forsythe-Lines-Point point line-6-Collapsing Points).

101. In the preceding footnote, the juxtaposition of a screenshot and a reference



Screenshot 2022-7-21 at 13.57.12 undraw8.png

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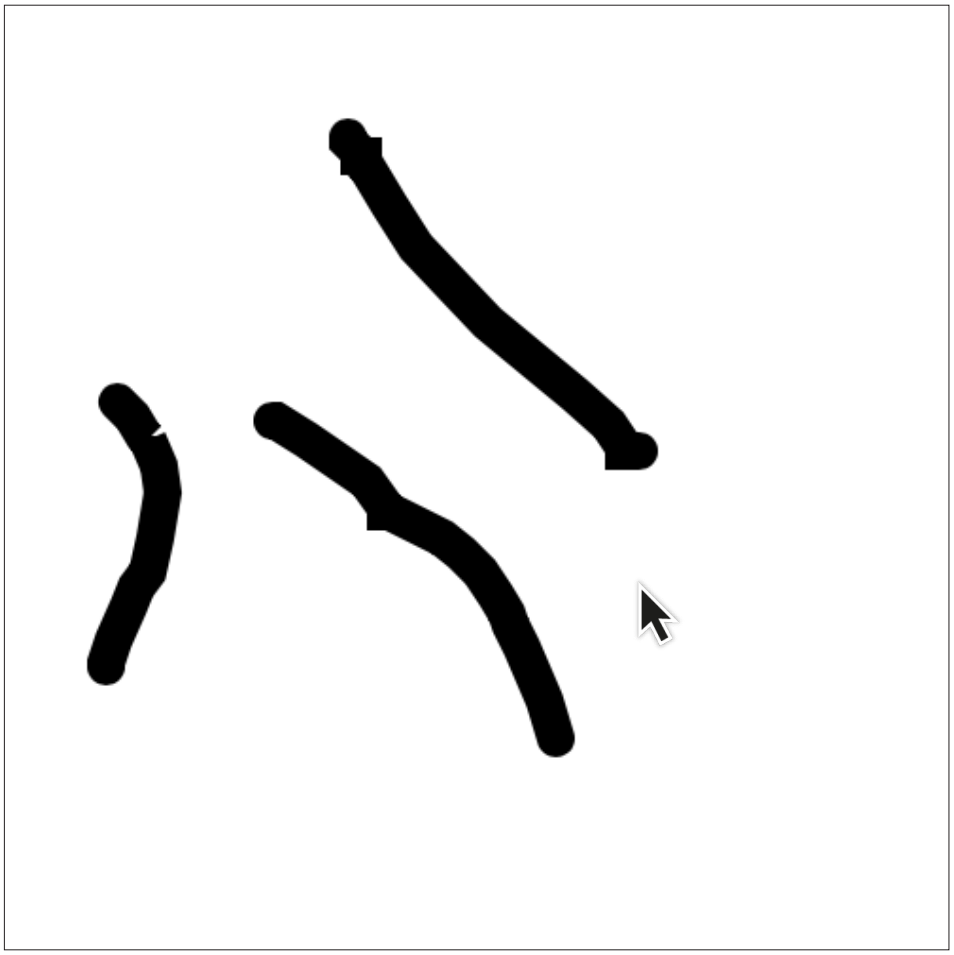
from differing contexts opens up a new conversation in their transdisciplinary connection, which will be further explored in the course of this chapter. Please refer to p. 58-60 of this PhD thesis for more information; A page turn on the following pages of this thesis should be considered to equate to different outcomes resulting from a repeated interaction with the same interactive programme.



Screenshot 2022-7-21 at 13.59.32 undraw8.png

Screenshot 2022-7-21 at 14.2.8 undraw8.png

Observing that the dancing body tends to move according to trained or habitual patterns, the choreographer William Forsythe seeks techniques that 'open […] up movement to its otherness', as Manning and Massumi write.[102] According to Forsythe, a figure in classical ballet holds 'an interior that is not often acknowledged'.[103] In his choreography, a familiar ballet figure such as a *tendu* is detached from its purpose to prescribe or guide a dancer's movement, instead becoming a point of reference, maintaining the dance in a tension between 'dis- and re-orientation'.[104] 'By continually approaching such a figure differently, plucking it apart and putting it back together in different sequences, I can bring forth a tremendous variety of information with very little material', explains Forsythe.[105] It is in such 'defigurative operations' that the dancers do not completely dissociate themselves from their training in classical ballet, but engage in an intensive state of 'de- and refiguration', deviating and decomposing but simultaneously re-approaching, and therefore expanding, the body's vocabulary of movement.[106]

As with Michaux's technique, it is not a matter of arriving at free bodily movement beyond training. If that were the intention of the exercise, someone who had never undertaken ballet training would have probably been more suitable for the

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102. Manning and Massumi, *Thought in the Act*, p. 93.

103. GrandpaSafari, *Forsythe-Lines-Point point line-6-Collapsing Points,* YouTube video (24 May 2008) <https://www.youtube.com/watch?v=_lK9_bG1-YI&list=PLAEBD630ACCB6AD45&index=6> [accessed 16 September 2022].

104. William Forsythe, cited in 'Defigurative Choreography: From Marcel Duchamp to William Forsythe', Gabriele Brandstetter and Marta Ulvaeus, TDR, Vol. 42, No. 4 (Winter, 1998), (pp. 37-55), p. 46.

105. Ibid.

106. Ibid.

task. However, Forsythe's technique becomes about what Massumi and Manning describe as an 'inventive infolding' of dance movement.[107] The conditioned and trained body is 'turned back around onto itself to begin again, never taking leave of itself, never ending'.[108]

The following excerpt collages Forsythe's account of his dance technique with my description of my encounter with the programmes on the previous pages:

> In [human computer interaction], there is an interior that is not often acknowledged, which is a number of relationships between points [on the screen]. So if you have a simple [mouse pressed() function], for example, you have a lot of relationships available. You have between the [position where the mouse was pressed] and the [position where the mouse was released], for example. [...] Or between the [position where the mouse was released] and the [position where the mouse was pressed], you have a [...] line.[109]

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107. Ibid., p. 39.

108. Ibid.; Massumi and Manning's phrasing on the 'turning back around onto itself' shows a parallel with Ghérasim Luca's poem with the title 'Comment s'en sortir sans sortir' ('How to leave without leaving').

109. GrandpaSafari, *Forsythe-Lines-Point point line-6-Collapsing Points* (24 May 2008) <https://www.youtube.com/watch?v=_lK9_bG1-YI&list=PLAEBD630ACCB6AD45&index=6> [accessed 16 September 2022]. The words written in square brackets replace Forsythe's words with my own, appropriating the quote to describing my observations while interacting with my programmes. Please refer to p. 58-60 of this PhD thesis for more information.

In the screenshots, the word ‘undraw’ that follows the screenshot’s timestamp suggests the dynamic at play within the programme.[110] ‘To undraw’, like Michaux’s ‘to insignify’, is not a simple negative of ‘to draw’. Rather, the term implies dwelling in a tension between drawing and not drawing without a resolution to either side.

The mouse, when pressed, leaves behind no trace. A second try. Again, the mouse leaves no trace behind. On a second attempt to draw a line pressing the mouse, a line shows in a different position, that seems to have no correspondence to the trace that was anticipated. Further trials eventually reveal that the trace shown corresponds to the mouse-path while the mouse button was not pressed. A single change in code, inverting ‘mouse pressed’ and ‘mouse released’, shifts the focus towards a movement that is usually neglected — that is, the mouse’s movement when the mouse button is not pressed. The programme presents an inversion of visible and invisible, acting and not-acting.

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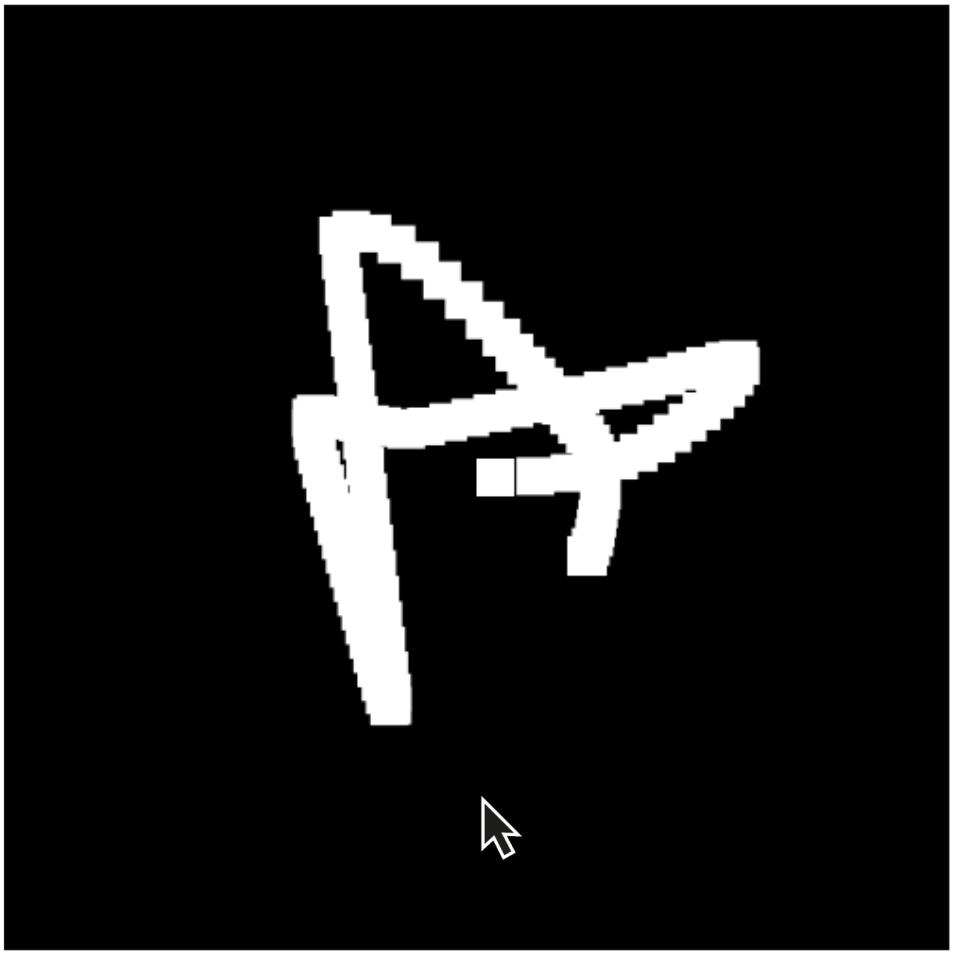
110. This thesis largely refrains from categorising the programmes created in the context of this research. The written thesis refers to individual programmes only to identify a particular idea by example, which does not necessarily apply exclusively to the programme shown. Nonetheless, a form of categorisation was required considering the number of programmes created – one more moment where the desire for regularity was indispensable.



Screenshot 2022-9-18 at 16.0.11 speed-down13.png [111] [112] [113]

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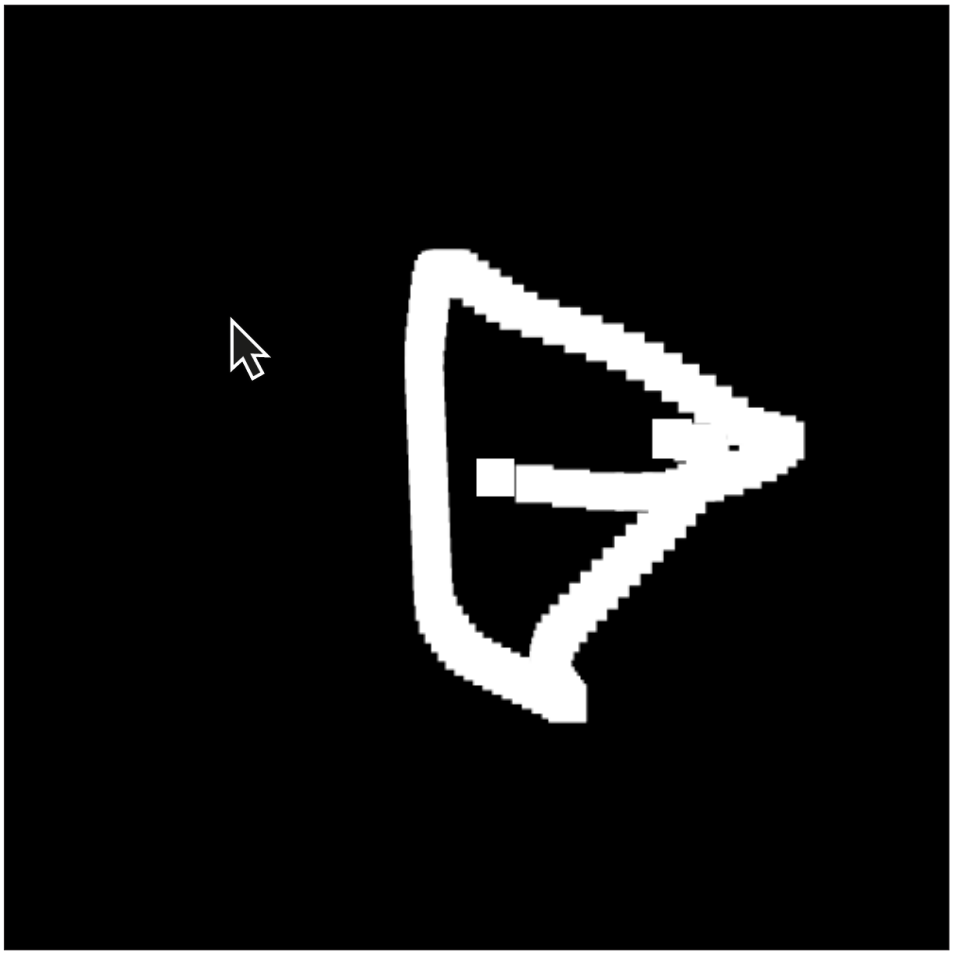
111. 'At extreme speed, [the body's] habits collapse into the velocity of movement. The body is at the limit of its functional capacity to chain positions and postures meaningfully and adaptively. It has no choice but to surrender itself to its own order of sensation' (Manning and Massumi, Thought in the Act, p. 40).

112. In the preceding footnote, the juxtaposition of a screenshot and a reference from differing contexts opens up a new conversation in their transdisciplinary connection, which will be further explored in the course of this chapter. Please refer to p. 58-60 of this PhD thesis for more information.

113. A page turn on the following pages of this thesis is to be considered as equating with different outcomes resulting from a repeated interaction with the



Screenshot 2022-9-18 at 16.0.18 speed-down13.png

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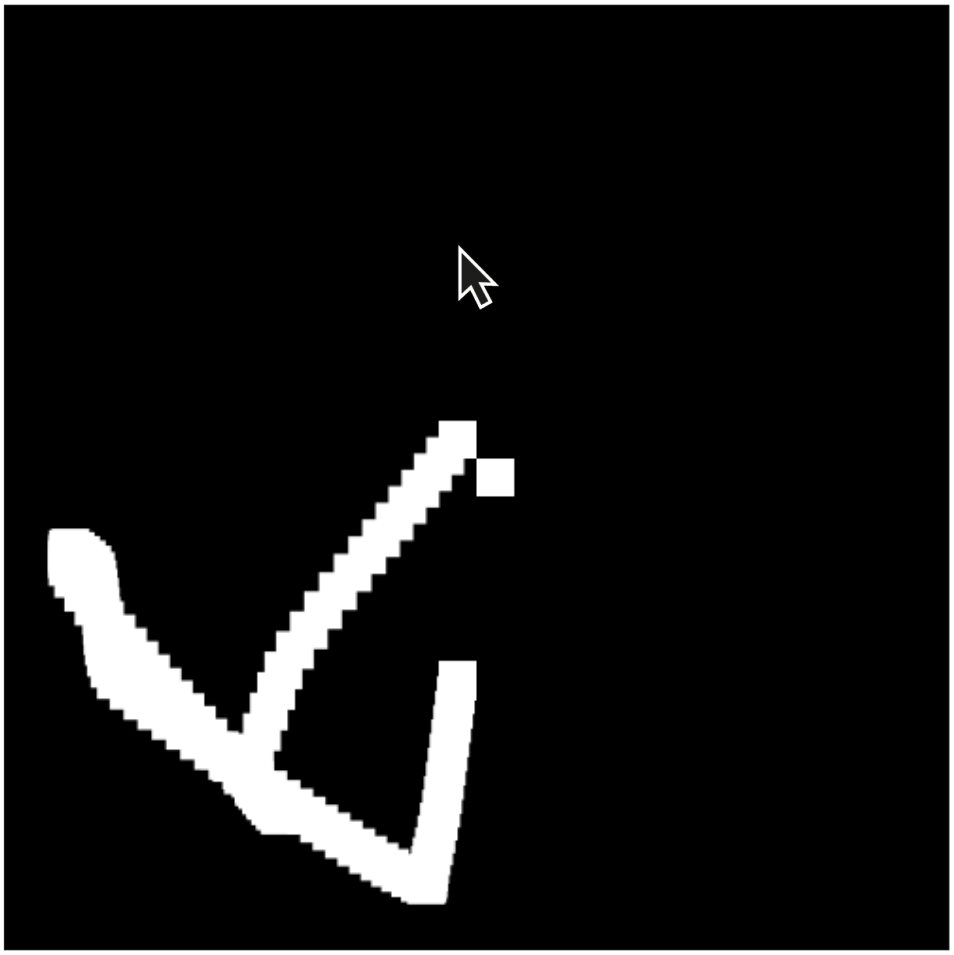
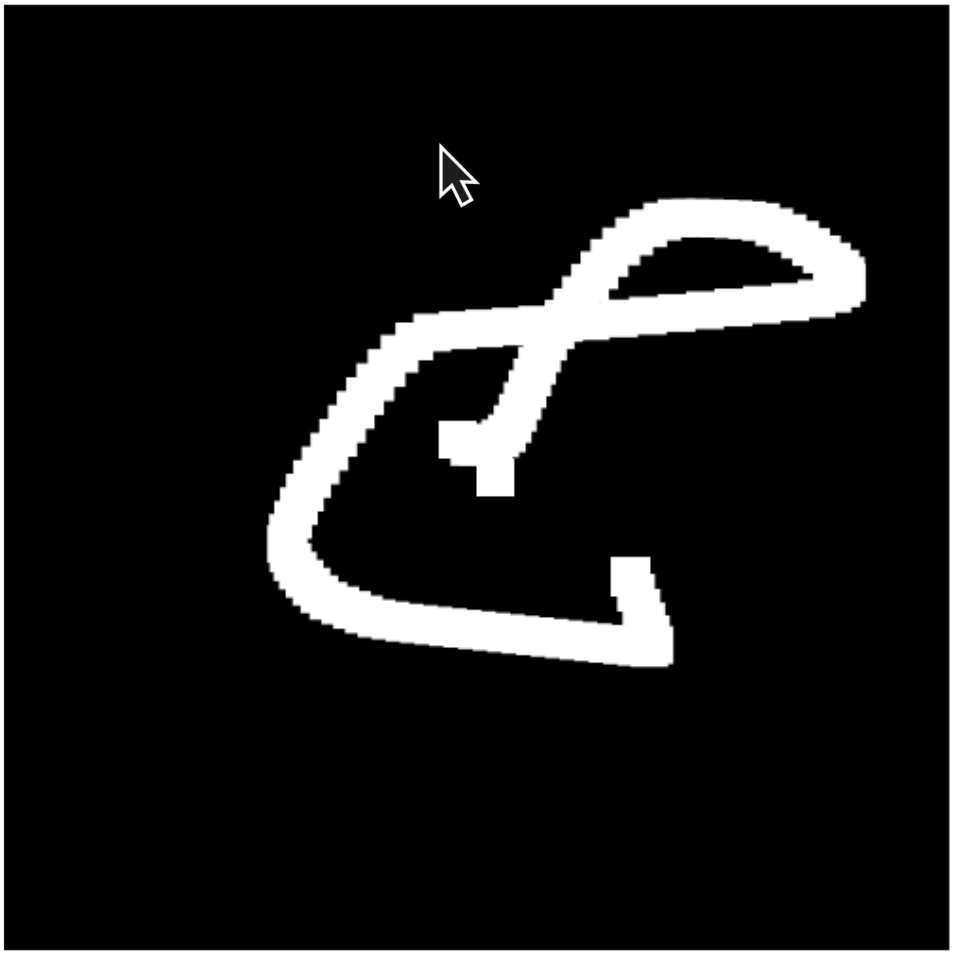
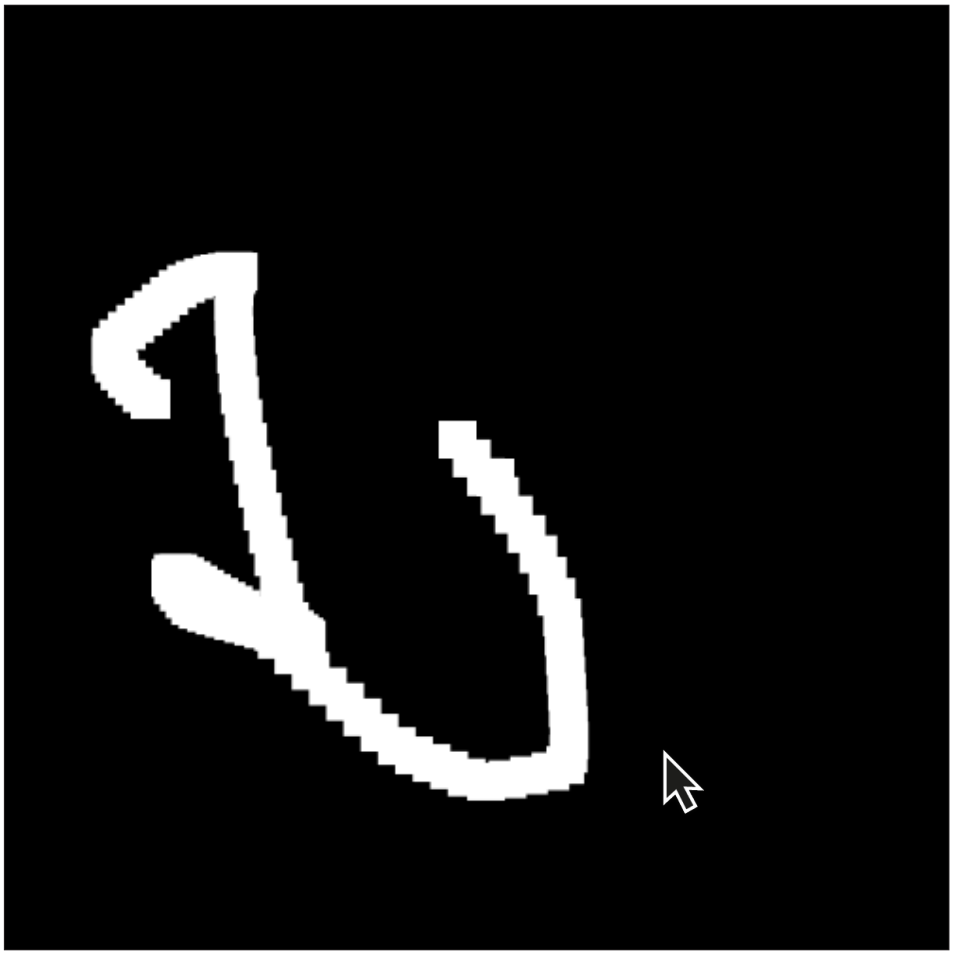
same interactive programme.



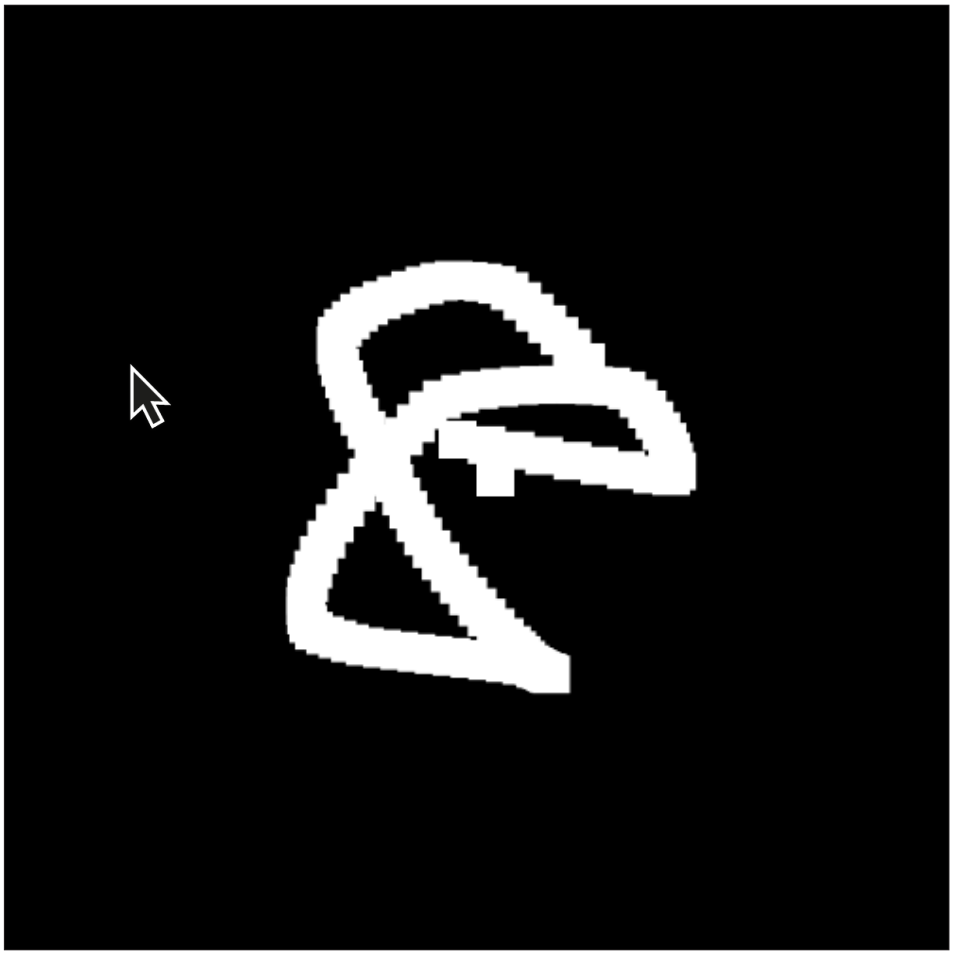
Screenshot 2022-9-18 at 16.0.25 speed-down13.png



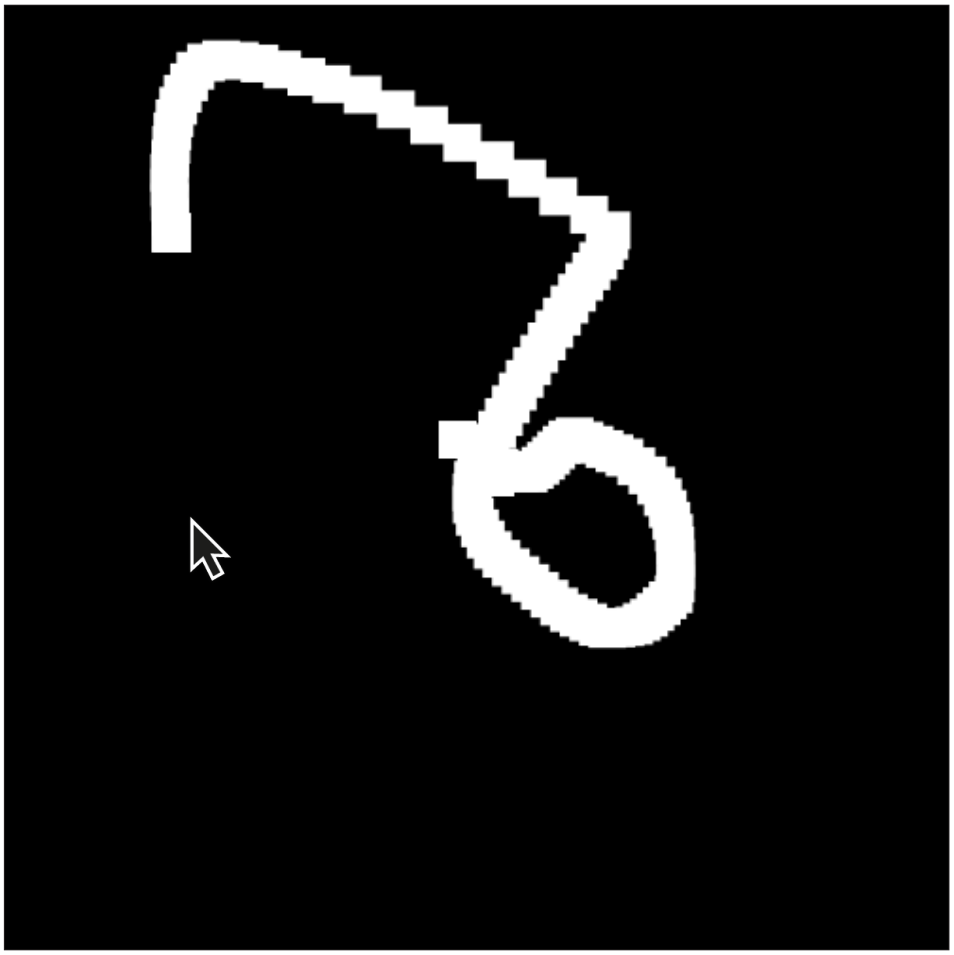
Screenshot 2022-9-18 at 16.0.33 speed-down13.png



Screenshot 2022-9-18 at 16.0.47 speed-down13.png



Screenshot 2022-9-18 at 16.0.54 speed-down13.png



Screenshot 2022-9-18 at 16.1.0 speed-down13.png

In Forsythe's choreography, speed becomes another key technique to challenge the body in its habitual movement.[114] 'At extreme speed, the body pushes the limit of its coordination', he suggests.[115] For Forsythe it is essential not to maintain extreme speed, but rather to 'vary the rhythm', to 'time-shift' in relation to one's habitual movements but also in relation to other dancers:[116] 'Go slower, be in the other's past (right before they catch up to you), then move past them to their future — look for the moment — aim at it rather than going directly to it [. . .] then shift'.[117] In his dances, Forsythe creates a 'rhythmic milieu' of varying speed, as opposed to synchronisation, a tension between training, organisational and structural elements of a dance and their intermittent and irregular interplay.[118] The body no longer moves according to habitual ways, but 'has been opened up by the what-if to its own variation', as Manning and Massumi observe.[119]

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114. Carrie Noland similarly refers to André Breton's 'technique of changing the speed, or "vitesse", at which he allowed his hand to scribble down thoughts. Breton even differentiated between five different speeds of writing, each of which was identified with another layer of conditioning' (Noland, p. 181). Though, in contrast to this research, that seeks to break with habit and automated processes of thought and action, surrealists considered automatism – as in automatic writing – as a source for invention and creation. For them, it was in speed that writing and speech evaded logic and aesthetic and social conventions and instead allowed access to unconscious thought and desire.

115. William Forsythe, cited in Manning and Massumi, *Thought in the Act*, p. 40.

116. Manning and Massumi, *Thought in the Act*, p. 44.

117. William Forsythe, cited in Manning and Massumi, *Thought in the Act*, p. 44.

118. Manning and Massumi, *Thought in the Act*, p. 44. 'Synching is not what's important, in the sense of matching already known timing'.

119. Ibid.

The dance is not preserved, but is explored as a 'choreographic resource'.[120] For example, in his piece *Whole in the Head*, Forsythe reordered the meticulously rehearsed dance two hours before the opening performance, as Manning and Massumi recount. In this way, the performance is not simply staged, but kept 'alive and uncertain'.[121] Manning and Massumi describe Forsythe's work as a 'practice of the what-if': that is, it is not about working out something in advance, but about creating an 'encounter with not knowing'. As Forsythe says: 'The biggest challenge is not seeing what I want to see but seeing what's actually in front of my eyes'.[122] It is only then that he finds himself experiencing 'movement's capacity to speculate', as Manning and Massumi observe.[123] Not to anticipate, but to be part of the process itself.

In the preceding programme, the word 'speed-down' following the screenshot's timestamp points to the dynamic at play within the programme. Again, like Michaux's 'to insignify', 'speed-down' maintains a tension between 'speed-up' and 'slow down', between 'deceleration' and 'acceleration'. Indeed, time is an element in human-computer interaction that is usually neglected. Or, rather, time becomes invisible since the only time there is in human-computer interaction is real-time. The speed of the computer is mapped to the speed of the human user, emphasising their ability to navigate and control, and thus their position of power. Indeed, the previous chapters revealed, via Chun, that 'seemingly real-time

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120. Norah Zuniga Shaw, *Synchronous Objects: for One Flat Thing, Reproduced*, March 2009 <https://synchronousobjects.osu.edu/blog/introductory-essays-for-synchronous-objects/> [accessed 18 September 2022].

121. Manning and Massumi, *Thought in the Act*, p. 43-44.

122. William Forsythe, cited in Manning and Massumi, *Thought in the Act*, p. 43-44.

123. Manning and Massumi, *Thought in the Act*, p. 47.

interfaces emphasise the power of user action and promise top-sight for all.'[124] These are 'seemingly' real time because the relation between a mouse-click and the screened effect is programmed into the interface.

In the programme above, each time the programme restarts, a trace sets off from the centre of the canvas, speeding in the direction of the mouse cursor. The direction of the trace can be manipulated by changing the position of the cursor in relation to the trace. Unless manipulated, the trace continues its path in the mouse's direction, even beyond the edges of the canvas. The speed of the trace prevents any regression to habit, forcing an engagement in the moment and in response to the computer. Determination is subjugated to speed and the rush of the moment. A time constraint of two seconds, after which the programme will end, provides additional time pressure that pushes habit out of its routine functioning. Thus it is in the variation of the speed, alignments and rhythms of real time that interactivity can intervene and resist what Manning refers to as 'capitalist time, […] the speed at which the everyday tends to function'.[125]

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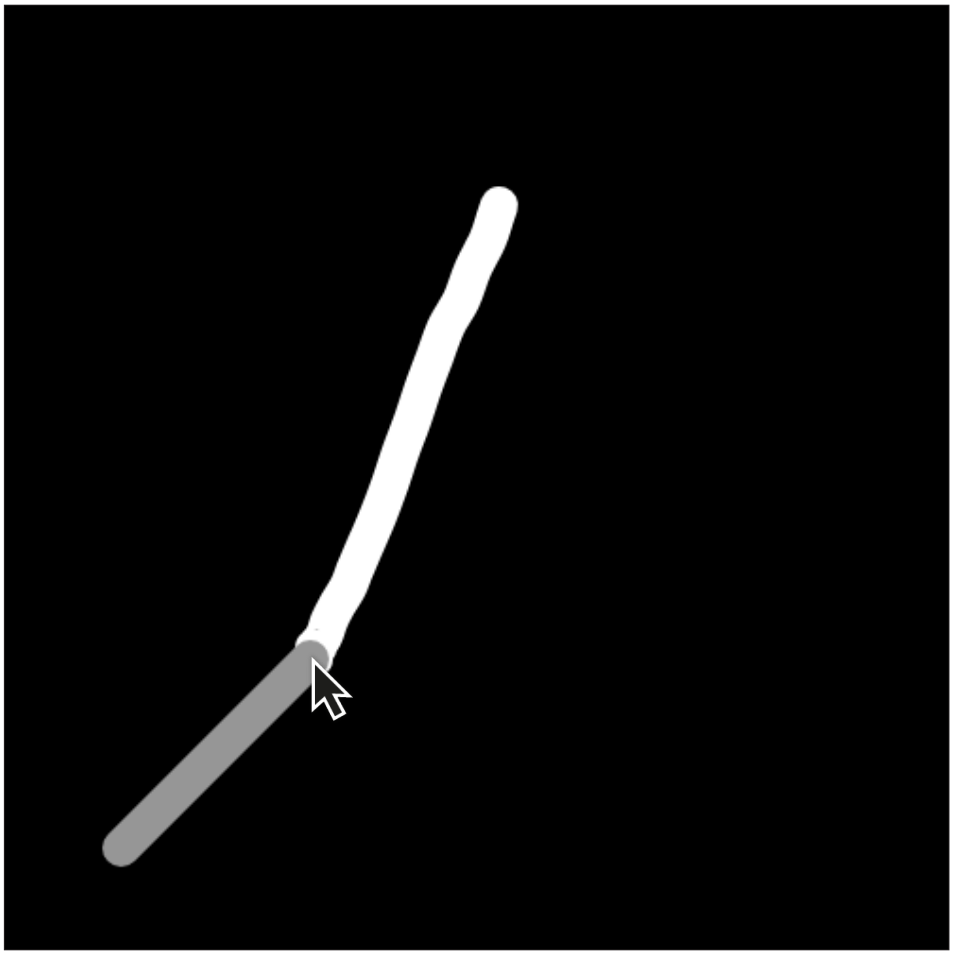
124. Chun, *Programmed Visions,* p. 10.

125. Erin Manning, *The Minor Gesture* (Durham, NC; London: Duke University Press, 2016), p. 15.

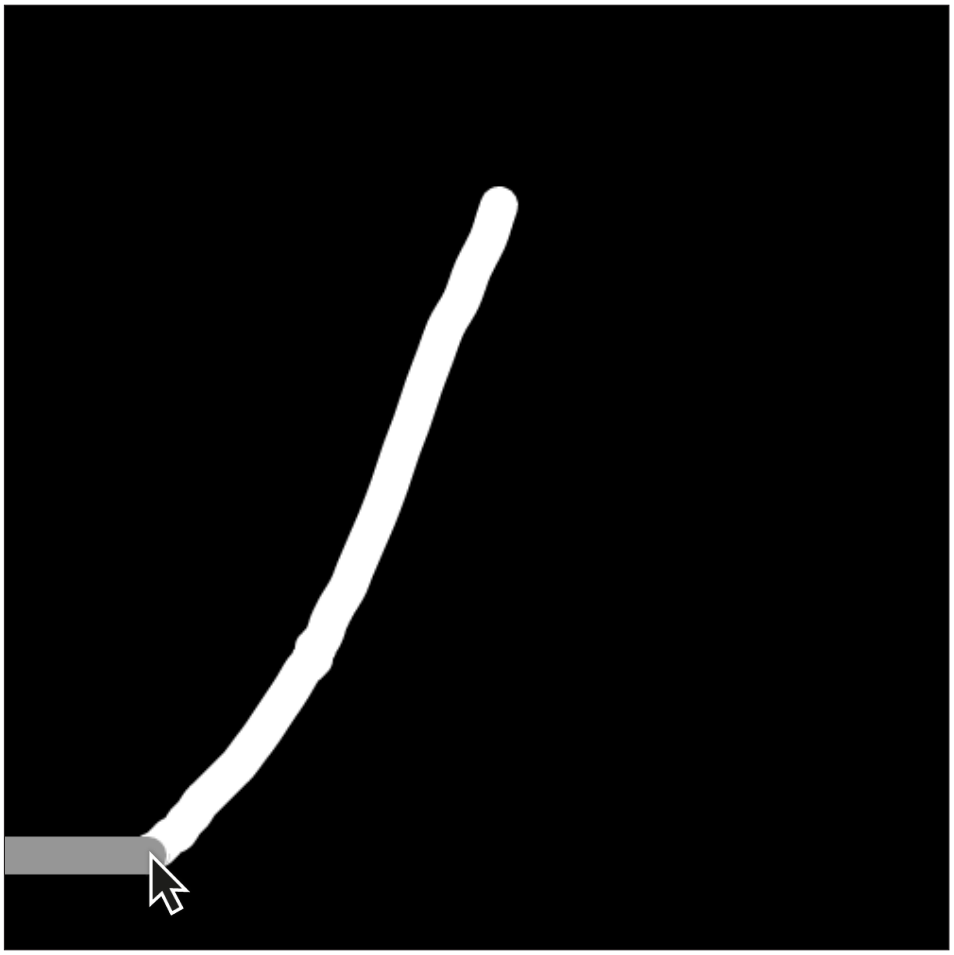


Screenshot 2022-7-21 at 15.4.43 unguide1.png [126] [127] [128]

126.‘On the LifeForms screen, a series of algorithms visualised as “odd little 3D bodies” without organs, bones or muscles move and float in a sort of vacuum space-time with no gravitational or chronological restrictions, simulating and suggesting all sorts of unexpected and unimagined motions’ (Stamatia Portanova, ’Thinking movement and the creation of dance through numbers’ (p. 148)).

127. In the preceding footnote, the juxtaposition of a screenshot and a reference from differing contexts opens up a new conversation in their transdisciplinary connection, which will be further explored in the course of this chapter. Please refer to p. 58-60 of this PhD thesis for more information.

128. A page turn on the following pages of this thesis should be considered



Screenshot 2022-7-21 at 15.4.46 unguide1.png

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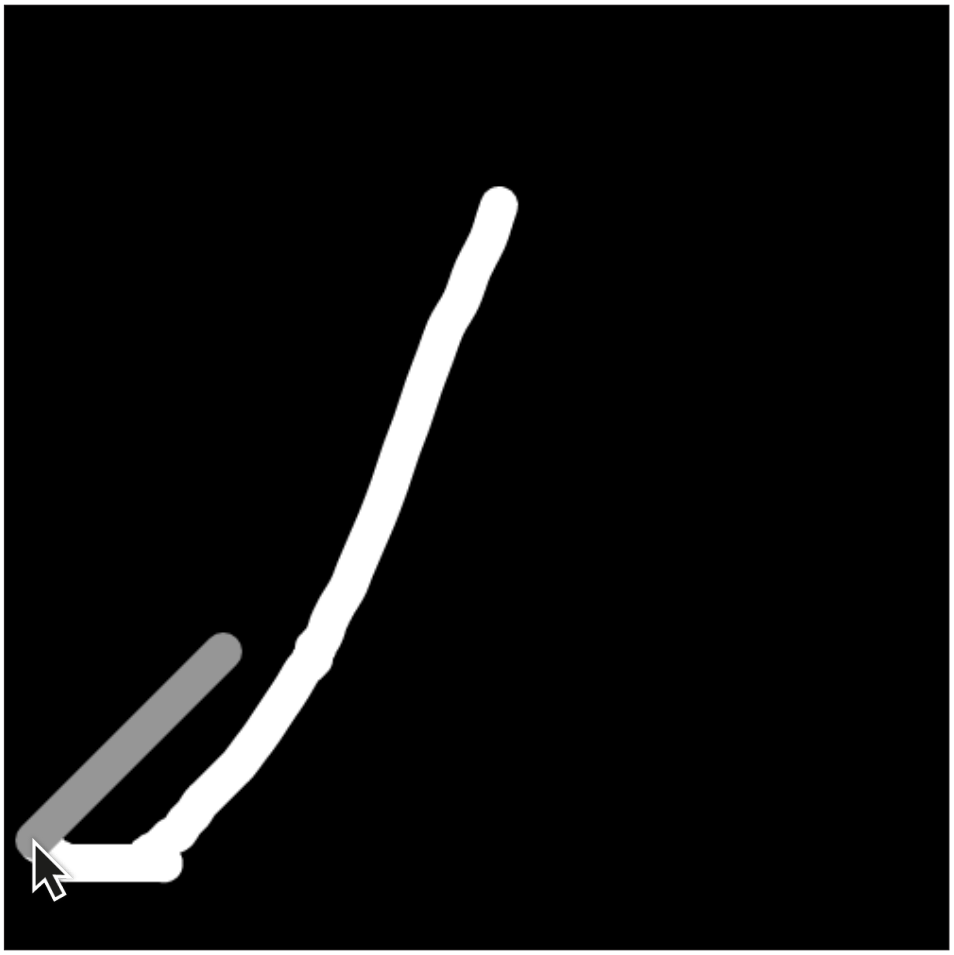
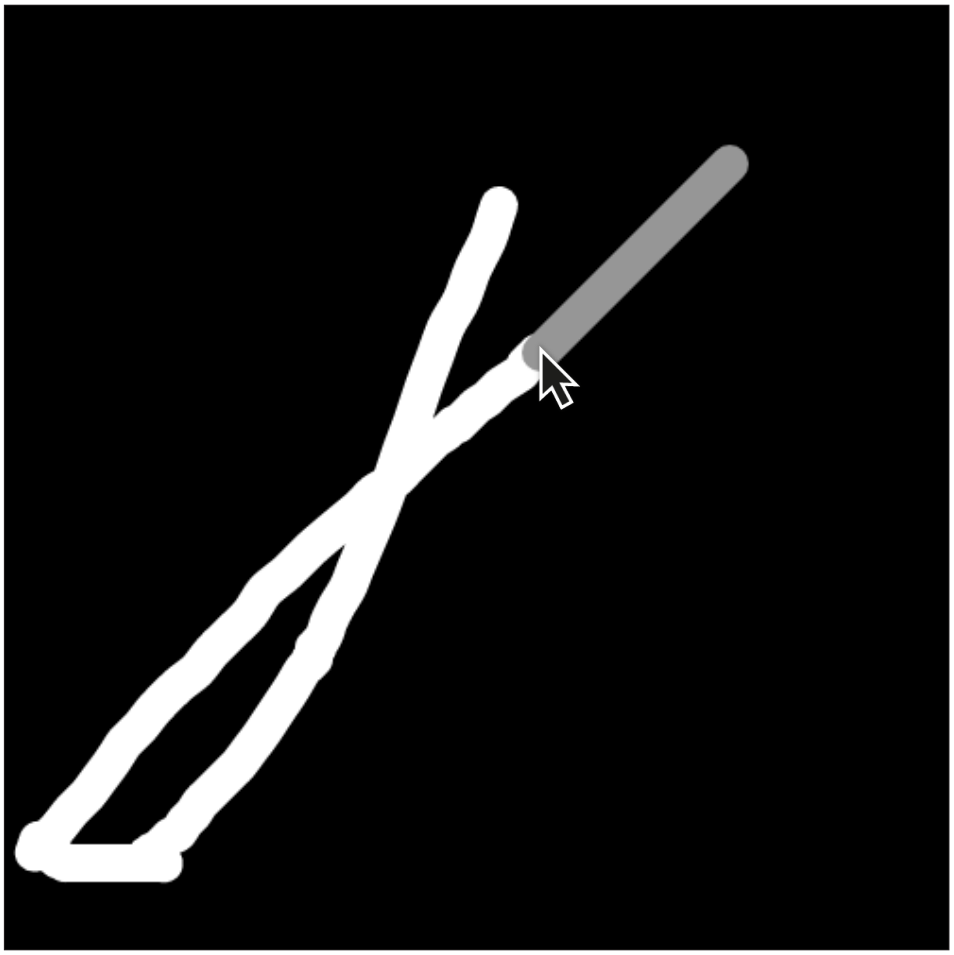
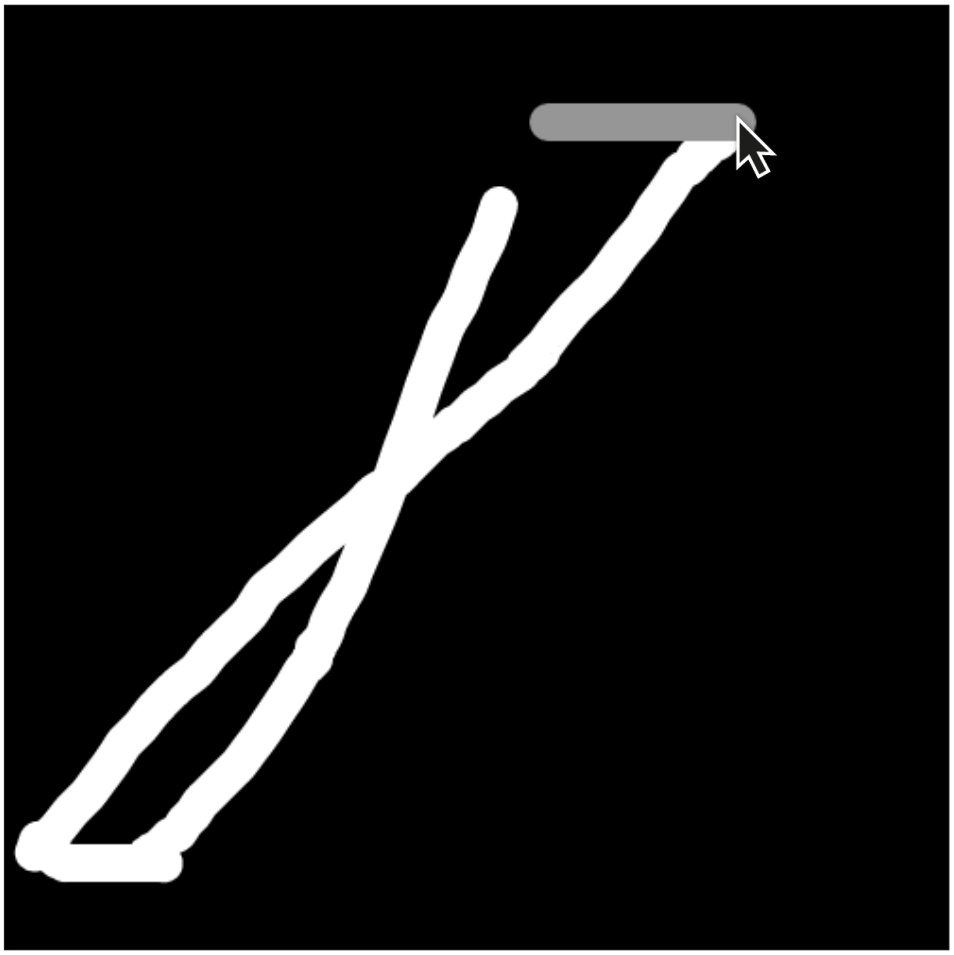
the equivalent of the sequential playing out of the mouse action in the same interactive programme.



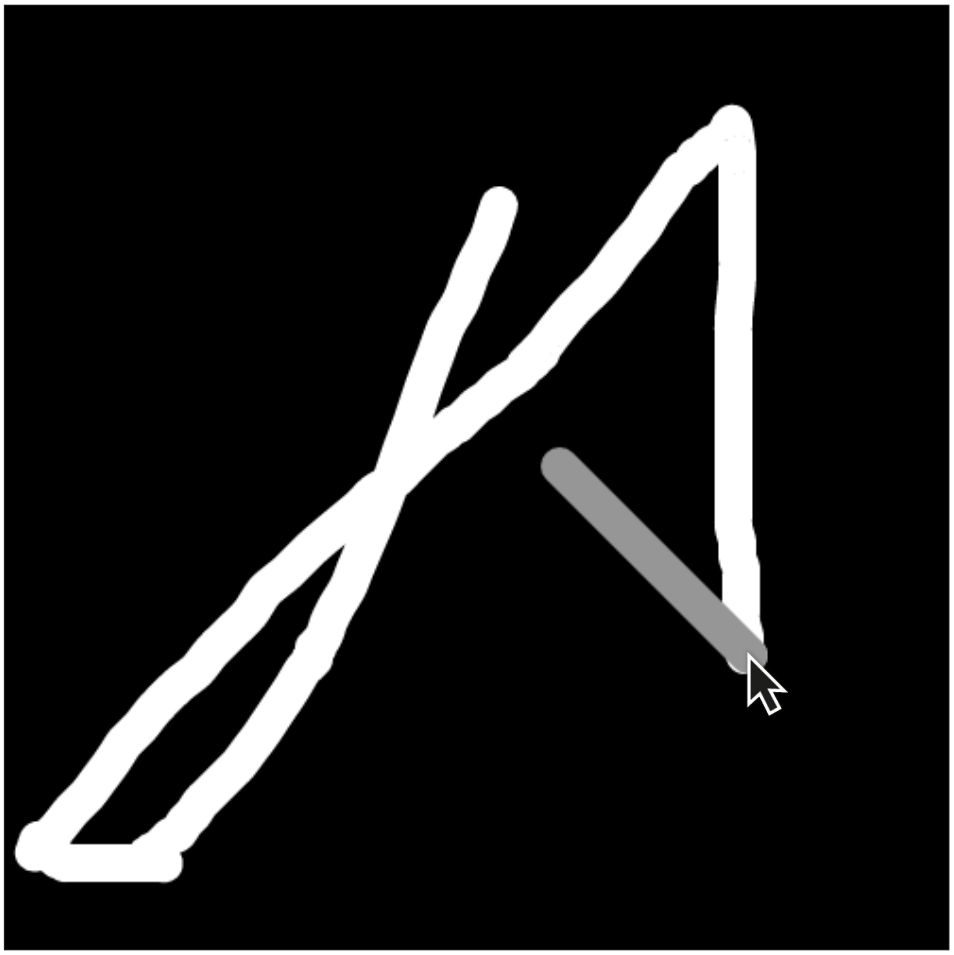
Screenshot 2022-7-21 at 15.4.49 unguide1.png



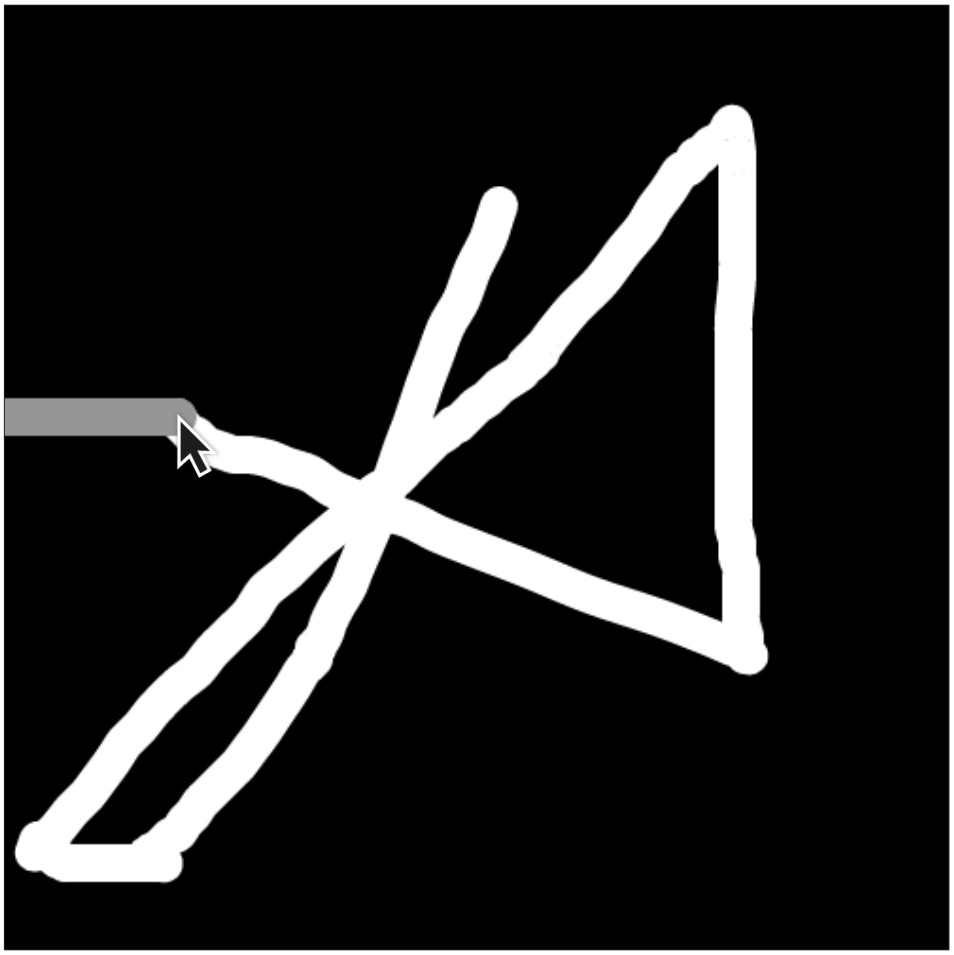
Screenshot 2022-7-21 at 15.4.53 unguide1.png



Screenshot 2022-7-21 at 15.4.56 unguide1.png



Screenshot 2022-7-21 at 15.4.59 unguide1.png



Screenshot 2022-7-21 at 15.5.3 unguide1.png

Portanova's exploration of Cunningham's LifeForms software underlines the value of digital technology to push against, rather than merely reflect or affirm, action, knowledge, imagination and thought. While technology is commonly used as a tool to imitate and extend human possibilities that are already known, Portanova's concept of the 'man/machine connection' (or 'dance/technology relation') explores whether, and how, technology can become 'a means of creation, transformation and becoming'.[129] Via the choreographer Cunningham, she expands on technology's potential, rather than simply affirming or imitating already known human possibilities, to interrupt the trained dancing body in its repetitive routine and push the body out of its habit. Portanova explores, via Cunningham, how our action is 'potentially infinite', but appears limited by our '"trained" imagination'.[130] It is more the limitations of our imagination, rather than the limitations of our body, that define and confine our ability to act and that prevents us from accessing and actualising the infinite potential of our human body.

Cunningham's LifeForms software enables not simply a visualisation of dancing 3D figures on a computer screen, but rather the creation of new, and, more importantly, unimagined, choreography using a method Cunningham refers to as 'fragmentation'.[131] This method implies a manipulation, 'mixing, matching and blending, copying and pasting', of the elements of which the choreography is composed (i.e., rhythm, movement, sequence, gravity, velocity, body parts) via a process of chance.

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129. Stamatia Portanova, 'Thinking Movement and the Creation of Dance through Numbers', *International Journal of Performance Arts and Digital Media*, 2.2, (2006), 139-151 (p. 146 and p. 139).

130. Ibid., (p. 150).

131. Ibid., (p. 148).

Portanova describes:

> On the LifeForms screen, a series of algorithms visualised as "odd little 3D bodies" without organs, bones or muscles move and float in a sort of vacuum space-time with no gravitational or chronological restrictions, simulating and suggesting all sorts of unexpected and unimagined motions.[132]

LifeForms generates a tension between the anatomical, physical, and also – most importantly – the 'imagined' possibilities of the dancing body on the one side and the apparently impossible movement sequences visualised by the software on the other. Thus, LifeForms creates an engagement not only with a physical tension, but also with an intellectual one. LifeForms, as Portanova argues, 'continuously pushes the body towards anatomical or intellectual thresholds'.[133] The LifeForms software, then, becomes an active and continuous engagement with, and negotiation of, a tension between imagined possibilities of the body, its actual possibilities and the impossibilities presented by the machine. Portanova describes it thus: 'When the movement sequences visualised on screen appear physically impossible, dancers make an effort to discover new ways of realising them'.[134] The tension between the algorithmic body on the computer screen and the physical body of the dancer results in a 'new degree of bodily deformation [...] a tendency to "twist" and "gnarl" and "fragment" the body in ways that take it increasingly far away from its habitual physical attitudes'.[135]

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132. Ibid.
133. Ibid.
134. Ibid.
135. Ibid.

The resulting 'kinetic novelty' and 'new imaginative possibilities', as Portanova argues, are produced, not by the technology itself, but by the 'man/machine connection'.[136] The technology is no longer considered to imitate, substitute, externalise, affirm or adapt to human capacities that are already known. On the contrary, enlarging and emphasising their fundamental difference leads to 'an inorganic becoming of both body and technology, on a common material level of rhythmic interchange'.[137] It is in this 'reciprocal feedback between [...] the technologically created score and its actualisation by the biophysical apparatus of each different performer', that the dancers expand on their potential to think and act.[138] Dance here is no longer dependent on a rationally thinking subjectivity, as Portanova argues. Instead, 'becoming-dance' describes a continuous rhythmic development and qualitative variation resulting from an engagement with a tension between modulation and surrender.[139]

Portanova's explorations of Cunningham's LifeForms software highlight the ability of digital technology to push against, rather than merely reflect or affirm, action, knowledge, imagination and thought. A fragmentation, uncoordination and thus complexification of choreography's 'composing elements' does not frustrate, but rather 'intensifies' the choreography, leading to a multiplication and actualisation of potential.[140] Thus the creation of a tension rather than a resolution is affirmed

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136. Ibid., (p. 148 and p. 150).

137. Ibid.

138. Ibid.

139. Ibid., (p. 146). There is a parallel with Deleuze's 'becoming thought', discussed in Chapter 1: 'Something in the world forces us to think. This something is an object not of recognition but of a fundamental encounter' (Deleuze, *Difference and Repetition*, p. 183).

140. Ibid., (p. 148 and p. 150). 'Reveals a virtuality, an affective nature that is only

as a valuable device to 'multiply the possibilities of gestural innovation and creation'.[141]

Cunningham's LifeForms software therefore presents a useful example in which the gap between human and machine is not bridged in favour of the human. Rather, as Portanova argues:

> Cunningham reverses the usual process of "humanisation" [...]. This time, it is the human body tending towards the working [...] of the technical machine, this inverted relation indicating not only the idiosyncratic adaptation of the script by the human body, but also an anorganic becoming of both body and technology, on a common material level of rhythmic interchange.[142]

Cunningham's software deliberately reverses the principles of user-friendly and human-centred interaction. Pleasure here no longer resides in the affirmation of power nor an action that is complete, but in an ongoing engagement and attempt to dance the undanceable, that reveals unimagined effects. It is the tension or the reciprocal feedback that bears potential for the unexpected, surprise, wonder and discovery. It is in the tension between human and machine, rather than in their assimilation, that the impossible becomes possible, the undanceable becomes danceable.

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actualised in unpredicted consequences' (Portanova, (p. 146)). Again, there is a clear parallel to Deleuze's 'intense usage' (Deleuze, 'One Less Manifesto' (p. 245)), as further discussed below in this chapter.

141. Ibid, (p. 150).

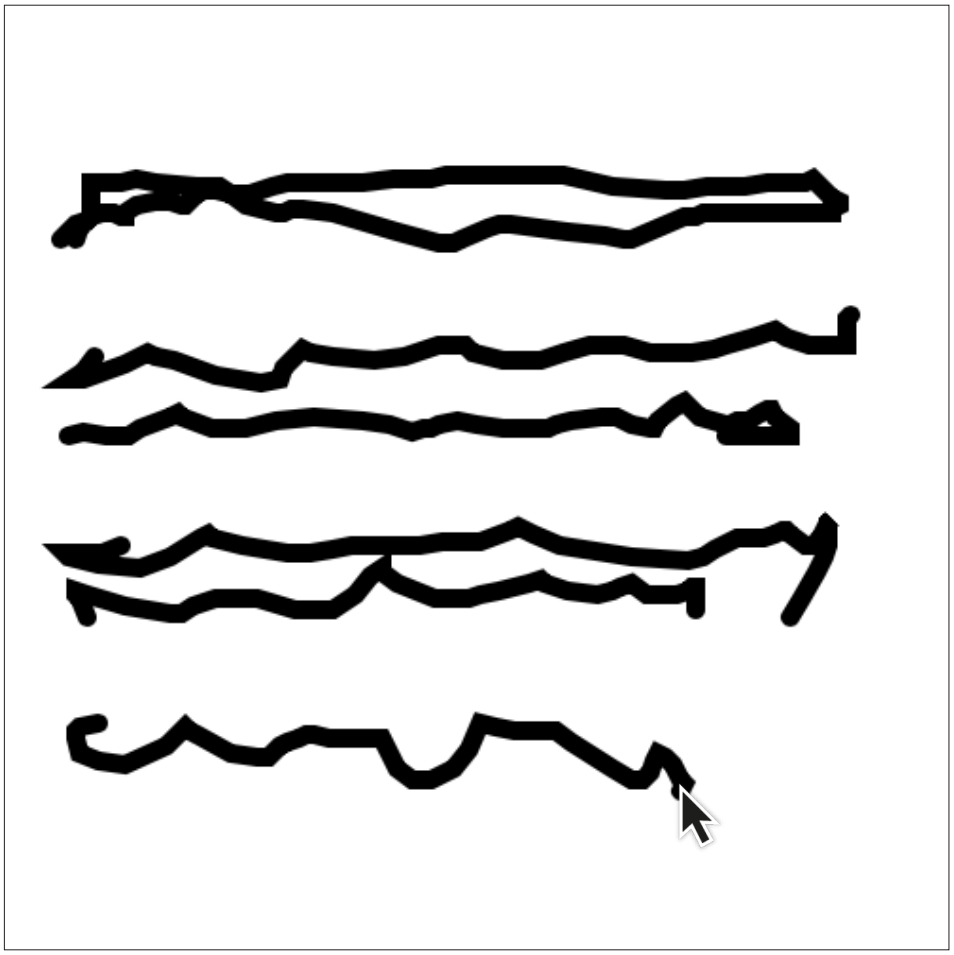
142. Ibid.

The screenshots above are taken from a programme in which the pressing the mouse leaves behind a trace. The release of the mouse puts an end to this process. Furthermore, when the mouse is released, the computer displays a grey line, with its origin in the end point of the mouse's trace end ending at a random position on the canvas. The line displays a possible, but not necessary, continuation of the mouse's path. It is no imposition but an offering to reconsider the next action: an opportunity to dismiss expectations of form in favour of an active experience of process, variation and deviation; a prompt to leave the safety of the anticipated and planned in order to engage on a walk for a walk's sake.

In the preceding programme, the word 'unguide' following the screenshot's timestamp points towards the dynamic explored in the programme. 'To unguide' maintains a tension between heteronomy and autonomy, sometimes leaning more towards guidance, sometimes more towards being guided. In the preceding programme, every action facilitates the next entry point for re-engagement. Every mouse action is followed up by the computer suggesting a possible next step, a junction, a moment to renegotiate power with guidance, action with distraction, determination with being determined. At the same time, the next step remains a suggestion rather than an imposition. There is always an active choice between following, diverging, or even following only to a certain degree – there is no binary opposition between guidance and freedom. Even completely ignoring the computers suggestion is an active decision, too. Furthermore, such decision can be renegotiated with every subsequent mouse action.

The action unfolds from an involvement with the computer, rather than being a thoughtless and automatic act directed towards a predetermined outcome. More than this, the programme makes clear how movement unfolds step by step in a space of potentiality: how taking an action at one moment may open up

an entirely divergent direction or orientation of subsequent actions than in another. The action is caught up in a continuous process, never settling or being determined.



Screenshot 2022-4-15 at 14.56.52 avoid17.png [143] [144] [145]

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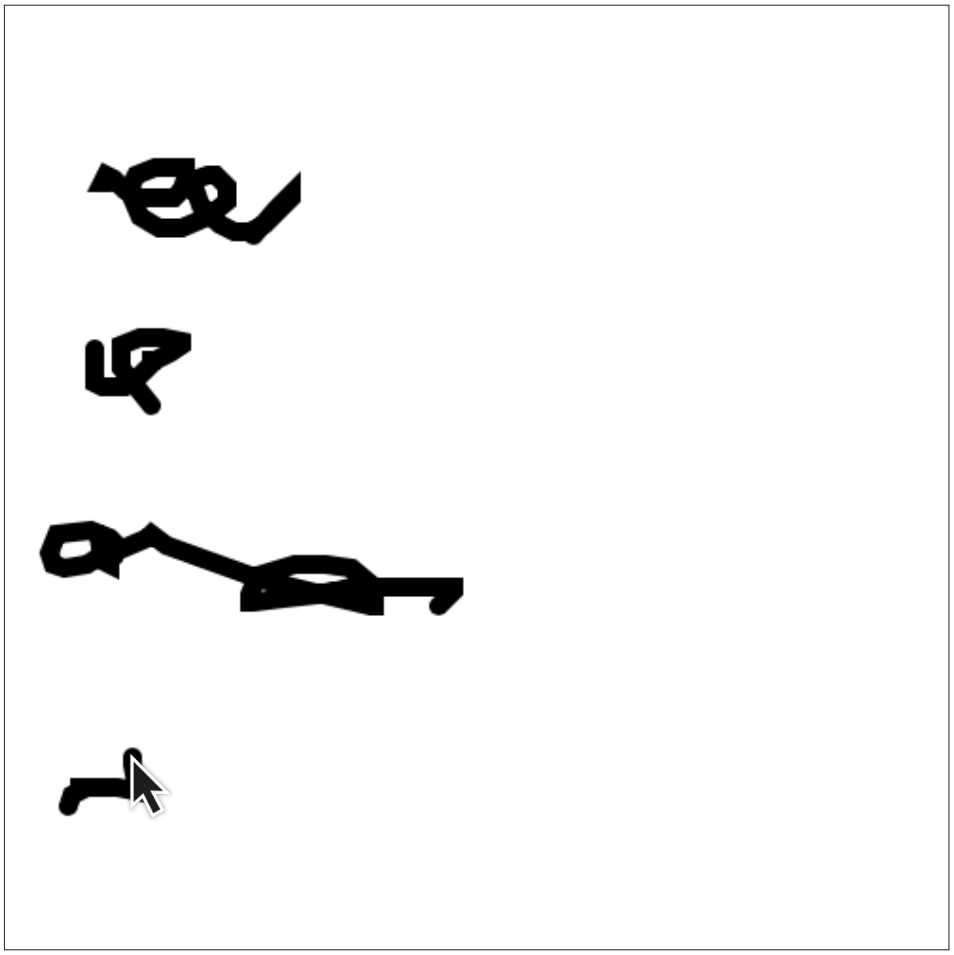
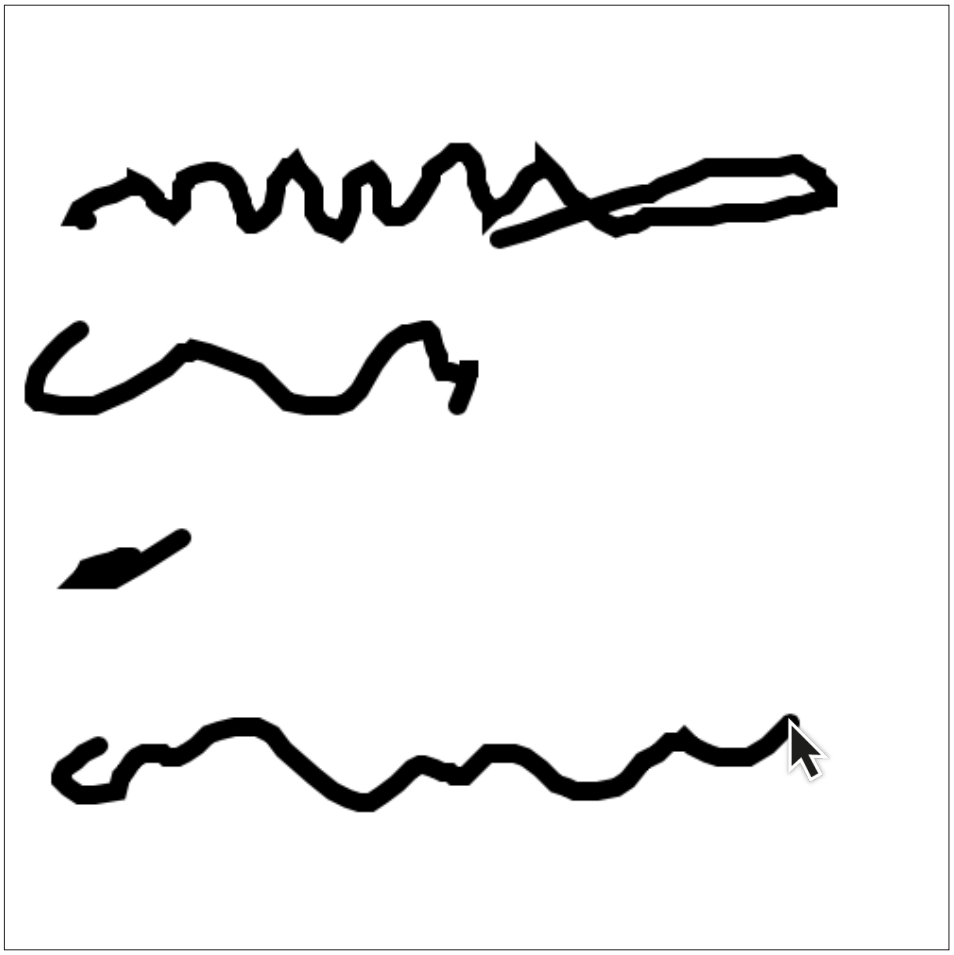
143. 'Nothing happens most where there are no constraints, because then anything goes (…) Without constraints there are no stakes' (Massumi, Politics of Affect, p. 72-73).

144. In the preceding footnote, the juxtaposition of a screenshot and a reference from differing contexts opens up a new conversation in their transdisciplinary connection, which will be further explored in the course of this chapter. Please refer to p. 58-60 of this PhD thesis for more information.

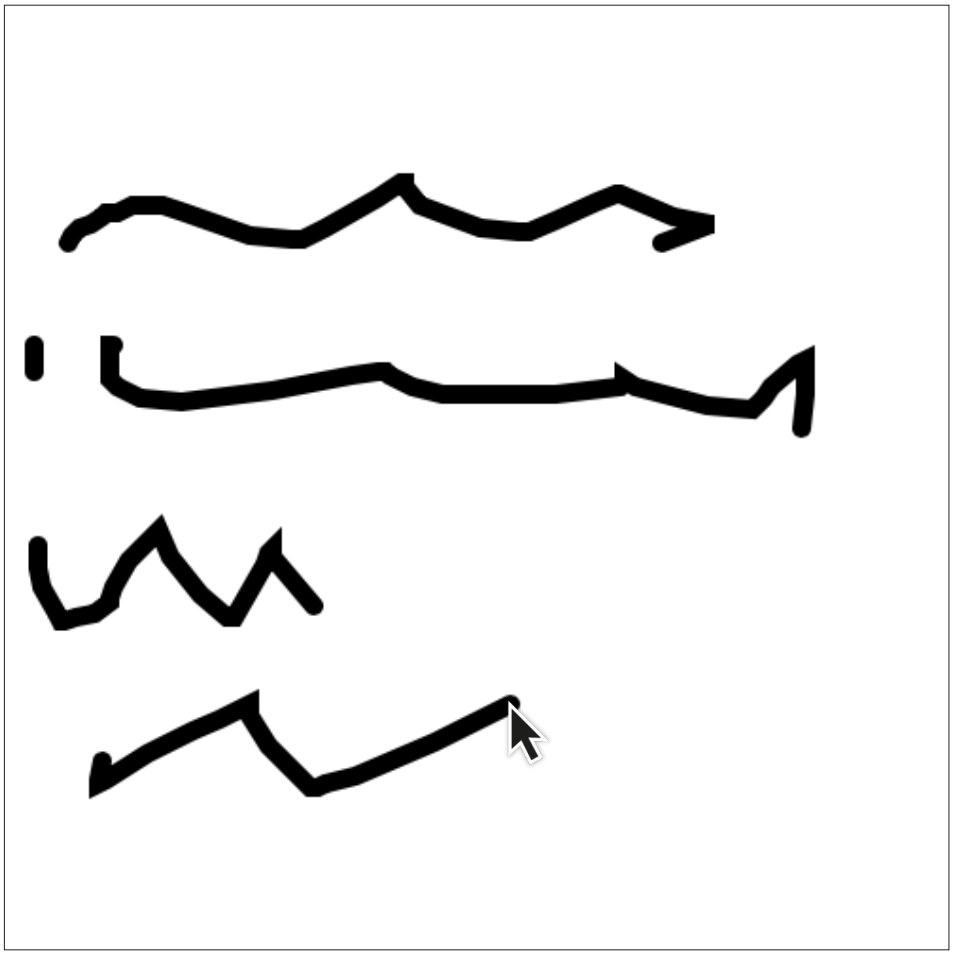
145. A page turn on the following pages of this thesis is to be considered as equating with different outcomes resulting from a repeated interaction with the same interactive programme.



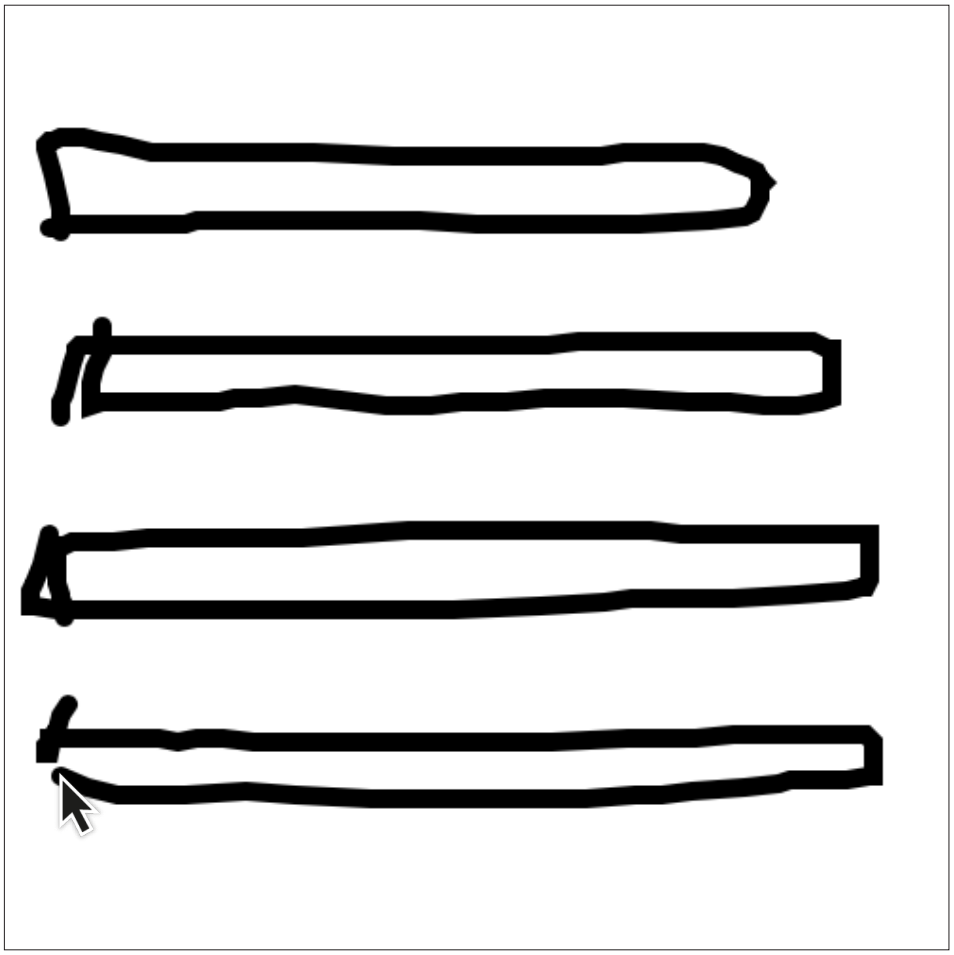
Screenshot 2022-4-15 at 14.57.45 avoid17.png



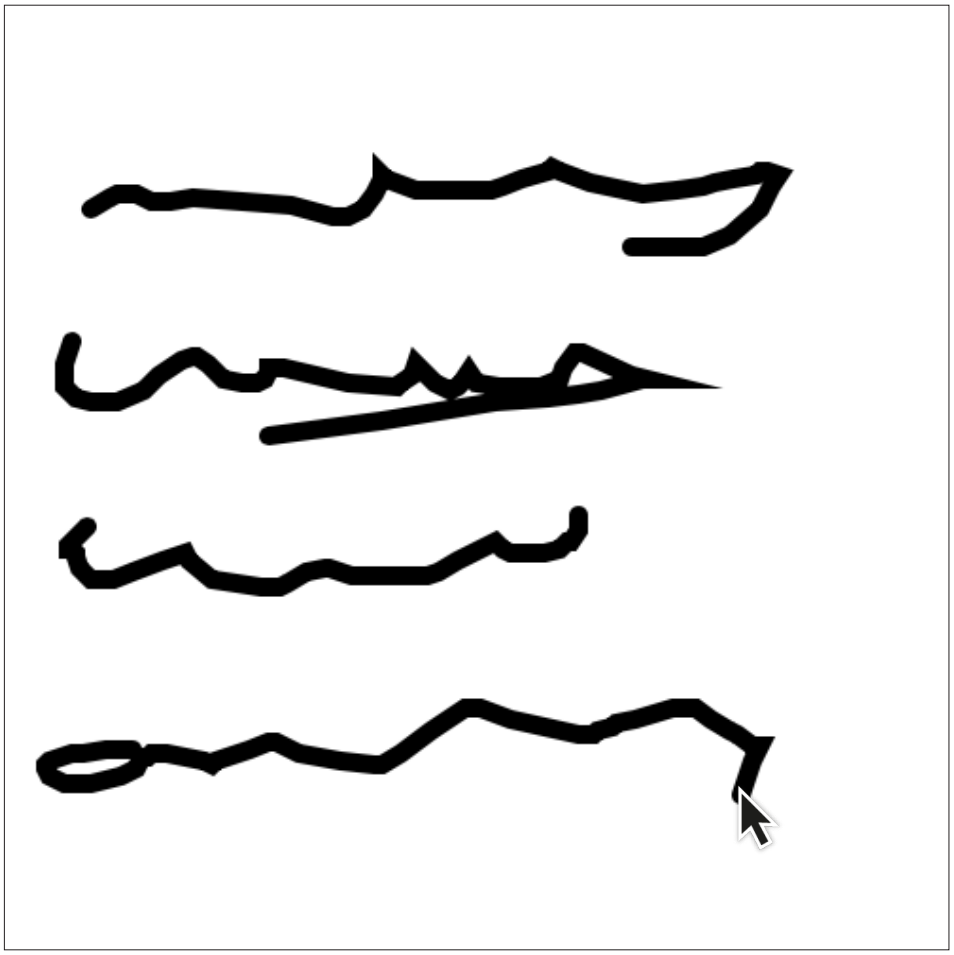
Screenshot 2022-4-15 at 14.58.22 avoid17.png



Screenshot 2022-4-15 at 14.58.47 avoid17.png



Screenshot 2022-4-15 at 14.59.56 avoid17.png



Screenshot 2022-4-15 at 15.1.5 avoid17.png

In the screenshots on the previous pages, pressing the mouse leaves behind a trace. Releasing the mouse puts an end to this process. At the same time, this action is constrained to certain areas of the canvas, dictating its scope and orientation. More specifically, the action is restricted to four rectangular areas on the canvas that are horizontally aligned at an equal distance from each other.[146] Therefore, action is simultaneously disciplined to a restricted space, yet it is a restriction that enables access to possibilities that are otherwise confined by habit, a dynamic that is captured in the word 'avoid' following the screenshot's timestamp. The word 'avoid' entails a dynamic in which action is directed towards avoiding an obstacle. An obstacle is a spatial constraint that simultaneously attracts and pushes away. 'To avoid' simultaneously implies a confrontation with what is to be avoided. Thus, while action is never prescribed, it is contained, altered or steered by a tension between claiming space and being displaced.

The negotiation and tension between stable elements and constants in relation to variables implied by the programme above could be described as what Manning and Massumi call 'enabling constraints'. According to Manning and Massumi, setting up a relation-of-nonrelation, as revealed above, consists not in bringing elements into a comfortable accordance, but in creating the conditions for 'mutual interference and resonance'.[147] Such conditions, therefore are not meant to bind a movement within a predictable and reproducible frame, but aim to push interactivity towards the emergence of the new, 'where something is set to happen, but there is no preconceived notion of exactly what the outcome will

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146. There is a clear formal parallel with Michaux's explorations described in the beginning of this subchapter, in which the artist's lines become denser an convene in a linear arrangement of five rows positioned horizontally one below the other, forming an inevitable association with writing.

147. Massumi, *Semblance and Event*, p. 22.

be or should be', Massumi notes.[148]

Enabling constraints then, are neither a matter of free improvisation, nor of establishing a set of rules. Rules are usually a measure of discipline, of keeping order, of constraining or restricting action to do things 'the right way'. At the other extreme, Manning and Massumi warn that it is neither about 'just "letting things flow", as if simply unconstrained interaction were sufficient to enable something "creative" to happen'.[149] While rules confine action and unconstrained action lacks rigour, the word 'enabling constraints' hints at a tension between both that is not only constraining but also enabling, thus opening up something that usually remains inaccessible. Manning and Massumi explain: '"Enabling" because in and of itself a constraint does not necessarily provoke techniques for process, and "constraint" because in and of itself openness does not create the conditions for collaborative exploration'.[150]

Designing enabling constraints becomes about composing a set-up or framing a situation that allows new possibilities to emerge in a negotiation between stable elements and constraints in relation to variables. 'An enabling constraint is positive in its dynamic effect, even though it may be limiting in its form/force narrowly considered'.[151] An energising tension between limitation and enablement, a field 'alive with competing tendencies to sort itself out'.[152]

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148. Brian Massumi, *Politics of Affect* (Malden, MA: Polity Press, 2015), p. 73.

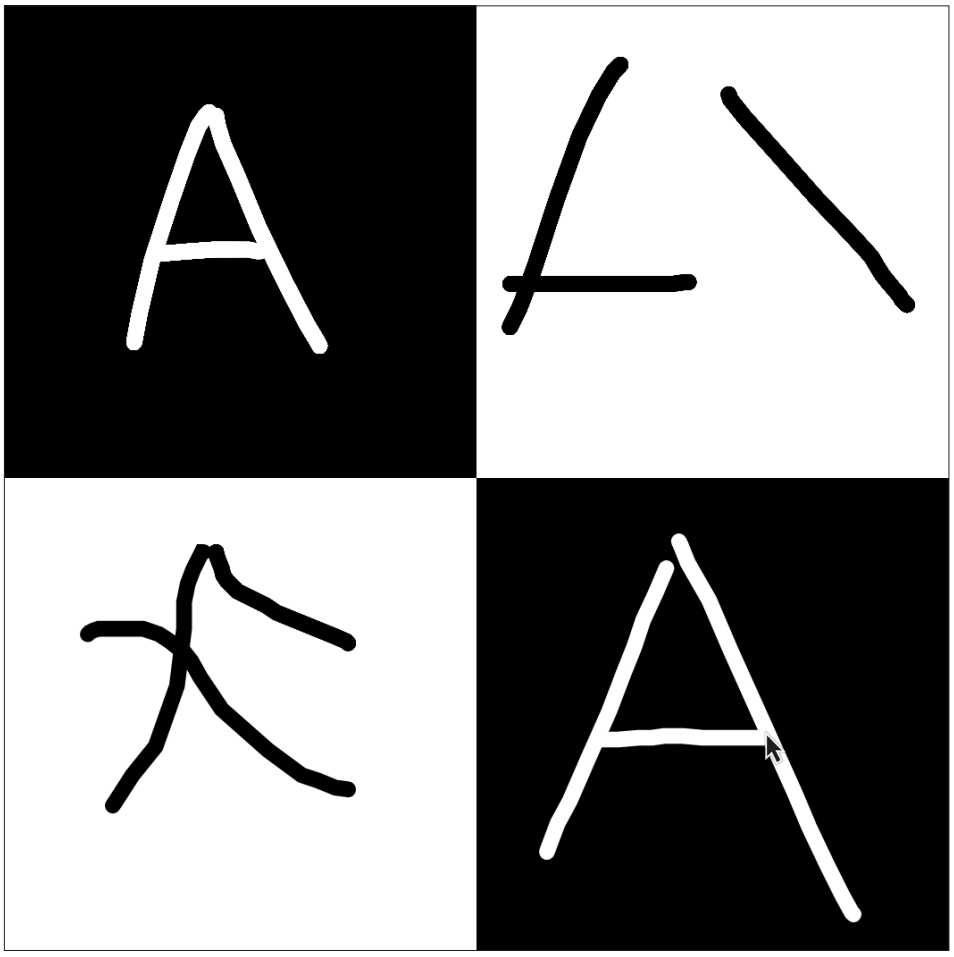
149. Erin Manning and Brian Massumi, *Thought in the Act: Passages in the Ecology of Experience* (Minneapolis, MN; London: University of Minnesota Press, 2014), p. 93.

150. Manning and Massumi, *Thought in the Act*, p. 94.

151. Ibid., p. 93.

152. Ibid., p. 13.

3.3. A Theatre of Interaction



Screenshot 2022-10-14 at 9.6.58 page20.png [153]

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153. ‘pas pas paspaspas pas
pasppas ppas pas paspas
le pas pas le faux pas le pas
paspaspas le pas le mau
le mauve le mauvais pas
paspas pas le pas le papa
le mauvais papa le mauve le pas
paspas passe paspaspasse
passe passe il passe il pas pas
il passe le pas du pas du pape

Ghérasim Luca's poem 'Passionnément' is a continuous deconstruction, variation, repetition and recombination of the syllables and phonemes of the poem's title.[154] The author's aim to release language from a 'standardised system that guarantees constancy and homogeneity' leads him not to a simple dissociation of language, but to what Deleuze and Guattari describe as 'creative stammering'.[155] Referring to the word '*passionnément*' whilst moving away from it, the poet exposes himself to a productive tension in which syllables merge and repel in a seemingly unending dance of making and unmaking words, of making and unmaking sense. This tension appears even more literal in another poem by Luca called 'Comment s'en sortir sans sortir' ('How to leave without leaving'). Continuous variation of language's variables pushes language beyond its limits, maintaining a productive tension that is full of potential.

Luca's endeavour to liberate himself from dominant systems is reflected not only in the syntactical and grammatical variation in his poems: it is also reflected in

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du pape sur le pape du pas du passe
passepasse passi le sur le
le pas le passi passi passi pissez sur
le pape sur papa sur le sur la sur
la pipe du papa du pape pissez en masse [...]'
(Ghérasim Luca, 'Passionnément' (1973));
```

The juxtaposition of a screenshot and a reference from differing contexts opens up a new conversation in their transdisciplinary connection, which will be further explored in the course of this chapter. Please refer to 58-60 of this PhD thesis for more information.

154. Ghérasim Luca, 'Passionnément' (1973), *Hache*, <http://editions-hache.com/luca/luca1.html> [accessed 19 April 2022].

155. Deleuze and Guattari, *A Thousand Plateaus*, p. 108 and p. 114.

the narrative of the poem, emerging from the words' continuous variation. The section *'le pas […] le faux pas […] le mauvais pas'* translates roughly as 'the step, the false step, the bad step', implying a violation of, and thus a liberation from, generally accepted social customs and traditions. Similarly, Luca goes on to vary from *'le mauvais pas' to 'le mauvais papa' to 'pissez sur […] papa',* translated as 'the bad dad', 'pee on dad', emphasising a liberation from common sense, from the state, from culture, from the father as dominant systems of structuration and homogenisation.

At the same time, Luca's critique is not a negation of language. As Deleuze emphasises, Luca's poems cannot be considered an anti-language: 'You cannot […] say that it is a negative operation because it already enlists and releases positive processes'. Quite the contrary: Deleuze describes Luca's poem as an 'intense usage of language' that is positive, creative and active.[156] Rather than constituting a simple negation of language, the continuous variation of language's variables pushes language beyond its limits, engaging it in a productive and potentialising tension. Deleuze and Guattari exemplify it thus: 'Agrammaticality, for example, is no longer a contingent characteristic of speech opposed to the grammaticality of language; rather, it is the ideal characteristic of a line placing grammatical variables in a state of continuous variation'.[157] Deleuze and Guattari argue that:

> it's easy to stammer, but making language itself stammer is a different affair; it involves placing all linguistic, and even nonlinguistic,

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156. Gilles Deleuze, "One Less Manifesto", in Mimesis, *Masochism & Mine – The Politics of Theatricality in Contemporary French Thought*, ed. by Timothy Murray (Ann Arbor, MI: University of Michigan Press, 1997), p. 245

157. Deleuze and Guattari, *A Thousand Plateaus,* p. 115.

> elements in variation [...] To be a foreigner, but in one's own tongue [...] that is when language becomes intensive, a pure continuum of values and intensities.[158]

Luca's poem unfolds from a tension between 'subtractions-constructions', 'regression-progression', 'speed or sluggishness', form and transformation or deformation.[159]

Deleuze's 'critical operation' or 'minoration' – as explored in 'One Less Manifesto' – is a method to open up a practice to its potential becomings: 'Operation must be understood as the movement of subtraction, of amputation [...] to multiply something unexpected'.[160] More specifically, a critical operation consists of a continuous variation and deduction of a discipline's 'elements of power' or 'major elements'. 'Elements of power', or 'major elements', refer to any structural, standardised, formal, or other, elements that 'constitute or represent a system of power'.[161] Thus, the minor becomes about engaging in a process of variation and the production of speed and intervals that gives rise to new potentialities. 'Only continuous variation brings forth this [...] virtual continuum of life, "the essential element of the real beneath the everyday"'.[162] Deleuze concludes that there is no longer form, subject or object, but only a 'continuity of variation'.[163]

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158. Ibid., p. 114-115.
159. Ibid., p. 251 and p. 149.
160. Deleuze, 'One Less Manifesto', p. 239.
161. Ibid., p. 241.
162. Ibid., p. 128.
163. Ibid.

Luca, Forsythe, Cunningham and Michaux could be said to be united by their method rather than their disciplines. In their striving to open up the boundaries of a practice they consider restrictive, they do not rely on a spontaneous or unconscious impulse for creation in the dissociation of their practice. Instead, they actively seek out and maintain a tension between stable and dynamic elements. In this way, in Deleuzian terminology, Luca's poem forms an example of a minor language, Forsythe's and Cunningham's choreographies become a minor dance and Michaux's marks become a minor writing, or a minor drawing.

The individual programmes, around two hundred, that emerge from this research should not be considered as isolated interactive environments, but as part of a continuous process of iteration and variation from which they emerged – a 'minor interaction' in Deleuzian terms. Coming together in a 2x2 grid arrangement, the programmes simultaneously mirror and conserve their continuous iteration, as well as the iterative process and nature of the practice of coding. The code is continuously altered, leading to ever new encounters, sometimes encouraging or refusing an action, sometimes imposing a limitation, sometimes leaving room for divergence. The code is subtracted, operated, not in order to generate, not in order to add, but to reveal its dynamic nature. As expanded on earlier in this thesis, it is the variation of parameters and variables in coding that reveals a programme's potential. At the same time, this process, characteristic of the practice of coding, often remains invisible and marginalised, with the focus on a single outcome aligned with the programmer's intentions.

In the context of this PhD, the programme's arrangement is not only a way of archiving or documenting their variations. Furthermore, it plays a key role in preventing a programme from becoming causal, or from becoming major, as Deleuze warns: 'There is always a great risk that the minority form will restore a

majority […]. Variation must always vary itself'.[164] When Deleuze speaks of the concepts of major and minor, they are not opposed to each other.[165] The minor does not aim to acquire the status of the major: 'There is no becoming-majoritarian'.[166] Instead, the minor describes the major in the process of becoming-minor. The minor then should be understood as a constant, potential and creative moving away from the major, without losing its reference to it, a continuous overstepping of the 'representative threshold of the majoritarian standard'.[167] As Deleuze argues via Pasolini, 'free indirect discourse is to be found neither in language A, nor in language B, but "in language X, which is [...] language A in the actual process of becoming language B"'.[168]

Indeed, every programme holds a discoverable causal logic, even if such logic implies a random factor.[169] In the previous chapter, we have seen that bugs

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164. Deleuze, 'One Less Manifesto', p. 254.

165. Deleuze suggests that, for example, a minor theatre 'is not an issue of an anti theater, of theater in the theater, or of theater denying the theater, etc.' (Deleuze, 'One Less Manifesto', p. 245). He continues by describing how 'Carmelo Bene is disgusted by so-called avant-garde formulas. It is a matter of a more precise operation: you begin by subtracting, deducting everything that would constitute an element of power […] But what remains? Everything remains, but under a new light' (Ibid., p. 245). Institutions are the organs of the representation of recognizable conflicts. And theater is an institution. Theater is "official", even when avant-garde or popular' (Ibid., p.252).

166. Deleuze and Guattari, *A Thousand Plateaus,* p. 123.

167. Ibid.

168. Ibid.

169. When a programme calls the function 'random()', the randomness is part of the logic of the programme. The programme makes a selection – at random –

usually do not imply an absence of a programme's causal functioning. Rather, the dissonance is between the human expectation and the programme's reaction. Creating a gap between man and machine, such discrepancy in expectations leads to an instinctive desire to close this gap, by either adjusting the programme to suit the desired reaction or by adjusting the expectation and action into a causal pattern to suit the given context. Thus, it becomes about creating conditions that maintain a tension, a dissonance, rather than homogenising the entities difference, as explored in the previous chapter.

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from a given set of options. Randomness then, is not entirely arbitrary, but is part of a causal process of executing a function that has been called. In its irregularity, even the random may eventually reveal a regularity, e.g. it varies according to certain parameters.

ac ac action ac action
action action ac ac ac actionaction
ac act the act acting act the acting
act act distract distracting act distract
enact act en act in enact inact
act active enactive enactment inaction
actual enact in act in in out in act
acting out ex out exacting
out ex extract extracting act acting
in out ex acting subtracting act
subtraction action out action
acting out action action actual
actual ac actualact actual act
compact act compaction actionact
abstract abact act compact
react act act reaction act over
action act overreaction action
ac action fraction infraction in
action diffraction action [170]

170. Charlotte Lengersdorf 2022, written in reference to Ghérasim Luca's poem 'Passionnément.'

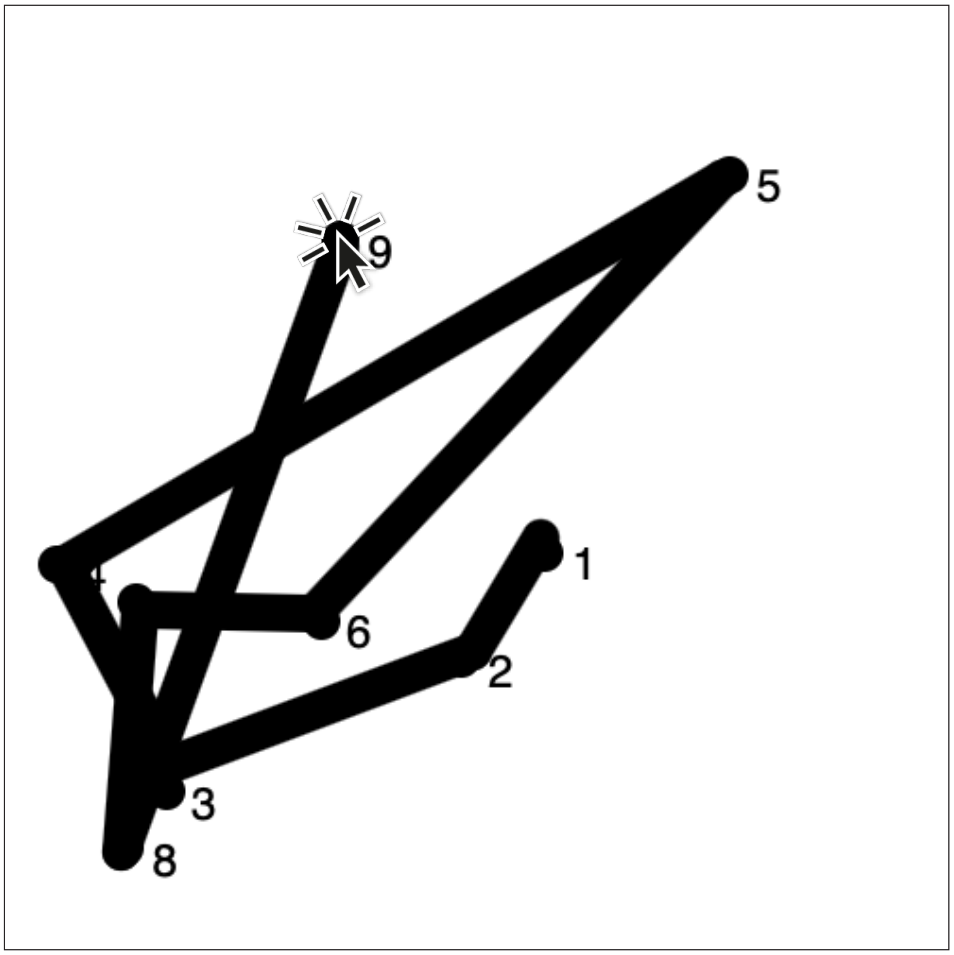
In their coming together, the programme's iterations enter into a relation with each other. They create a maze of interactivity that constantly morphs, varies, moves and changes, continuously pushing action before it can become habitual, and thus passive. The aim is not to discover a logic, but to resist logic, and to move on as soon as something settles into generalisation. Action must always vary, travelling through what Deleuze describes as 'new and always unexpected routes'.[171] Continuous deviation and variation leaves no room for closure but bears promise for continuous discovery and engagement. It is the continuous variation of the programmes that creates spaces that cleave action from its habitual, causal flow — a critical operation of human-computer interaction.

The poem on the previous page is written in reference to Ghérasim Luca's poem 'Passionnément'. A continuous deconstruction and reconstruction of the word 'action' mirrors the variation of the programmes created in context of this research. In constant variation, the word 'action' uncovers new and divergent, and at times conflicting tendencies between action and distraction. At other times such a process may lead to the creation of new words or may weave connections to words that may not be immediately associated with action, such as 'fraction', 'subtraction' or 'compaction'. These are tendencies that exist simultaneously in the programmes rather than being mutually exclusive.

Positioning the interactive environments in direct relation to each other, further reveals the tendency to assume that an experience made in one interactive programme is translatable and useful for the navigation of another. Experience leads to a generalisation of action, not only in the present context, but the properties of one context are inevitably transferred onto and carried along onto seemingly similar contexts. Indeed, because we base our expectations on past

171. Deleuze, 'One Less Manifesto', p. 254.

experience, we instinctively carry expectations from one context to the next. Human expectation is based on laws of continuation and repetition. Expectations are formed across contexts, probabilistically, by recollection. At times, the uniform background of multiple programmes even makes it impossible to discern one programme from the neighbouring one. At other times, the programmes' alternating black and white backgrounds makes a distinction possible. In such cases the programmes clearly stand out from each other and are discernible as individual environments with potentially differing properties.



Screenshot 2022-4-15 at 13.52.1 unguide7.png [172] [173]

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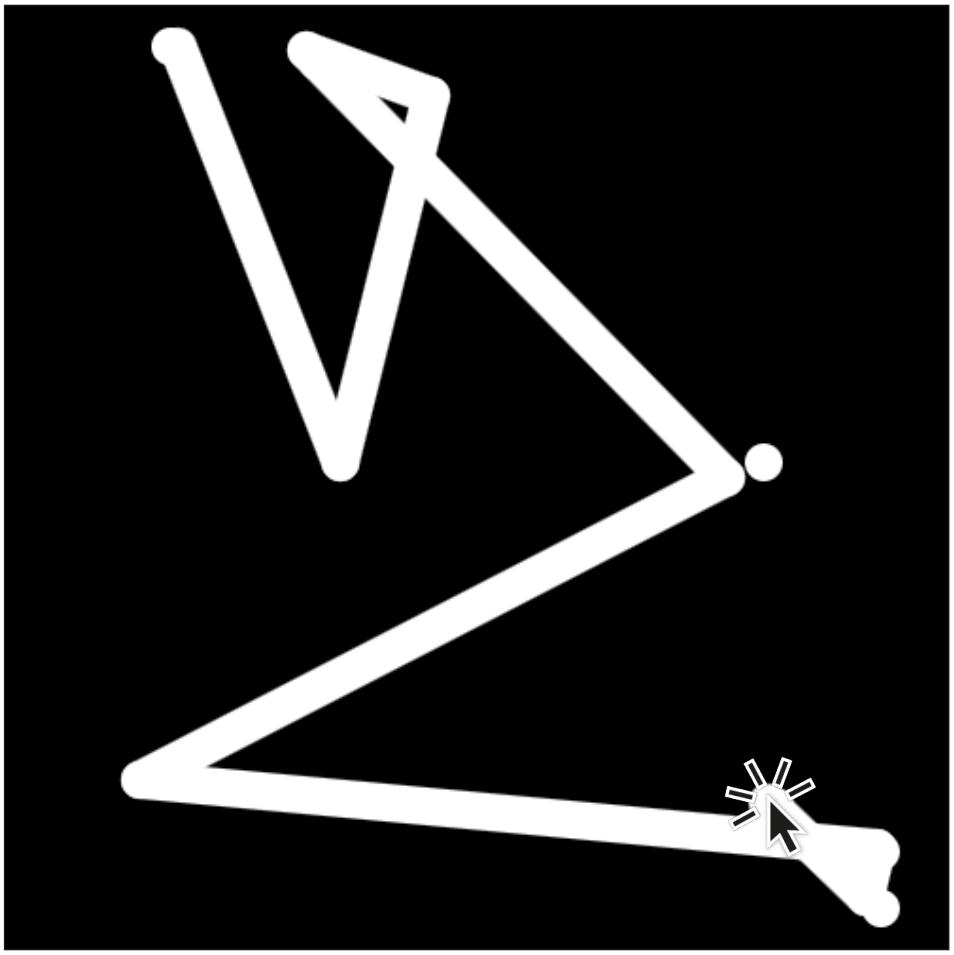
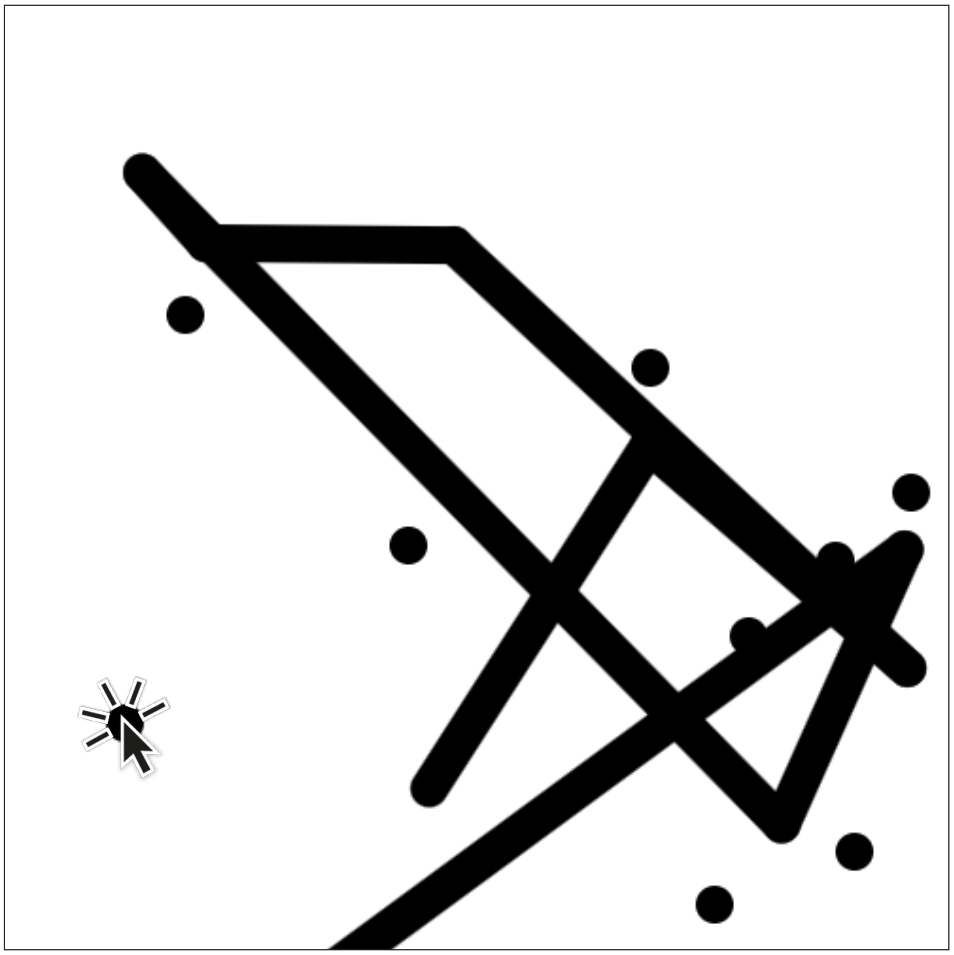
172. A white canvas with numbered black dots from 1 to 9. The numbered dots suggest an order of execution. Two succesive mouse clicks in different positions on the canvas create a line connecting the respective positions.

173. A page turn on the following pages of this thesis is to be considered as equating a moving on to a next programme, showing the continuous variation of major elements of the interactive environment that the programmes are caught up in.



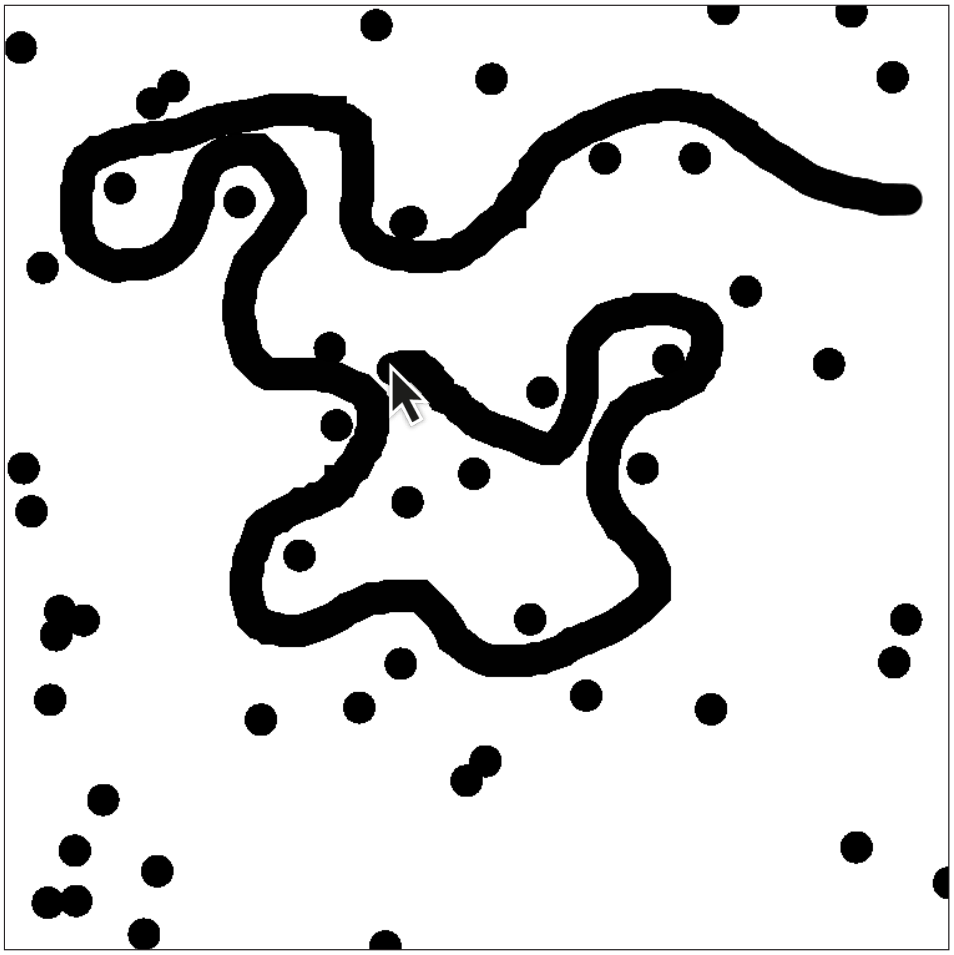
Screenshot 2022-4-15 at 13.52.10 unguide8.png [174]

174. A black canvas with nine white dots. The dots do not suggest an order of execution. Two succesive mouse clicks in different positions on the canvas create a line connecting the respective positions.



Screenshot 2022-4-15 at 13.52.22 unguide9.png [175]

175. A white canvas with nine white dots. The dots do not suggest an order of execution. Two succesive mouse clicks in different positions on the canvas create a line connecting two random positions, that do not appear to stand in any relation to the position of the mouse.



Screenshot 2022-4-15 at 14.44.17 avoid1.png [176]

176. A white canvas with a number of black dots. The dots do not suggest an order of execution. The mouse moved over the canvas leaves behind a trace. If the mouse collides with a black dot, the mouse's line ends and the programme stops.

The following extract collages Deleuze's description of a 'minor language' with my own words, appropriating the quote to describe what I refer to as a 'minor interaction' that results from my programme's continuous variability:

> One must define minor [interaction] as [interaction] of continuous variability — whether the considered dimension may be [temporal, spatial, quantitative, or even stylistic]. A minor [interaction] is comprised of only a minimum of structural constancy and homogeneity. It is not, however, a pulp [...] since it finds its rules in the construction of a continuum. Indeed, the continuous variation will apply to all the [causal components] in a sort of generalised chromatics. It will be theater itself or the 'spectacle'. [...] Continuous variability is [...] explained by [interactivity's] most inherent, creative property as apprehended in minor usage. And, to a certain degree, this is the 'theater' of [interaction]. [177]

The word 'unguide' following a screenshot's timestamp describes a dynamic that is not solely applicable to the respective programme. Rather, the same dynamic may be found across other programmes and alongside other dynamics. In continuous iteration, the programmes move within an oscillating tension between varying degrees of guidance and autonomy.

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177. Deleuze, 'One Less Manifesto', p. 244-245. The words written in square brackets replace Michaux's words with my own, appropriating the quote to describe what I refer to as a 'minor interaction'. Please refer to p. 58-60 of this PhD thesis for more information.

A dynamic that is categorised as ‘avoid’ in one programme, may transform and tend towards a differing dynamic in another programme. In the screenshots on the previous pages, for example, the dynamics titled ‘unguide’ and ‘avoid’ are not mutually exclusive.

Rather their margins are fluid, unclear, rather than rigid. As mentioned above, any categorisation of the practice is not meant to enclose it within a fixed frame, but rather to open it up to a movement of continuous variation and deviation. Each programme habituates a pattern and sets new expectations that are challenged when moving on to the next programme. It is in their coming together that programmes create spaces of encounter between different interactive contexts, and continuously disrupt the body’s ability to act intentionally. They urge the body to continuously renegotiate action based on the specific context and programme it is confronted with.

While the individual programmes sometimes only differ subtly or almost imperceptibly, they continuously disappoint and counter this expectation, triggering a repositioning and revaluation of action and reaction. What might work in one environment may diverge, or even be completely inverted, in another programme. Thus, the knowledge gained from the interaction with one programme may not be useful for the navigation of another programme, and even less so, as in their relation, the programmes weave a net of continuous change and variation, entangling processes of tension heightening and tension releasing in a never-ending cycle.

Their difference is amplified; they engaging in a never-ending cycle of building up and shattering expectations. Each programme becomes a little space of exploration, maintaining curiosity and engagement. One action leads to the next. Action is no longer about a concrete goal to be achieved, but about the process

of interacting with the programmes and their continuous variation: not in order to arrive at knowledge and closure, but to engage in a continuous process of learning and questioning assumptions of regularity.

Thus, it is not only the individual programmes that challenge the relation between an action and its effect, but in their coming together; and in the transition from one interactive environment to the next, they create another area for potential discrepancy and encounter, thereby multiplying the possibility of creation and interaction. Returning to Simondon's notion of the metastable equilibrium and Massumi's concept of the relation-of-non-relation, any assimilation between the human and the computer is always only temporary, establishing an entry point for the next encounter.

The previous chapter expanded on the way that a dissonance between human expectation and computer reaction opens up a gap between the two entities. This is a moment where action can no longer rely on past experience but needs to be renegotiated in its immediate context; it is a cut, an interruption that opens up action to its potential difference. Massumi, in *Parables for the Virtual*, describes the 'joyously incongruent juxtaposition of surfing the internet' or the 'oddly compelling' 'cuts across programming and commercials achievable through zapping'.[178] He suggests that while a cut suspends the continuity of a movement, it opens up the potential for 'the movement to veer off in another direction, to become a different movement'.[179] Indeed, Massumi's notion of the 'cut' can be argued to parallel the Deleuzian slit in the umbrella of uncausality, as discussed in Chapter 2. According to Massumi, a cut is simultaneously a break as well as an opening or beginning of something else: 'Everywhere the cut, the suspense

178. Massumi, *Parables for the Virtual*, p. 45 and p. 153.

179. Ibid., p. 44.

– incipience. Vitality, perhaps?'[180] He describes the allure of the tension between 'the boredom [on the web]' and 'a strange sense of foreboding: a sensing of an impending moreness, still vague. Next link [...] a pull to surf'.[181] Chun, similarly notes how 'our digital (finger) manipulations make us crane our necks forward, rather than sit back on our couches, causing back and neck pain. The extent to which computers turn the most boring activities into incredibly time-consuming and even enjoyable ones is remarkable'.[182] Like surfing the net, the discrepancy between the programmes in the context of this PhD thesis leads to 'a pull to surf'. They pull at our curiosity, our drive to know, to explore alternatives – the joy of discontinuity.

I suggest, that this sense of 'impending moreness' might even translate to the viewer. As expanded on earlier in this thesis, it is not intended that the reader of the thesis necessarily needs to interact with the programmes. Chapter 1 discussed psychologist Albert Michotte's theory of the causal impression, wherein causality can be 'seen', rather than necessarily being inferred from one's own action.[183] Here, vision and action are analogous. Therefore, my interaction with the programmes, recorded in the screen capture video that accompanies this thesis, is not about reproducing or performing the practice, but about making the viewer feel the making of the action by witnessing its effect.

In the screen capture, the arrangement of the programmes is mostly sequential. However, programmes that had been created previously were sometimes revisited, altered, reiterated or complemented by new variations of the same

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180. Ibid., p. 45.
181. Ibid., p. 153.
182. Chun, p. 69.
183. Michotte, p. 15.

programme aligned with new theoretical findings in the written research. In reverse, the chapters were revisited, altered, reiterated and aligned with a newly created programme. They come together as a body of work that is defined by the continuous iteration and variation of programming's parameters. The viewer may feel how action and thought travels and continuously changes in conversation with the computer, hovering between the causal and the uncausal, expectation and dissonance, determination and indetermination, mastery and subversion, pleasure and frustration. As the viewer follows the progressive emergence of the action, they may anticipate and form expectations about the course of the interaction, about next steps made or paths not taken. They, too, may get involved in the successive space of potentiality that every action unlocks and renews.

Watching the screen capture video following the reading of this thesis, the reader might also note the careful selection of programmes that are discussed in the context of this written thesis. As argued at the beginning of this thesis, the screenshots present a selection of programmes that is intented to drive the narrative of the thesis rather than depicting an exhaustive representation of the entire body of practice. Nonetheless, forming the body of work that was created alongside this thesis and that facilitated this discussion, all the programmes were included in the screen capture video. Paralleling, mirroring, reflecting on and being reflected by the written part of this thesis, the screen capture video may almost be considered analogous to the written thesis in the form of practice.

Referring back to the argument above that engaging in a process of variation is not about a creation of the new in the object-oriented sense of the term, Deleuze is careful to stress that a critical operation is 'not about addition'.[184] He points out the fact that Carmelo Bene 'does not call his play […] one more

184. Deleuze and Guattari, *A Thousand Plateaus*, p. 123.

Hamlet but "one less *Hamlet*"'.[185] It is not about creating one more version of the play: 'It is not to make it a fashionable parody or to add literature to literature. On the contrary, it is to subtract literature, to subtract the text, for example, a part of the text and to observe the result'.[186] It is not about an outcome: 'It has no other purpose and does not extend further than the process of this creation', as Deleuze argues.[187] Thus, a critical operation, according to Deleuze, is a means of rendering a potentiality that is present and actual, establishing what he refers to as a 'minoritarian consciousness'.[188] That is, a consciousness of 'the strength of becoming' and the 'virtual continuum of life'.[189] 'A simple loving potentiality'.[190]

Thus, the arrangement of the programmes does not simply aim to document their variability, but rather stretches out and slows down a dynamic often repressed by the human desire for closure. That is, the human ability to continuously become and change, rather than settle in mastery. They establish a minoritarian consciousness, in the Deleuzian sense — that is, a consciousness and pleasure of becoming and changing and experiencing oneself in change with the world. While it is almost impossible to abandon the instinctive human desire for resolution, it is the arrangement of the programmes that counters and continuously resists any effort towards generalisation.

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185. Deleuze, 'One Less Manifesto', p. 239.
186. Ibid., p. 239-240.
187. Ibid., p. 240.
188. Deleuze and Guattari, *A Thousand Plateaus*, p. 123.
189. Gilles Deleuze, 'One Less Manifesto', p. 255-256.
Deleuze and Guattari, *A Thousand Plateaus*, p. 128.
190. Gilles Deleuze, 'One Less Manifesto', p. 256.

Connected and interlinked, the programmes maintain a sense of discovery, making sensible and maintaining the body in a state of tension. They create a space of change, encounter and discovery in co-creation with the computer. Even a repeated interaction with the programmes does not simply reproduce or display actions, but reactivates a continuous process, maintaining a tension between the human and the computer. It conserves a space of potentiality that can be actively revisited: a challenging arena for interactivity, an experimental and ludic space for the indeterminate and truly active. A world to encounter, to shape and be shaped anew with each interaction. Quite literally, to take a cursor for a walk, continuously varying the relation between mouse action and computer reaction. An active line, moving freely without goal. A cursor on a walk for a walk's sake.

Chapter 4

No Conclusion

'We are led to believe that the activity of thinking [...] begins only with the search for solutions.' (Gilles Deleuze, *Difference and Repetition*)

'What exactly is [uncausality]? What exactly do you mean by [uncausal pleasure]?' (Gilles Deleuze, *Negotiations*)[1]

1. Deleuze's concepts in the original quote were replaced by concepts in this thesis.

4.1. An Intensive Way of Writing

As a kid, when I had just learned to write, I wanted to be a novelist. I *started* writing one story after the other. The focus here is on *starting*, because what they all had in common is that they were never completed, didn't even come close. Some stories did not even properly begin. But I remember my excitement each time I started writing a new story. I didn't outline or determine anything in advance. There was no general idea, no predefined settings or characters. My curiosity was about seeing where the act of writing would lead me. For me, writing became an opening to a world of potentialities, a journey of discovery, a leap into the unknown. I trusted in the process, without worrying about resolutions of potential conflicts in the plot. Indeed, I can recall how it was specifically the eventual closing down of possible continuations as a plot developed that made me lose interest. I got bored by the determined and began with another story.

Further on in my education, I eventually lost interest in writing and could no longer relate to my initial passion. Writing lost its sense of discovery. Instead, it became about determination, about documentation, about structure, about grammar, about a completed narrative. It was not a conscious decision to abandon that dream. But lacking my initial ease of writing, and my devotion to it, I must have felt that maybe this was just not for me. Eventually other interests and curiosities prevailed, leading me to pursue a different path in my further educational career.

Of course, this reflective account of my younger self's passion for writing is nothing I was aware of as a child. It is only now, passing in review my experience of writing up this PhD, that I feel transported back to my younger self. The one that truly enjoyed writing – motivated not by extrinsic aims, not even by the aim of finishing the story. But truly and intrinsically motivated to discover,

to learn and to create. This is not to say that writing this PhD thesis has been thoroughly enjoyable. Quite the contrary: it has been a journey of conflicts and major frustrations. But I rediscovered a way of writing that I had lost during my education. A writing in the spirit of adventure, with curiosity leading my way. Writing not as a means of retelling, word by word, what is already fully formed in thought. But writing as a continuous and laborious process of discovery, of challenge, of change, of thinking.

Having written extensively about the value and potential of resisting the human intuitive desire for closure and resolution throughout this PhD thesis, writing up a conclusion appears paradoxical. At the same time, the title of this chapter – 'No conclusion' – is not denying a conclusion to this research as a completed project. What it is denying, though, is a conclusion in the sense of an end to a discussion or a solution to a problem, an answer to a question as if there was nothing more to say. 'As though problems were only provisional and contingent movements destined to disappear in the formation of knowledge', as Deleuze notes critically.[2] Rather, this chapter should be read as a pause, a reflection, a provisional form setting the conditions for further investigation. Not as a solution to a problem, but as a 'better problem', as Massumi would suggest, that 'provides a jumping-off point for others to continue from in their own way, along their own exploratory paths, for intensities of experience to come'.[3]

The preface to this thesis began with a question in response to a confrontation with asemic writing: 'What does it mean?' At the same time, this question was not posed with the intention of answering it in the course of this PhD. My fascination with asemic writing did not lead me to an investigation of the same.

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2. Deleuze, *Difference and Repetition*, p. 207.
3. Massumi, *Politics of Affect*, p. 204.

Instead, asemic writing was merely a starting point for what Scott refers to as 'an intellectual detour', or what Michaux describes as a 'line of blind investigation':[4] a line that seeks without determination, 'refuses the immediate finds, the easy solutions, the initial temptations. Guarding itself against "arriving"'.[5] In my effort to leave the well-trodden path behind, it was the question above that tried to discipline me, to trick me back onto the paved road. It was this tension between my desire to know and my refusal to arrive at knowledge that became both the motor and subject of this thesis, embodied in the concept of uncausality.

While the concept of uncausality is one of the main contributions of this PhD thesis, this final chapter does not aim to imprison the uncausal within a definition. As explored via Deleuze in Chapter 1 of this thesis, concepts do not determine or explain what something is, but they initiate an event, a process of creation and investigation. Not for the purpose of understanding or of arriving at a definition, but as a means to engage, to form new connections and new encounters. This PhD thesis presents one of many potential other explorations that might have been gained from prolonged contact with the concept of uncausality. It is within such prolonged contact that this research formed alliances with other concepts and other discourses. The creation of a concept becomes about finding 'resonances, common ground, with what other writers, musicians, painters, philosophers, and sociologists are doing or trying to do, from which we can all derive greater strength or confidence', as Deleuze describes it.[6] Confidence in something that is not simply explained away or dismissed from the outset. Thus, engaging with the uncausal is not about making the uncausal causal, or of making sense

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4. Scott, *Seeing Like a State*, p. 1.

Michaux, *Emergences-Résurgences*, p. 11.

5. Ibid.

6. Deleuze, *Negotiations*, p. 27.

of nonsense, but about opening up a space for encounter rather than explanation. Forming new alliances with people who are not united by their disciplinary history or tradition but in the way they challenge the rationalist tradition, to open up constraints that define, and thus confine, thought, action and the ability to become creative. It is in their coming together that they leave their discipline's confines in order to open up to something else.

Concepts become and change depending on the specific problematic of the context they are discussed in or depending on the concept's proximity to other concepts. Thus, the concept of uncausality should be understood in both the context and conditions of its becoming as factors of singular moments as well as in unity with its creator – 'each [brain] constitutes a "domain of survey"'.[7] For example, a creators name implied in a concept (e.g., Deleuze's 'body without organs') does not refer to the person or the concept but instead to the creator as being the 'potentiality of the concept' – the conceptual persona.[8] Therefore, the way this research has played out cannot be considered independently from the Western cultural and socio-economic context I grew up and was educated in, my gender, nor from my training as a visual communicator. Like Michaux, exposing himself to a tension between his conditioned body and his effort to decondition it, as expanded on in Chapter 3, my practice and my origin remain points of both reference and repulsion. Indeed, it is a valuable argument that a reader 'might have found a more experienced guide' for a discussion on computer science, philosophy, choreography or the other disciplines that this thesis draws from.[9] However, it is me as the conceptual persona that makes

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7. Deleuze and Guattari, *What Is Philosophy?*, p. 210.
8. Ibid., p. 5.
9. Scott, *Seeing Like a State*, p. 1.

this thesis a visual communicator's thesis, rather than one by a computer scientist, a philosopher, a choreographer or someone from any other discipline.

While type design is neither the end point nor subject of this thesis, it was necessarily the starting point for this PhD research. Indeed, as Guattari has argued, while they are encouraged to draw from beyond their discipline, a researcher's disciplinarity remains a necessary point of departure: the reason and origin from which such conversation started in the first place. It was against the background of the discipline's boundaries that my interest in asemic writing and as a consequence this research, emerged, as discussed in the preface to this thesis. Watching the screen capture video, and as touched on at the beginning of Chapter 3, the viewer might notice scattered references to letterforms as well as stylistic references to graphic design and type design programmes.[10] Thus, while this thesis departs from the discipline of type design, it remains an important point of reference.

Again, this is not to dismiss the value of the disciplines of type design or typography. Rather, it is to acknowledge that their field of applicability 'must be recognised as limited to a particular mode of existence, or a particular dimension of the real', as seen via Massumi in Chapter 1of this thesis.[11] Conversely, this implies that expanding or transgressing the boundaries of a discipline involves venturing into other modes of being and other dimensions of the real.

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10. For example, some programmes visually allude to vector drawings with anchor points, a reference to the digital tools of a graphic or type designer.

11. Brian Massumi, *Parables for the Virtual: Movement, Affect, Sensation* (Durham & London: Duke University Press, 2002), p. 7.

Thus, while on the one hand this PhD reflects a very personal journey, I nonetheless consider it to be valuable beyond the personal. It should not to be read or encountered as an enclosed or isolated reality that seeks to have the final word. Instead, the reader/viewer is invited to encounter it in the context of and in interaction with, other things and events outside of the thesis, as an 'intensive way of reading', how Deleuze calls it:[12] as an intensive way of reading, but equally, as an 'intensive way of viewing'. Encountering this thesis, the question is asked: 'How does it work for you?'[13] The reader/viewer is invited to continue the detour, to become the conceptual persona, to make connections to other things, other practices, other media, other disciplines. To explore what new thoughts and new practice may emerge from such encounter: 'As a series of experiments for each reader in the midst of events that have nothing to do with books, as tearing the book into pieces, getting it to interact with other things, absolutely anything … is reading with love'.[14] At the same time, this is an invitation rather than an imposition. As Deleuze writes:

> Something comes through or it doesn't. There's nothing to explain, nothing to understand, nothing to interpret. It's like plugging in to an electric circuit. I know people […] who immediately saw what bodies without organs were, given their own "habits", their own way of being one.[15]

The choice of the term 'uncausality' here appears specifically appropriate because it does not suggest an immediate association with a particular field or discipline.

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12. Deleuze, *Negotiations*, p. 8-9.
13. Deleuze, *Negotiations*, p. 8.
14. Deleuze, *Negotiations*, p. 8-9.
15. Ibid., p. 7-8.

The connotation of the term changes depending on the context in which it is discussed. Therefore, a discussion of uncausality in one discipline might lead to unexpected implications, new directions or convergences in another. Just as the preface to this thesis set the scene, preparing the reader, guiding them from their own standpoint into my personal journey of research, this final chapter of this PhD is intended to lift the ideas of this thesis, transitioning the reader back into their own context, their own discipline, their own practice.

This PhD research aims to encourage a practice of philosophical thinking, that is, as pointed out in Chapter 1 via Deleuze and Guattari, not limited to philosophers. Rather, anybody can become a philosophical thinker who seeks to expand the possibilities of their respective medium or discipline and leave the well-trodden path: anyone who is willing to make a slit in the protective and affirmative umbrella of habit, determination and mastery. Already in 1977, in his book *Negotiations*, Deleuze suggested that 'philosophical thinking has never been more important than it is today, because there's a whole system taking shape, not just in politics but in culture and journalism too, that's an insult to all thinking'.[16] Deleuze describes 'a whole system of "acculturation" and anticreativity specific to the developed nations' that stifle any creation, making it impossible from the outset.[17] This is a problem that, as this PhD thesis suggested, persists today. By contrast, philosophical thinking is a thinking that does not 'reflect "on" things', but that creates:[18] one in which thinking is no longer based on patterns of habit and automation, but is freed from the Western rationalist tradition in order to explore other ways of invigorating action and practice. Thus, this thesis does not seek to resolve questions, but to reveal new regions of thought and action.

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16. Deleuze, *Negotiations*, p. 32.
17. Ibid., p. 27.
18. Ibid., p. 122.

Not to solve problems, but to create them, so that thought becomes active and creative, rather than remaining imprisoned in patterns of determination and causal inference.

A major reason for pursuing my PhD in the UK and at the RCA was the practice-based research tradition in both. However, I did not find a safe space to start from, nor a well-trodden path to lead me. Starting from a place where right and wrong has not yet been established is both a challenge and a freedom. For me, writing this PhD thesis became an opportunity to explore on my own terms what it means to write as a practising researcher, as a visual communicator. Not by adopting the voice of another discipline, but by wrestling with what it means to write and read and think as a visual communicator. To do and say things outside of the problems and limitation of my own field. To not simply be working in and navigate an intellectual space, but a space where the prosaic, the poetic, the interactive, the visual and the diagrammatic interweave and join in a common narrative.

At the same time, such an exploration is only free within the framework of academic regulations and accepted contemporary international standards. A space between the confines of academia and the freedom of uncharted territory. However, Chapter 3 of this thesis, in particular, indicated the value, not of dissociating completely from the known, but of maintaining a tension between reference and dissonance as a means to open up new potentialities. Therefore, the productive power of what Manning and Massumi refer to as 'enabling constraints' appears to resonate on this level of the thesis, too. Thus, this thesis seeks to navigate a space between academic elements while treating writing and also reading as a process, as movements, as experiences, as encounters rather than simply as code. Struggling to find a suitable format to grasp the scope of this research and its transdisciplinary endeavour, I worked with mind mapping,

especially in the first two years of this research. To write a mind map is to emerge within a process, starting with a single point of entry and splitting up into diverse directions. To depart only to return from another direction. To take a detour. To connect the disconnected. A mind map is not planned in advance — it advances within the process. An experiment, an exploration into the unknown. A continuum, without a goal. A piece of writing in constant variation, revealing its potentialities on the go. In writing a map, the whole body physically engages in the process of writing. The body leans over the paper. It moves in a non-linear way, unlike writing a text. It keeps returning to points, following back a path by tracing it with the index finger. The body thinks, the body moves.

Expanding on these characteristics of the mind map, this PhD thesis is not just a retrospective narrative or detached description of its subject, suggesting a retelling or documentation of something that is already fully established. Nor does it offer a simple theory to be applied to the practice. In a way, writing this thesis could be considered as an 'intensive way of writing'.[19] A writing that is not about reflecting on the already thought. Writing, for me, became less a reflection on, or description of, my work or practice at a safe distance. Rather, it was a process of immersing myself in potentialities that renewed with every new sentence written, a progressive immersion in thought.

Speaking of an 'intensive way of writing' in the context of this conclusion does not imply solely the writing of text. Rather, it suggests an interweaving of theoretical and practical elements, overcoming both disciplinary boundaries as well as any distinction between modes of research. Here, the fact that the practice of coding consists largely of 'writing', is more of a coincidence

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19. See the reference to Deleuze's 'intensive way of reading' above (Deleuze, *Negotiations*, p. 8-9.)

than a deciding factor. However, it is the dynamic nature of code that is of essential relevance in choosing it as practice in this research. As Chun argues, coding is not a 'dead repetition' but 'a writing, open to alteration/iteration'.[20] The process of writing became a process of creation and of making connections. An act of thinking, a practice of shaping, diverging, guiding thought into new directions, seeking to avoid the contemplative and maintain the playful. With each text written, and with each programme created, I was pushing my thinking and acting further. Thus, this PhD thesis mirrors in writing as well as in the practice, the dynamics, the struggles and challenges that led me through this research. The challenge of approaching ideas from different directions, of immersing thought, writing, reading and practice in a constant iteration and variation.[21]

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20. Chun, *Programmed Visions*, p. 25.

21. According to the computer scientist Seymour Papers, learning to programme may provide children with new ways of thinking about knowledge and its acquisition. For example, he suggests how programming may 'chang[e] our notion of a black and white version of our successes and failures' (p. 416). Cultivating a practice of 'correcting "bugs"' (p. 416), as opposed to as a model of learning and thinking in which you 'either "got it" or "got it wrong"' (p. 416), programming may become beneficial for other practices. For example, Papers describes his process of writing a text: 'For me, writing means making a rough draft and refining it over a considerable period of time. My image of myself as a writer includes the expectation of an "unacceptable" first draft that will develop with successive editing into presentable form. But I would not be able to afford this image if I were a third grader' (Paperts, p. 419.). While the way that programming shapes thought has been widely discussed, the focus is mostly on human mastery and the way that 'computers may well turn our to be our guide in understanding the human brain' (Miller, p. 271) based on the 'similarity between the way we process information to acquire knowledge and the way computers to so' (Ibid., p. 181).

Thus, when speaking here of 'an intensive way of writing,' this does not solely refer to the written part of this PhD research.

4.2. An Uncausal Practice

An investigation of asemic writing identified a complex dual dynamic, that Schwenger refers to as 'asemic effect', simultaneously encouraging, while disappointing, the human urge to understand, gain knowledge of and consequently control the world around them. This asemic effect was explored to offer a dynamic that diverged from the 'causal pleasure' of human-computer interaction. The instantaneous and anticipated causal relation between human action and computer reaction was found not only to appeal to, but also to consolidate, a conception of the world as intelligible to human reason, and thus submissive to human control. Emphasising the power of human action, humans' ability to anticipate, navigate and control, human-centred computer interfaces transform a user's initial 'grudging acceptance or outright, hostility' towards the computer into a 'a glowing enthusiasm' and a 'thrilling sense of power', as discussed via Shneiderman.[22]

Indeed, this thesis expands on how the way we interact with technology reveals profound cultural assumptions and, vice versa, how technological logics and defaults are embedded within culture. This does not refer to technological determinism in the sense that technology determines the development of the social structure and cultural values. Rather, technology and culture are seen to interweave and collide. Interactive interfaces, in their functioning, mirror the context in which they emerged, but also reinstate such context.

At the same time, a consideration of the machine as what Simondon describes as a 'tool' and what Englebart refers to as a 'clerk' in the service of humans

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22. Shneiderman, 'The future of interactive systems and the emergence of direct manipulation', (p. 246 and p. 247).

is a relict from the pre-industrial era and the Industrial Revolution.[23] These descriptions are a nineteenth-century product, created in response to the increased insecurities of the relationship between humans and machines in an industrialised and globalised world. Simondon's book *On the Mode of Existence of Technical Objects*, written in 1958, was way ahead of his time, pointing to the need for culture to be contemporary with technology. And still, over sixty years on, we seem to be confronted with the same problematic. Culture bears the danger of bringing a regulative representation of the computer, but also of the world in a certain era, that does not seem to respond to the problems of our current reality. Interactivity's causal pleasure is not only based on, but also sustains and reinforces a world view that affirms, protects and pleases the human in the face of an increasingly complex world around them. In both in interaction design and modern design discourse, 'human' remains a 'magic word', as Colomina and Wigley argue.[24]

This thesis suggests that interactivity's clear causality may confine rather than affirm the human. Thus so-called human-friendly interaction was explored to reveal a level of ignorance not only towards the contingency of the world and nature, but also towards the human ability and willingness to learn, to be challenged, to actively engage with their surroundings as opposed to being pleased and affirmed in their knowledge and position of power. Confining human action and thought in repetition seems to fail to respond to humans' potential, presenting them as far more simple-minded than they really are. Moreover, it not only presents the human as stupid but also fosters a kind of human that lacks motivation, spontaneity and initiative. Interaction's strict functionality, controlled

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23. Simondon, *On the Mode of Existence of Technical Objects*, p. 17. Engelbart, *Augmenting Human Intellect*, p. 6.

24. Colomina and Wigley, p. 127.

environment and single-purpose approach include the qualities of what Scott refers to as 'sensory-deprivation tanks' that are 'ultimately stupefying.'[25]

If the role of design and interactivity is to improve the human condition, causal pleasure may not be able to shelter from, nor respond to, the potential contingencies of the future. Indeed, the contemporary problems we are confronted with are a result of taking human fears as the primary concern, of sheltering humans from the complexity of reality, of lulling them into a state of ignorance, of inhibiting their capabilities, but even more importantly their willingness to think and act.

The contemporary condition increasingly confronts us with problems that surpass the causal and rational, so-called 'intelligent' thought. At the same time, discussions of technology in the digital and post-digital environment often pivot around artificial intelligence, artificial neural networks or machine learning. They also take place around so-called 'intelligent' machines, that are defined by their ability to mimic and even strengthen a way of thinking and acting that this thesis has explored as restrictive. Machines are considered to be work more and more independently of us. Humans no longer interact with computers, but instead are initiators of processes and systems of automation.[26]

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25. Scott, *Seeing Like a State*, p. 349.

26. Simondon notes critically that technical perfection is commonly considered proportional to automatism. He problematises that a purely automated technology is 'completely closed in on itself in a predetermined way of operating' (p. 17-18). Instead, for Simondon, technical perfection should not be a matter of an increase in automation or determination, but, on the contrary, of an increase in indeterminacy. The margin of indeterminacy opens up the machine to human intervention, facilitating a relationship of cooperation rather than opposition.

Indeed, the Israeli-American computer scientist and leading AI researcher Judea Pearl argues for the way causal reasoning could provide machines with human-level intelligence – to 'communicate in our mother tongue – the language of cause and effect'.[27] Artificial intelligence even amplifies causal reasoning to a point where the very accountability of the programmer, who called those 'intelligences' into being, is questioned. Again, this amplifies the duality between human and machine and the human fear of the machine venturing off their own path. And even beyond that, making people 'doubt their relevance to creativity'.[28] It feels like an important moment not only to question the way that machines affect our lives, actions and our way of thinking, but also to explore ways in which they may enrich and open up new ways of being in the world.

The references in the context of the discussion of technology in this thesis are sources that were written ten, some even twenty, years ago.[29] These discourses emerged from a completely different era, considering the speed of technological developments in recent decades. Judged by the date they were created, they may seem outdated and unable to contribute to a contemporary discussion.

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27. Judea Pearl, *The Book of Why: The New Science of Cause and Effect* (UK, USA: Penguin Books, 2018), p. x. On another note, intelligent machines, created to 'mimic the problem-solving skills of a human being' directly counters the endeavour of this research to cultivate an approach to problems which consists of resisting solutions. (Arthur I. Miller, *The Artist in the Machine: The World of AI powered Creativity* (Cambridge, London: The MIT Press, 2019) p. 38.)

28. Margaret Boden, *The Creative Mind: Myths and Mechanisms* (1990), cited in Arthur I. Miller, *The Artist in the Machine,* p. 271.

29. As an example, Chun wrote her book *Programmed Visions* in 2011, Turkle's book *The Second Self* was published in 2005, Torvald's *Just for Fun* even earlier, in 2001.

Yet they imply a relevance and discussion that appears to have faded in recent years, specifically because it seems as though the discourse has moved on from thinking about the human interacting with the machine to how the machine is automated, thinks, creates, becomes intelligent, without the human. While the fields of user-experience design have become independent disciplines, Shneiderman's principles of direct manipulation from the 1990s remain uncontested, taken as the 'law of the computer'. However, this thesis suggests that there is so much more to say, especially from the perspective of a designer working with these technologies, from a practical, as well as a creative, perspective.

If the way we interact with computers influences the way we interact with and perceive the world, a different conception of interactivity may point to a reverence for, rather than compensation for, the world's indeterminacy. This thesis has suggested that the aim of design and interactivity to improve the human condition may not necessarily be synonymous with reinforcing the human in their position of power, control and mastery. From a contemporary point of view, an improvement of the human condition may imply a consideration of the human in relation to and on an equal footing with the world. Here, the role of the visual communicator is no longer to support humans in doing the things they can already do, and think in ways they can already think, but instead to create situations that break with routines, that divert thought and action from their automated, and thus passive, path.

The practice of programming in context of this PhD research became a means to open, rather than bridge, a gap between human and computer. The programmer's position of mastery is not exploited as a tool to reaffirm their power, but instead is employed only to create spaces of mutual engagement and negotiation. This is not an argument about making the human small, diminishing their potential.

On the contrary, as this thesis has suggested, it is the dissonant, the gap between action and reaction, that allows for creative responses to the world, beyond utility and consumerism. It is moments of nonsense, illegibility, unintelligibility, of stammering and stuttering that create encounters beyond the already known. It is a challenge to, rather than an affirmation of, human action and thought that can reveal potentialities beyond the confines of habit, repetition and automated execution. It is where interaction creates gaps in knowledge, disrupts causal inference, and thus maintains human beings in a state of physical and intellectual tension. It is where communication is not about bridging a gap or about assimilation, but about maintaining a gap, about discovering difference as an opportunity to learn continuously, rather than know. It encourages humans, instead of consolidating their position as an all-knowing agent, to strengthen them in their ability to be responsive and sensible, to adapt, to learn and create in a confrontation with the novel.

Human-centricity may be redefined as giving the human being the space to become and to change in an encounter with the computer's nature, as opposed to moulding them closer to their own nature and potential flaws. It nurtures a responsibility for the world we live in and a pleasure of learning with that world: a world where knowledge and intelligence is not based on constants, generalisation and an ability for causal inference, but on continuous engagement and creation. At the same time, this approach should not be understood as countering the necessity of causal or rational thought, nor as countering Enlightenment thinking. The human urge to generalise and universalise remains a necessary condition for humans to plan ahead and apply means to an end.

Rather, this thesis suggests that the binary opposition between humans and the world, of the human governing nature, may be limiting. The uncausal deters us from becoming too comfortable, too settled in our position in this world.

It suggests a scenario where humans are no longer agent, determining how the world comes to be, but instead engage in a continuous exchange with the world around them, in order to reveal a sense of becoming, of co-creation, that should guide our journey on this planet.

The incipient question of this research, investigating the value of asemic writing for visual communication practice, grew beyond its initial endeavour. A question of meaning became about an encounter with, rather than a dismissal or an explaining away, of the paradoxical and nonsensical. Through introducing the concept of uncausality, I hope that this thesis will play a small part in the endeavour to invigorate rather than dismiss practices that encourage people to leave the protective umbrella of causality, determination and disciplinarity: to cultivate a way of thinking and acting that encounters and opens up, rather than closing down, the world around us. Here it should be noted, that this PhD research offers just one possible rather than an ultimate way of approaching such endeavour. It is not the role or claim of this thesis to be exhaustive. It is necessarily grounded within my background and practice as well as the relatively small word count of a PhD by practice at the RCA.

Engaging in an uncausal practice is less about adapting the concept of uncausality as a given and more about actively engaging with and participating in the creation of the concept: that is, in its mutation and invention across disciplines and contexts. It is a practice which is not only about the production of uncausality, but equally about an encounter and involvement with the uncausal: both establishing and experiencing a consciousness for the potentiality, strength and pleasure of becoming, of pushing a discipline's boundaries, of speculating about alternative ways of thinking and acting, of changing through an interaction with the world and with the computer. It is a practice that is not about mastery, but about a continuous challenging of its boundaries. A practice that is not

confined by its definition, by its rights and wrongs, but whose terminology is enabling. A practice that keeps the human mind elastic in a confrontation with a world in the process of change.

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