



MONASH University

Structuring Potentials: Sculpture as Apparatus

Sophie Claire Takách

Bachelor of Fine Arts (Hons 1st class) Monash University

An exegesis submitted for the degree of Master of Fine Art at

Monash University in 2019

Faculty of Art, Design and Architecture

© Sophie Takách (2019). Except as provided in the Copyright Act 1968, this exegesis may not be reproduced in any form without the written permission of the author.

I certify that I have made all reasonable efforts to secure copyright permissions for third-party content included in this exegesis and have not knowingly added copyright content to my work without the owner's permission.

TABLE OF CONTENTS

Abstract	ii
Statement of Authorship	iii
Acknowledgements	iv
List of Figures	v
Introduction	1
Chapter One:	
Apparatus as bridging device: directing attention towards potential disparity	19
Chapter Two:	
The performative sculptural apparatus: interacting with potentials	28
Conclusion	41
Works cited	50
Appendix	53
Bibliography	68

ABSTRACT

This research project investigates the capacity of sculpture to act as an apparatus that can make imperceptible forces perceptible to an audience. When understood as an apparatus, the task of sculpture is to bring the subtle, often imperceptible, forming exchanges between material bodies to the awareness of those who encounter them. These forming exchanges are an expression of information as recounted by Gilbert Simondon, a structuring force that alters the positions and perspectives of those encountering the artwork. I draw on the philosophy of Simondon and his notion of information as a structuring force that modifies or alters bodies in response to changing conditions to explore sculptural processes as active processes of exchange.

The artworks of my practice are mainly sculptural objects that relate to the scale of my body; these artworks are generally made public within installations or as performative objects that are offered for handling during conversation. Developing sculptural apparatus that are able to extend this performativity without my direct presence was a catalyst for this research. Materials and processes have been selected for this project for their potential to respond to variable pressures and transmit or hold tension. Close examination of how imperceptible structuring forces of information operate on these malleable compounds and their subsequent interactions with other bodies makes evident how information is contained, exchanged and transmitted through sculptural apparatus.

Through an investigation into the work of artists such as Aram Bartholl, Cameron Robbins and Joyce Hinterding, I identify complementary modes in which sculpture can produce these forming exchanges. I focused on my encounter with the apparatus in Bartholl's artwork to understand how it elevates imperceptible psychosocial forces related to the production and consumption of energy. I examined *Creek thing* (2017) by Robbins to consider how sculpture can hold tension and transmit forces beyond the immediate performative action of a living body. In contrast, Hinterding's interactive force drawings enact both bodily orientations and make imperceptible forces audible through an interactive encounter between the observer and conductive materials. These explorations have allowed me to reconsider the notion of information through sculptural forming by drawing on Simondon's understanding; alongside production of sculptural apparatus that direct attention to the imperceptible shaping forces of encounters.

DECLARATION

This exegesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this exegesis contains no material previously published or written by another person, except where due reference is made in the text of the exegesis.

ACKNOWLEDGEMENTS

I would like to express my utmost gratitude to my supervisor Dr. Terri Bird, whose unfailing patience and generosity in all matters has made this research possible. Not only in her direct support of my writing and creative practice, but also for the long conversations where my rambling enthusiasm was gently directed into productive channels through her insightful questioning. Thank you for teaching me how to write, and how to be more at ease with uncertainty.

I would also like to thank Dr. Spiros Panigirakis for his considered feedback on my creative practice, and for giving me the additional perspective (and sense of humour) I needed to keep me on track.

Special thanks go to Megan Sheehy for reading my first draft, your enthusiasm and clear eyed criticism pushed me to clarify my ideas and move past doubt.

The wonderful editor and artist Jennifer Choat completed the final copyediting, proofreading and typesetting of this exegesis. Thank you for making the last leg so much less of an ordeal.

Of all the delightful and helpful people I have met during my time at Monash; I would like to particularly thank both Mairi-Rose MacLeod and Elena Galimberti for your endless support and kindnesses.

I am also grateful to all those who have been so generous with both their time and interest in my ideas in the studios, and especially to Kara Baldwin for being an extra pair of hands when I most needed them. Thanks also go to Jack Balfour for taking the time to critique my throwing and demonstrating his expertise.

And to my spouse Chris O'Neill, I cannot thank you enough for holding on tight during the obsessions and absences that have made up these last few years, for being my technical support, listening to all of my wild proposals and continually risking life and limb to make me laugh.

This research was supported by an Australian Government Research Training Program (RTP) Scholarship.

LIST OF FIGURES

Figure 1. Sophie Takách, <i>evert manifold (80cc)</i> , 2014, bronze, 14 x 5.2 x 4cm.	13
Figure 2. Sophie Takách, <i>handlings</i> , 2016, bronze, guided handling, dimensions variable.	14
Figure 3. Sophie Takách, <i>handlings</i> [casting positives], 2016, Pinkysil Putty.	15
Figure 4. Aram Bartholl, installation view of <i>5v</i> photographed at 14:43 on June 26, 2017. Skulptur Projekte Münster, Münster.	21
Figure 5. Cameron Robbins, installation view of <i>Creek thing</i> (2014) exhibited in FLOW 21 April–21 May 2017, Counihan Gallery, Brunswick. Photographed 13 May 2017.	23
Figure 6. Joyce Hinterding, installation view <i>Aura</i> , Breenspace, Sydney, 2009, in Davis, Anna, and Douglas Kahn, <i>Energies: Haines & Hinterding</i> . (The Rocks, New South Wales: Museum of Contemporary Art Australia, 2015), 97.	31
Figure 7. Joyce Hinterding, <i>Wunderlich curves</i> (graphite) from <i>Aura</i> Series, 2009–15, in Davis, Anna, and Douglas Kahn, <i>Energies: Haines & Hinterding</i> . (The Rocks, New South Wales: Museum of Contemporary Art Australia, 2015), 96.	32
Figure 8. Sophie Takách, <i>fluid balance bodies</i> , 2018, dimensions variable, porosity test.	35
Figure 9. Sophie Takách, <i>fluid balance bodies</i> , 2018, soaking bovine rawhide.	37
Figure 10. Sophie Takách, <i>fluid balance bodies</i> , 2018, testing membranes under tension.	39
Figure 11. Sophie Takách, <i>fluid balance bodies</i> , 2018, force markings on clamping apparatus.	44

STRUCTURING POTENTIALS:
SCULPTURE AS APPARATUS

SOPHIE TAKÁCH

MFA

MONASH ART DESIGN & ARCHITECTURE

2019

INTRODUCTION

This research project began with the aim to produce artworks that respond to the variable pressures and constraints of their surroundings and generate perceptual connections for those who encounter them, thereby altering the trajectories of the observers' subsequent thoughts and actions. In considering what it means for a sculpture to respond to its surrounding conditions, my research concentrated on both the forming processes of making a sculpture and the systems of exchange that take place once the artwork is made public. These imperceptible systems of exchange are the mechanism by which all forming takes place. This is not only within the production of sculptural artworks but within any structuring of matter from the geology of erosion and sedimentation to the organisation and entropy of living organisms. The uneven terrain of the current global social and political landscape also influenced the flow of my enquiries.¹ Questions of materiality, presence, interactions and participation have become more prevalent in artistic discourse.² Our everyday experience increasingly revolves around screens and technological devices with digitised or remote modes of communication and connection. These recent discussions around materiality seek to act as a corrective to the privileging of human over non-human, but they run the risk of collapsing the specificity of materials into a vaporous unification of everything that does not relate to the heterogeneity of my own lived experience.³ I would argue that this power of an encounter to alter and be altered in turn is particularly evident with sculptural artworks

¹ Here I refer to the pressing need to resolve both sustainable practices of resource consumption in order to minimise the current devastating impact of human activity on the global systems, as well as the unequal distribution of wealth and access to those resources.

² There are too many divergent arguments to list here, however the main texts that encompass the breadth and diversity of such thinking include: Christoph Cox, Jenny Jaskey, and Suhail Malik, eds., *Realism Materialism Art* (Annandale-on-Hudson, NY Center for Curatorial Studies, Bard College Berlin: Sternberg Press, 2015), Emily Apter et al., "A Questionnaire on Materialisms," *October*, no. 155 (Winter 2016), Rick Dolphijn and Iris Van Der Tuin, *New Materialism: Interviews & Cartographies* (Ann Arbor, Mich.: Open Humanities Press, 2012). Diana Coole and Samantha Frost, eds., *New Materialisms: Ontology, Agency, and Politics* (Durham & London: Duke University Press, 2010).

³ Explicitly vitalist accounts such as Jane Bennett's *Vibrant matter* in which poetic depictions of material agency within inanimate objects dominate the new materialist field. I acknowledge they are an attempt to reconsider the agency of non-human matter, but I feel that the degree by which Bennett emphasises the autonomy of materials shuts down dialogue between more pragmatic viewpoints. Jane Bennett, *Vibrant Matter: a Political Ecology of Things* (Durham N. C.: Duke University Press, 2010).

due to their tactile presence within the same space as the observer's body.⁴ The making of sculpture can also recall the physicality of bodies, both in the operation of forming and in the perceptual constructions we make as we encounter things in the world.⁵

A sculpture is well positioned to operate at a visceral level for an observer when it relates to the scale and corporeality of a human body.⁶ Sculpture already invites bodily participation in relation to the pathways it creates within a room.⁷ To view the sculpture from all sides requires the mobilisation of the viewer's body as they move around, navigating the spaces offered within the specific boundaries of the gallery.⁸ Sculpture is extended spatially, offering no single privileged standpoint from which to view the artwork.⁹ However, framing sculpture as being one thing or another is not the focus of this research.¹⁰ Instead, I approach sculpture through its operations of forming while taking shape and how these particulars go on to shape others. Engaging with sculpture within an encounter might guide the observer to one particular viewpoint from which specific alignments or correspondences become apparent.¹¹ The correspondences between human bodies and sculptural bodies during an encounter can redirect attention to the other interactions unfolding within their surroundings. Encounters with a sculptural apparatus amplify what is otherwise imperceptible, drawing attention to slight, unnoticeable exchanges of forces that usually fall below the threshold of everyday

⁴ Hal Foster, "The Un/Making of Sculpture," in *Richard Serra*, ed. Hal Foster and Gordon Hughes (Cambridge, MA: MIT Press, 2000), 179-80.

⁵ Hans Haacke, *Working Conditions: the Writings of Hans Haacke*, ed. Roger Conover, Writing Art (Cambridge, MA: MIT Press, 2016), 10.

⁶ This does not mean the sculpture has to be figurative or the size of a human body. Consider the formal variance between Richard Serra's monumental Corten steel installations, that reconfigure space and human movement, to that of Louise Bourgeois's latex forms. The scale and materiality are widely divergent, yet both develop a relationship to the human body as they engage with spatial relations of embodiment, producing an awareness in the viewer of their own bodies. Eva Grubinger and Borg Heiser, eds., *Sculpture Unlimited* (Berlin: Sternberg Press, 2011), 15; Briony Fer, "Objects Beyond Objecthood," *Oxford Art Journal* 22, no. 2 (1999): 31-32.

⁷ Foster, 178.

⁸ In reference to non-geometric shapes specifically. Morris suggests that for regular solids such as cubes and rectangles, it is possible to apprehend the entity of the form from a single perspective. Robert Morris, *Continuous Project Altered Daily: the Writings of Robert Morris* (Cambridge, Mass.: MIT Press, 1993), 6.

⁹ *Ibid.*, 14.

¹⁰ Engaging with the ubiquitous discussion of what sculpture is and isn't feels like stepping off a cliff. My embodied engagement with sculptural processes of making means that regardless of how dematerialised or objectified sculpture is, it is for me inescapably embodied. Pertinent resources include: Michael Fried, *Art and Objecthood: Essays and Reviews* (Chicago: University of Chicago Press, 1998); Rosalind Krauss, "Sculpture in the Expanded Field," *October* 8, (1979); Lucy R. Lippard, *Six Years: The Dematerialization of the Art Object from 1966 to 1972* (Berkeley: University of California Press, 1997).

¹¹ Susan Best, "Elemental Constructions: Women Artists and Sculpture in the Expanded Field," *Australian and New Zealand Journal of Art* 1, no. 2 (2000): 147-148.

awareness. In the context of my creative practice, informing exchanges are integral to forming both living (the artist or observers) and the non-living bodies which are the sculptural objects. The intensity of any encounter is linked to the material presence of the artwork and the particular experience of being situated in relation to structures that are positioned within the same volume of space.

My thoughts about sculpture, and sculptural installation, have been shaped through my own encounters with artworks that provoked closer attention. One particular artwork that initiated a difference in my thinking was Hans Haacke's *Condensation cube* (1963-5). The work invoked both the physical processes of evaporation and precipitation within a 'closed system', yet still connected to its surrounding environment as a responsive non-living organism.¹² *Condensation cube* brings into focus the controlled environment of the museum space and the imperceptible exchanges of information that drive physical processes.¹³ My engagement with the encounter was particularly triggered by the ways in which the artwork exceeded formal concerns such as line, shape and composition yet remained appreciable on an aesthetic level.¹⁴ My embodied presence in relation to the cube was registered, however slightly, by a difference in the ambient temperature of the room created by the additional heat produced by my metabolism. The subsequent awareness of this brought the impact of my presence and movements to my attention.¹⁵ Both my body and the cube occupied the same space only for a short time, but the resulting perceptual shift resonates with me still. The result of my brief encounter shifted my sense of the potential of artworks to result in perceptual shifts for those who encounter them.

Initially, the immanent philosophy of Gilles Deleuze and Felix Guattari provided a framework for my understanding and engagement with the productive intersection of art, science and philosophy.¹⁶ I then became aware of the work of contemporaneous French

¹² Haacke, 48.

¹³ Haacke's socio-political artworks are an extension of systems based enquiries. Ibid., 50-51.

¹⁴ Haacke discusses how the visual appearance of his artworks follow their systems and functions in an interview with Jeanne Siegel. Morris, 35.

¹⁵ Haacke's *Condensation cubes* followed earlier works that explicitly required activation by a person. He considered the condensation cubes to function independently from human interaction, relating instead to their surrounding conditions. However, I would argue that they still responded to the presence or absence of human activity in that they were placed within a controlled built environment and are affected by both the intermittent presence of people and as a result of human activity. Haacke, xiv.

¹⁶ Especially to Deleuze's notion of art as a capture of forces, making them perceptible. Gilles Deleuze

philosopher Gilbert Simondon, whose ideas influenced the development of Deleuze's notion of difference.¹⁷ In her book *Artmachines*, Anne Sauvagnargues provides a compelling account of the often uncited links between Deleuze and Simondon which led me to conduct a close examination of Simondon's theories in order to understand the technical and sculptural operations behind my methodologies better.¹⁸ The scope of Simondon's project is no less than a complete reorientation of the hylomorphic schema, locating the operation of individuation before the genesis of subject and object.¹⁹ For Simondon, a body is not a fixed identity but a continual emergence of shifting potentials that is linked to a pairing of sensation and tropism.²⁰ It is not a matter of the living body adapting to the environment but the meeting of two dynamic, responsive systems in disparity, producing an internal resonance that enables change.²¹ Simondon's notion of individuation, potential disparity and information leading to the shaping of entities are key ideas that I explore in relation to sculptural forming throughout this exegesis.

Simondon's connection with scientific methodologies and the use of practical examples such as the workings of turbine generators and signal broadcast modulations align closely with my interest in the technical aspects of making. My creative practice combines industrial fabrication techniques with the hand made, responding to the

and Felix Guattari, *What is Philosophy?*, ed. Lawrence D. Kritzman, trans., Hugh Tomlinson and Graham Burchell, European Perspectives (New York: Columbia University Press, 1994), 182.

¹⁷ Simondon completed his PhD dissertation in philosophy but also studied physics, mineralogy and psychology. His practical engagement with science and technology combined with his studies in social psychology makes his writing particularly suited to my own practice due to my concerns with technical operations of sculpture, and understanding how things work in real world complex systems rather than idealised hypothetical situations. Nathalie Simondon, "Gilbert Simondon, Biography, Some Reflections on the life and work of Gilbert Simondon," Gilbert Simondon, accessed December 09 2017, <http://www.gilbert.simondon.fr/content/biography>.

¹⁸ Anne Sauvagnargues, *Artmachines*, trans., Suzanne Verderber and Eugene W. Holland (Edinburgh: Edinburgh University Press, 2016), 62. Elizabeth Grosz also details the links between Deleuze and Simondon and notes that Simondon was working on the problem of individuation as early as 1952, which is prior to Deleuze publishing his first book on Hume. Elizabeth Grosz, "Simondon and the Preindividual," in *The Incorporeal: Ontology, Ethics, and the Limits of Materialism* (New York: Columbia University Press, 2017), 169.

¹⁹ Hylomorphism refers to the separation and privileging of form (morphe) over matter (hyle) since Aristotle, in which matter is conceived as passive, unformed and essentially feminine, whereas form is considered active and masculine, imposing its structure on the inert matter. Form in this scheme is the primary cause, or genesis of individuals but then does not explain how form and matter come into being themselves. Grosz, 170-174.

²⁰ Gilbert Simondon, *Being and Technology*, trans., Arne De Boever (Edinburgh: Edinburgh University Press, 2012), 102.

²¹ Gilbert Simondon, "The Position of the Problem of Ontogenesis, translated by Gregory Flanders," *Parrhesia* 07, (2009): 9.

tension between the limits of my hand eye coordination and mechanised processes. Simondon traced the alienation of workers not to ownership and factory production, but rather to the disconnect between the user and tool as a failure of being able to repair and maintain those tools.²² My engagement with scientific methodologies and material processes also led me to draw on a range of historical sculptural practices, including systems art, arte povera and mono ha.²³ Each offer nuanced ways of incorporating a lucid sensitivity to materials and systematic methodologies to generate connections with both process and site further.²⁴ I am interested in sculptural practice as an investigation into methodology and processes, not in appearances, resemblances or likenesses. For me, sculptural practice is a way of knowing through the tactile encounters of making. Jack Burnham's *Systems Esthetics* was an early formative text that guided my understanding towards the potential of sculpture to connect to systems within a social and physical framework and to think of sculpture as active processes that extend beyond the physical boundaries of the object.²⁵ However, systems art methodology, taken literally, contains a subtle misdirection. Equating the art concept to software and the physical structures (the art object) as hardware creates the sense that ideas can be indiscriminately applied to any configuration of material; the meaning is separate from the materiality.²⁶ While the analogy appears to be apt, the more insidious corollary is that the hardware is anterior (and inferior) to the software (the idea or concept of the artwork). This emphasis on the ideas privileges the concept at the expense of the material energy exchanges that systems art promotes.²⁷ It also discounts the resistance and potential of specific materials to alter outcomes and processes.²⁸ The processes of sculpture that I engage

²² Simondon was also concerned about the consequence of human activity in his time, and in developing his theory he was addressing the alienation and subsequent 'idiocy' that leads humans to waste and pollute. Pascal Chabot, *The Philosophy of Simondon: Between Technology and Individuation*, trans., Aliza Krefetz (London: Bloomsbury Academic, 2013), 123-124.

²³ Particularly those of Giuseppe Penone, such as *Essere fiume (Being the River)* in which Penone extracts a river rock and uses a slab of geologically analogous stone to reproduce the forces that shaped the tumbled river rock. Penone discusses this artwork in an interview for Apollo Magazine <https://www.apollo-magazine.com/force-of-nature-interview-with-giuseppe-penone/> (accessed 12 Jan 2019)

²⁴ Alex Potts, "Disencumbered Objects," *October* 124, (Spring 2008): 171-172.

²⁵ Systems art thinking leans on Ludwig von Bertalanffy's General System Theory to expand the boundaries of the art object. "Where the object almost always has a fixed shape and boundaries, the consistency of a system may be altered in time and space, its behavior determined both by external conditions and its mechanisms of control." Jack Burnham, "Systems Esthetics," in *Esthetics Contemporary*, ed. Richard Kostelanetz (Buffalo, New York: Prometheus Books, 1978), 164.

²⁶ This has been comprehensively challenged by McLuhan. McLuhan, Marshall. *Understanding Media: the Extensions of Man* (Reprint, Cambridge, Mass.: MIT Press, [1964] 1994), 9.

²⁷ Marga Bijvoet, *Art as Inquiry: Toward New Collaborations between Art, Science, and Technology*, ed. American University Studies 32 (New York: Peter Lang, 1997), 83.

²⁸ Even purely conceptual artworks involve materiality in some form, such as when a set of instructions are

with are situated within my broader concerns about the operation of physical forces and their relation to the exploitation of energy and resources. The active capacities of my body have directed my creative practice towards sculpture as a means to explore the forming exchanges of interactions, aiming to generate artworks that perturb habitual modes of perception and consumption.²⁹

When I am referring to forces in this exegesis, I am considering forces in the scientific sense as interactions.³⁰ Defining electricity as separate and independent to other types of forces such as heat or motion disregards the common operation of molecular interactions in exchanges of matter and energy. As such, force is not a separate, intangible property that can be isolated from the interactions between particles, masses and bodies. It is only through interactions that forces emerge, and once the interaction ceases there is no force. Forces are only perceptible in material bodies. This process is observable as differential pressures between entities, the dynamic stimulus of pressures and constraints interacting with that specific body. Consider a draft in a room; a movement which is the result of a complex interaction between the air molecules within the room, the intervening apertures of doors or windows, and a difference in pressure or temperature of the air molecules outside the room. This physical interpretation of force as an interaction does not entirely exclude other ways of thinking about force; however my research defines force in terms of its relation to energy and work.³¹

typed or written, or verbally communicated in some way. These elements can be co-opted by the market as commercial product just as easily as object based works. See Lippard, 263.

²⁹ It seems to me incredibly important to consider resource use against the backdrop of late capitalism and sustainable human development. The individual responsibility and actions of any one of us might appear insignificant against the scale of humanity but within the closed loop of global resources any activity has implications. Understanding the impact of any material or energy use needs to factor into what is gained for what cost. Olafur Eliasson's *Ice Watch* (2014–2018) takes blocks of glacial ice and transports them to cities where people can closely observe the melting ice at an estimated cost of over 35 tonnes of CO₂e. However, Eliasson considers this a worthwhile cost considering the number of people who may be reached by the work. Olafur Eliasson, "Ice Watch" <https://olafureliasson.net/archive/artwork/WEK109190/ice-watch> (accessed Dec 2018).

³⁰ I'm using a physics definition of forces, viewed not as independent properties (gravity, electricity, magnetism) but as interactions between particles. In an everyday understanding of force, we would differentiate, say, gravity as a single kind of force separate from electricity as an electromagnetic force. However, as I understand it, all 'kinds' of forces are reducible to interactions. The apparent difference emerges due to the entities/bodies that are involved in the interaction. As the development of physics progresses, the 'different' forces are being combined—initially we needed separate explanations for the atomic strong and weak forces, and also for electromagnetic and gravitational forces. A single theory that combines everything excepting gravity is currently being verified, and there is a concerted effort being made to develop a single TOE (theory of everything) that would combine the very massive with the very small (black holes and the quantum realm). Bijvoet, 65.

³¹ Consider the difference between physical forces of physics and force as defined and utilised by Foucault. This does not strictly align with my use of force in the physical sciences sense, yet there are corresponding

The sculptural apparatus as defined within this research project both lifts an aspect of imperceptible force from below the usual threshold of awareness and also shapes and defines the limits of the shared milieu for the involved bodies, both sculptural and living observer.³² This viewpoint enables a reconsideration of the significance of orientation within the process of sculptural forming. Elaborating how sculpture can be considered an apparatus, the following chapters investigate how physical and psychosocial forces orientate bodies and influence individuating beings.³³ This takes into account how sculpture challenges learned, habitual responses by being the shock, or germ to the individuating bodies that encounter it.³⁴ The first component of this elaboration is a discussion of the apparatus as an instrument for perception. This demonstrates how an encounter with a sculpture directs an observer's attention towards an imperceptible potential disparity within its milieu. The first chapter focuses on the apparatus as it bridges potential difference and produces change within a context of flows and potentials. The examples that support the argument include an extended analysis of my encounter with a sculptural apparatus of the artwork 5v by Aram Bartholl at the 2017 Skulptur Projekte Münster and one of Cameron Robbins's drawing machines titled *Creek thing* (2017). My analysis of these artworks will focus on how the apparatus produces awareness of an imperceptible shaping exchange by producing an interface or meeting of thresholds of potential disparity within its milieu.

The second chapter shifts the discussion to the performativity of sculptural apparatus as it orientates bodies and amplifies an imperceptible aspect of our surroundings. This chapter continues to develop an expanded understanding of bodies and interactions and elaborates how the process of orientation takes place within bodies and in relation to

elements in the way Simondon applies his notion of individuation to the collective in the psychosocial terrain. See Michel Foucault, "The Confession of the Flesh" [Interview, 1977], in *Power/Knowledge: Selected Interviews and Other Writings*, ed. Colin Gordon (Brighton, Sussex: Harvester Press, 1980), 194.

³² Simondon's term 'milieu' encompasses the complex collection of interactions affecting a body. The interactions can be materials, forces, other bodies (which are also in a concurrent forming process in relation to their own associated milieu); all connected by a nodal point that is the emerging constituted being. A body is, therefore, at the centre of an associated influence of interactions that define and shape that body. If a milieu is the influx of informing circumstance encompassing everything that registers on the forming body it cannot be considered as a separate or generic space. There is no singular milieu, or milieu of general circumstance, only an associated milieu to a specific body. Think of overlapping spheres of influence, not smooth like a balloon with a clearly demarcated edge, but amorphous permeable fields that are continuously modulating systems. At the centre of each sphere of influence, at the point that is in balance between the shifting forces of information, is the constituted being—a body. Muriel Combes, *Gilbert Simondon and the Philosophy of the Transindividual*, ed. Brian Massumi and Erin Manning, trans., Thomas LaMarre, Technologies of Lived Abstraction (Cambridge, Massachusetts: The MIT Press, 2013), 4.

³³ Chabot, 20-21.

³⁴ Ibid., 83.

an associated milieu. My analysis of Joyce Hinterding's electromagnetic apparatuses draws out the interaction of forces leading to performative movements, both on the macroscopic scale of human bodies and on the molecular through sonic vibrations. Chapter two continues with an examination into the operation of forming within a recent work from my creative practice, *fluid balance bodies* (2018–2019), substantiating processes that orientate and connect both molecular and macroscopic bodies. A configuration of this artwork is presented alongside this exegesis as the outcome of the research project, and the chapter discussion will follow the development of the components through a granular observation of the shaping forces of sculptural forming. This will provide an account for how the forming of sculptural components took place alongside a corresponding development of my methodologies and research parabolic.

In this research project, I focus on the aspects of Simondon's notion of individuation that touch on how the structuring of potential can describe processes of sculptural forming. Accounting for these complex ideas requires a close examination of specific key terms of Simondon's; individuation (of bodies and their associated milieu), information, and potential disparity. I also create a propositional account of sculpture as sculptural apparatus, based partially on Karen Barad's apparatus but also in the everyday sense of the term, namely as both preparatory activity and the specialised equipment or mechanism to bring about an investigation.³⁵ The remainder of the introduction will begin to tease out the key terms of my research starting with my positioning of information as structuring exchanges.

Interactions and information leading to individuations

My research draws primarily on the philosophy of Simondon's theory of individuation as it describes the way information drives the structuration of individuating bodies.³⁶ The active informing operation of information is an interaction that leads to a shaping or forming action on all entities involved in the interaction.³⁷ Encounters with sculptural apparatus take place between living bodies of observers and non-living

³⁵ The etymology of apparatus leads back to its Latin sense of preparation, 'to make ready'. The Oxford English Dictionary links the word to both instrumental and social mechanisms. The word apparatus captures the sense of instrument in measuring or observing, and tool for enacting alteration or intervening between. Oxford English Dictionary, "apparatus, n.", *Oxford University Press*, OED Online, accessed December 01, 2018, <http://www.oed.com.ezproxy.lib.monash.edu.au/view/Entry/9508?redirectedFrom=apparatus+>.

³⁶ Simondon, "The Position of the Problem of Ontogenesis, translated by Gregory Flanders," 5.

³⁷ Ibid., 7-8.

bodies of sculpture.³⁸ Interactions can be subtle and are not limited to touching, holding or moving objects in the habitual sense of the word. An interaction can range from a single photon being absorbed by a retina, or it can be the slight exchange of kinetic energy that accompanies a change in relative temperature. These interactions consist of structuring exchanges of information. Information for Simondon is not a signal, message or series of bits in binary data; rather it is a process by which one entity is affected or modulated by another through a process of interaction and exchange.³⁹ This interaction can include what is generally referred to as ‘content’ or ‘meaning’. However, in Simondon’s sense of information exchange, information is ‘tension between two disparate realities’ leading to structuration of individuating beings, a stabilisation of a more or less temporary nature.⁴⁰ Instead of thinking of information as a code that is impressed on the inert matter (taking on a form) it is instead the modulation of form and matter in a concurrent forming.⁴¹

³⁸ The term body or bodies in the common sense of the word encompasses both the human body and also large aggregates of similar matter, such as clay and water. It is not the body, a kind of universal template that covers all types of bodies, but a body, a specific aggregate of matter that can be described as a consolidated mass of sustained coherence. Therefore, a body can be a human body in the common use of the word and also refer to other masses, from an aggregate of clay to a chunk of metal. Bodies in this sense include the sculptural object and also the components before they are assembled or joined into a larger structure. This is an expanded understanding of the term body or bodies, referring to any consolidated being of any level of internal complexity. This is not to imply all bodies can be directly equated with each other. These differing bodies have their own capacities and durations, nonetheless I aim to uncover the parallel processes that direct their formation and affect their subsequent stability. I think of a body as a sustained coherence—body as a mass. The macroscopic properties of a body emerge due to strong and weak interactions at the microscopic level.

³⁹ Information passes between entities as exchanges or interactions. In the case of electromagnetic energy, the interaction comes from a stream of particles, known as photons. Other exchanges involve the transmission of motion, as when heat moves from one body to another, or of the interaction between atoms on a microscopic scale experienced as resistant solid surfaces—what is generally thought of/experienced as an object. Living bodies encounter sculptural objects through physical touch, sound, sight, taste and smell. The tangible presence of a sculptural object is experienced by the encountering bodies via these interactions, conducting transmissions of informing force that lead to a shift in the observing body. Direct physical contact in the everyday sense (such as touching or holding) is actually a macroscopic interpretation of tiny exchanges between molecules, and sight is just as reliant on direct interactions between particles when you realise that vision is a perception that arises from the absorption of a reflected photon that has travelled from one surface to the retina. Every encounter is associated with a chain of successive interactions between bodies.

⁴⁰ The key aspect of Simondon’s notion of information is that it can not be considered a separate property or thing. Information is an operation, a shaping that leads to individuation. “Information is therefore a primer for individuation; it is a *demand for individuation*, for the passage from a metastable system to a stable system; it is never a given thing. There is no unity and no identity of information, because information is not a *term*; it supposes the tension of a system of being in order to receive it adequately.” (emphasis in original) Simondon, “The Position of the Problem of Ontogenesis, translated by Gregory Flanders,” 9-10.

⁴¹ Molecules affect one another by passing on momentum or exchanging information. For every action, there is an equal and opposite reaction. This understanding of the basic mechanism by which all force is transmitted in terms of classical, Newtonian physics still accurately describes everyday experience at the scale of human bodies. While quantum theory has been attractive for many artists, the rules of the subatomic are specific to that scale—they do not influence changes or operations at the scale of human

For Simondon, any notion of an ideal or transcendent form is replaced by the structuring force of information.⁴² He rescues information from both the form/matter bind and the limited sense of information theory or cybernetics which posits information as signal separate to the medium.⁴³ Rather than taking a singular position, which relies on a prior definition of ‘information’, Simondon looks to define the passage of information as the modification of both constituted being and its associated milieu.⁴⁴ Chabot makes this clear in his summation of Simondon’s individuation: ‘To exist is to be connected’.⁴⁵ Through his examination of technical processes, Simondon develops a new analysis of the relation between form and matter where information is not a separate signal or content, but the structuring force of interactions between bodies and milieu. Simondon uses the analogy of brick making, which sees the meeting of clay and mould as a brick is formed, as the simplest example of individuation. Extending his theory, Simondon argues that instead of being a classic example of pure form being imposed onto indeterminate matter, the brick and the clay are themselves undergoing changes during the process that alters both.⁴⁶ Simondon closely observes that both the mould and the clay are already *prepared* forms of matter with suitable capacities of malleability, plasticity (the clay) and rigidity (the wooden mould).⁴⁷ The meeting of forces at a threshold—the exchange of information—is what brings matter and form together.⁴⁸ A process of exclusion and aggregation takes place on the clay body before it encounters the mould.⁴⁹ Therefore, any component matter has already undergone a

perception. Yet the degree at which an effect is easily perceptible might seem to imply that exchanges of molecular motion only holds true at a molecular level. However, the heat I sense in the palm of my hand when I clasp another hand is just this; molecular kinetic energy transmitted directly into the molecules of my skin. Thresholds such as the skin are the boundaries and borders of diffuse zones of imperceptibility, not a definitive limit that ordinary experience might lead one to conclude. What we interact with also affects us in turn. Bodies resist or conduct affect as they enable or defy reactivity, the subsequent result can be observed as held tensions and transmitted potential.

⁴² Simondon, “The Position of the Problem of Ontogenesis, translated by Gregory Flanders,” 8.

⁴³ I refer to the idea that any signal can be separated from the medium of transmission. Information theory supposes a pure signal divorced from any contamination, unaffected by the means of transmission. There is a striking similarity between the matter/form opposition, mind/body and signal/content division. These binaries assume a separable characteristic, a divisibility that overlooks the entangled informing processes that reciprocates between the matter and form, signal and content, mind and body as they are always in resonance.

⁴⁴ Simondon, “The Position of the Problem of Ontogenesis, translated by Gregory Flanders,” 5.

⁴⁵ Chabot, 77.

⁴⁶ *Ibid.*, 75-7.

⁴⁷ This links with my construction of an apparatus as preparing to enact an alteration or being instrumental to an operation of forming.

⁴⁸ Chabot, 77.

⁴⁹ This process is more easily seen in some consolidated bodies than others, but it can be followed in the production of matter as diverse as steel and wool fibre as well as other altered minerals such as gypsum (plaster) and Portland cement (concrete).

series of modulating interactions in order to become a consolidated body. This can be observed in preparatory actions prior to throwing clay on a wheel. The clay must first be free of any imperfections or inclusions. Purchased clay has already gone through a series of refinements, where the silt has been sieved, washed and homogenised before being packaged.⁵⁰ The ‘raw’ material is already prepared, meaning there is not a singular act that turns a block of raw material into a thrown form that may be fired.⁵¹ Instead, consider these shaping forces as the meeting of thresholds, the limit of the plasticity of clay meeting the limit of rigidity of the mould.

Simondon’s concept of individuation accounts for the internal resonances in sculptural forming, allowing me to reconfigure the status of the sculptural object and my understanding of the artist working the material: neither are predetermined, but are implicated in a mutual orientation, or forming, that is not the artist expressing an already preconceived form that is impressed onto passive material.⁵² The artist is not the only motivating force that forms matter, or a living body applying form to a non-living body. Rather, following Simondon, the production of artworks can be understood as resulting from informing processes that impact the living and non-living bodies within a shared milieu. The relation of individual and milieu is not an ‘accidental feature’ emerging from an association between matter and form after the fact; but that nothing has determinate properties considered outside the connections and relations to other substances and within a specific milieu.⁵³ Enabling a recognition of the active ongoing mutual relationships between living and non-living bodies, this understanding of information as structuring force has come to underpin my methods of sculptural forming. For example, Simondon contrasts individuation to the individual to draw attention to a constant process that does not terminate in a

⁵⁰ The preparation of clay also involves the elimination of voids and solids within a consolidated body. When a mass of clay is aggregated, dispersed particulate matter is brought into a homogenous, consolidated body. It forms a solid while its associated milieu supports that condition; for example, a lump of clay in the open air will lose moisture into the atmosphere, shrinking and cracking. The same lump of clay placed into a bucket of water will dissolve into a loose slurry. The constant force of gravity and the relative humidity of the surrounding air contributes to slumping or shrinkage, acting to modify the internal structure of the mass; or the clay may be modulated in an operation of forming in reference to the activity of a human body. From the perspective of the clay these aspects of relative pressures, humidity and gravity impact its consolidation and coherence, and define the milieu specific to that body. They are the informing exchanges that support the coherence and stability of the clay body.

⁵¹ Stepping further away from an anthropocentric view, the silt of the clay body was ‘prepared’ when it eroded and was aggregated through the action of water flowing over a landscape prior to its extraction from that system.

⁵² Chabot, 77.

⁵³ Ibid.

finished, completed individual.⁵⁴ I find that sculptural processes do not cease in a finite, defined object either. In the context of producing sculptural objects, this means that there is no predetermined form that sculpture reaches when it is finished, but the sculptural body emerges and is continually redefined in relation to successive contexts just as the living body of a person is altered over time.

Having stated that beginnings and endings are not fixed or final doesn't mean that there is no possible way of defining boundary points. Boundaries exist and are the thresholds of bodies and milieu. Thresholds are important designations of the limits and intensities of both bodies and milieu. Thresholds are contextual and conditional. For example, we can register a sound in a quiet gallery that would go undetected in the same room filled with conversations, even though the sound is technically still there. A sculptural apparatus can also connect to an otherwise imperceptible vibration on the electromagnetic spectrum and transduce that vibration into an audible frequency for human ears. This kind of transduction will be covered further in chapter two through an analysis of Joyce Hinterding's artworks. The thresholds of a milieu are not defined by quantitatively determined spatial relations, but by the degree of qualitative influence or registered impact on the associated body. They make up the internal resonance that is produced during an interaction.⁵⁵

The methodology of my creative practice responds to the circumstantial conditions of my current situation, informing my materials and processes. It is an iterative process of responding to interactions and exchanges of prior encounters that direct the development of each artwork—the outcome of my own individuations. I conceive of my sculptural objects as components that, when assembled in a specific location, act as an apparatus enabling awareness of the interactions that flow into that encounter.⁵⁶ These interactions help to develop further individuations in the bodies of that encounter. As such they operate in the way Simondon proposes; that any changes within an

⁵⁴ Grosz, "Simondon and the Preindividual," 174.

⁵⁵ Ibid., 182.

⁵⁶ Simondon provides an operative analogy between the individuation of living beings and the technical individuation of objects. For me, the components of my sculptural apparatus are equivalent to Simondon's elements and they do not construct their own milieu as elements, but only when joined into an ensemble. Simondon, *Being and Technology*, 213.



Figure 1. Sophie Takách, *evert manifold (80cc)*, 2014, bronze, 14 x 5.2 x 4cm.

individuating body (either artist, observers or sculptural bodies) take place through the relations and correspondences that are made in a specific milieu.⁵⁷

Capturing moments of intensity: handlings and the reiterative process of individuation

In my creative practice, I have been working to capture moments of intensity that relate to the interactions of bodies to reveal spaces that are otherwise imperceptible.⁵⁸ In 2015 I developed a new work that responded to the everyday actions associated with bodies meeting, specifically the action of clasping someone's hand when meeting physically. *Handlings* (2015-ongoing) are products of interactive exchanges between bodies, and they exist over multiple versions and iterations. Nominally, they are a series of small, tactile bronzes formed from casting the negative space between the palms of two clasped hands. The production of each *handling* begins as a conversation between myself and another person and sometimes extends via an intermediary to people who are not personally in contact with my body.⁵⁹ However, the conversations producing the

⁵⁷ Chabot, 77-8.

⁵⁸ In previous works, I focused on developing the intensities of my own body, such as casting the space of my vagina in *evert manifold* (2012-ongoing) pictured in fig. 1.

⁵⁹ For example, some of the *handlings* were produced during a movement workshop conducted between Camila Marambio, Fayen d'Evie and myself, and my own hand does not necessarily participate in every



Figure 2. Sophie Takách, *handlings*, 2016, bronze, guided handling, dimensions variable.

work always commence with a verbal recounting of the previous versions and touches on how each moment is a modulation of prior encounters. A corresponding extension beyond my own body can take place with the public display of *handlings*. *Handlings* have been presented in multiple locations as a performative sculptural apparatus. Sometimes it is my own body reintroducing the handling to another person, and other times the work is placed within a supporting structure that presents the work to the public without the presence of a human body.

The encounter begins with building the precise configuration that is able to completely close a threshold between the differently shaped hands of two people, progresses to a moment of attention, followed by a still, meditative clasping and holding while the material stabilises. While acknowledging the differences between the living palms of the people and a more typical rigid mould, the coming together of palms around the malleable casting compound is analogous of Simondon's brick making process. The temporary mould produces a form that reflects the internal resonance of that particular

initial casting. This openness to external forming forces initiating the casting does not mean the work is completed without my own hands, as I always work on each during mould making and while finishing the surface of each bronze after pouring. Furthermore, each *handling* is open to alterations and marking after 'finishing'; completeness is not implied with the term finishing, rather it is the consolidating of a coherent form by the selective removal of excess material introduced by the processes of lost wax casting.



Figure 3. Sophie Takách, *handlings* [casting positives], 2016, Pinkysil Putty.

moment. Using a rapid-set, skin safe silicone allows for the immediate capture of minute details of the palm print alongside the configuration of skin, bone and callus. The process is initiated as a tactile encounter and a physical conversation between two people. Each part of the process is a continual individuation and crystallisation of forming, from the early conversations regarding the work with a new person to the stabilisation of each bronze casting. This process of active forming takes place between the malleable compound and a section of the membrane enclosing bodies. The material is introduced, and the clasp is held for the duration of the setting process (around ten minutes). The resulting stabilised configuration is then moulded and cast to produce a version in bronze, which is later reintroduced to the hand during further encounters. These consolidated sculptural bodies are then used to enable connections and exchanges between other bodies via further interactions. In the process of making the work public, the small bronzes are handled alongside a conversation that develops from a discussion about the process of making. When the components are used in configurations as sculptural apparatuses, they serve as an amplification of previous forming processes, made evident as tactile encounters.

The artwork acts to reveal the conditions of its emergence; its milieu—as when the rock reveals the conditions of the stream or the brick retains the indent of a chipped mould. Each specific element of the forming process responds to the presence of bodies interacting. The initial casting requires two entities interacting to perform a negative moulding space that cannot otherwise exist. That space is not only specific to those bodies but also to that duration and location. Each individuating body at the time of the encounter presents a current state of consolidation and wear, their palms bearing the marks and calluses of prior individuations alongside the genetic whorls of palm prints. Creases in the palms deepen over time and with use, the thinning skin of ageing bodies countered by the thickening of worked muscle structures beneath the skin.

Each subsequent encounter with the work generates additional connections, including neural connections that are strengthened and formed in the brain in response to the perceptual synthesis relating to the encounter. The presence of a specific material can deflect or divert the flow of awareness, not only revealing the state of the flow but revealing the existence of a flow itself, as when a rock in a stream troubles the water's surface. *Handlings* are artworks that are produced in concert—there is a chorus of matter taking shape, and the specificity of any particular work reflects the conditions that it emerged from. Each *handling* is formed through a series of encounters, individuations

of specific configurations of bodies and milieu.⁶⁰ The process to produce one of the *handlings* has a tangible record that results in the bronze that you see, but also an intangible history of conversation, physical labour and forces operating on the materials. The work does not terminate in the formed object because the bronze *handlings* become kernels, or seeds, for new work or further actions. In this way, *handlings* are sculptural apparatuses that enable the interaction of conversation between those who handle them.

A sculptural apparatus can be understood as a mechanism that enables specific interactions to take place.⁶¹ In a technical sense, an apparatus can be defined as specialised composite equipment enabling a specific action to take place.⁶² These varied senses of the word are linked inflections of the same concept.⁶³ Defining a sculpture as apparatus is partly associated with Karen Barad's notion of *performativity*.⁶⁴ Barad proposes that an apparatus is inextricably linked to the conditions of its frame of reference.⁶⁵ An apparatus can be considered as an instrument or tool for measuring or observing, as well as both an intermediary and the alteration itself. Barad makes explicit the scientific relation of the apparatus to the observer and the subsequent interdependence of observed and observer. Inflecting interaction with her neologism *intra-action*, she directs attention to the repositioning of the in-between as the primary cause rather than the more passive *interaction* which she posits as a linguistic privileging of the subject before the action.⁶⁶ By positioning the interaction prior to the forming of the individual, Simondon's notion of individuation mirrors Barad's efforts to bring attention to how relations are not formed between separately definable things or objects. Instead, both Barad and Simondon

⁶⁰ I would argue that there is a primary point of entry into this work and that there is, additionally, an optimum point of entry. However, these points do not preclude other ways of experiencing the work. Such as this particular instance, as you are presently encountering this artwork through photos and written text. Nonetheless, I do have a personal bias towards the physical and I would argue that there is a way of encountering artwork that is more or less active or reciprocal.

⁶¹ Apparatuses are also organised structures that support social processes. Foucault has a fully developed understanding of apparatus in his concept of *dispositif*. I am not specifically drawing on his notion of apparatus in this research but there are some productive analogues with how the movement and control of bodies can be inscribed by forces in his account. Foucault, 194-195.

⁶² I am using the word 'apparatus' in the sense of its technical application in science as being part of the equipment used to conduct experiments and also for the etymological connotation of preparation.

⁶³ The specifics of the components vary according to the particular operation. The consequence of specificity will be explored further in chapter two through a discussion of the different apparatuses of both my own artwork and Hinterding's sensory transductions in her force drawings.

⁶⁴ Karen Barad, "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter," *Signs* 28, no. 3 (Spring 2003): 803.

⁶⁵ *Ibid.*, 814.

⁶⁶ I continue to use the more familiar 'interaction' in this exegesis to convey the sense of both internal and external relations. *Ibid.*

show it is a networked complex of both perceptible and imperceptible interactions enabling the definition of individuals. Understanding sculpture as apparatus allows me to engage with the complexity of interactions that emerge from the encounter with artworks, exploring the structuring forces of interactions. The sculptural body has its own capacities and limits, and my research explores the specific capacity of sculpture to operate as an apparatus. Exploring ‘limit cases’ of sculptural apparatus enables an investigation into subtler processes which are often revealed as they break down.

Sculpture operates as an apparatus by preparing and enabling interactions between disparate bodies within a shared milieu. An encounter with sculpture leads to a corresponding alteration of the set of conditions that operate on the bodies within that space. The production of sculpture comes about via the manipulation and consolidation of bodies through a combination of the artist’s interaction with tangible and malleable substances and the conditions of the associated milieu. Developing an artwork involves drawing connections, layering context, materials or forces, and bringing them to an audience—forging connections between bodies. It is a conversation, a back and forth exchange, not between artist and material or even artist and audience (ever difficult to define) but the making/artist making/materials making/audience making/space all together.⁶⁷ The sculpture is the apparatus that informs the shared milieu for the duration of that encounter. The sculptural apparatuses of my creative practice are not conceived as finished, formed bodies detached from their surroundings but instead as components that interact with the potential of the site to reveal the informing activity of that exchange. To understand how this informing activity is revealed by the sculptural apparatus, the following chapter will focus on the apparatus of two artworks—Aram Bartholl’s *5v* and Cameron Robbins’s drawing machine, *Creek thing*—that both connect to potential disparities and reveal the energy exchange of those encounters.

⁶⁷ I’m referring here to the way I felt about Anne Imhof’s work *Faust* at the Venice Biennale 2017. The subsequent discussion of the work that I encountered revolved around many forms of critique, debating if it was boring, too serious, too clichéd—or maybe it was only art in comparison to the terrible banality of Hirst’s *Treasures from the Wreck of the Unbelievable*. More interesting for me was when Imhof’s work formed the body of the performance and audience through the setting—the glass platform dividing the performers and the audience could be viewed from outside the pavilion. The effect was a striking ‘making audience/making performance’, where the bodies of the spectators were performing audience just as much as the more overtly choreographed movements of the titled performers were performing art. The artist discusses the production of space in her interview with the curator: <http://moussemagazine.it/anne-imhof-faust-german-pavilion-venice-biennale-2017/>.

APPARATUS AS BRIDGING DEVICE: DIRECTING ATTENTION TOWARDS POTENTIAL DISPARITY

This chapter explores how a sculptural apparatus can bridge a potential disparity and direct our attention to that interaction through an examination of my encounter with an artwork by Aram Bartholl. This artwork, 5v, provides a fulcrum for my examination of the operation of a sculptural apparatus as I expand on the way sculptural apparatuses produce connections and make evident imperceptible forces within a milieu. A different mode of apparatus is then introduced via Cameron Robbins's *Creek thing*. Bartholl's apparatus, which was to be handled, is contrasted with Robbins's seemingly static artwork as viewed within a particular exhibition context. This reveals the common operation of interactions by these apparatuses that do not depend on literal touching.⁶⁸ Throughout this chapter, I develop further the role information plays as structuring force, as outlined in the introduction, and my framing of a sculptural object operating as an apparatus. In establishing connections between the operation of information and forming within sculpture, I consider how these correspondences identify the impacts of information on awareness of imperceptible exchanges. In the introduction, I outlined how a milieu is always associated with a body and cannot be considered as a separate or generic space; a milieu is the influx of informing circumstance, encompassing everything that registers on the forming body. A sculptural apparatus directs attention to the exchanges of informing circumstance, enabling us to register how these interactions alter the conditions of a shared milieu. The sculptural apparatus bridges potential disparities in the process of amplifying the action of the interaction. This is how a sculptural apparatus directs attention towards something that might otherwise go overlooked or remain below our threshold of awareness.

Considering Bartholl's work through my reading of Simondon allows for an understanding of how this artwork produces both an awareness of potential disparity within a milieu and the physical apparatus of exploiting this disparity to obtain energy

⁶⁸ Robbins's larger installations are nearly always viewed in motion as they directly conduct kinetic energy through the gallery into drawings. However, this particular exhibition was a group show that limited the activity of the work. I prefer to focus on this artwork as it allows me to differentiate the subtle forces that carry over from the more spectacular events of the active installations.

for consumption. I focus on the installation 5v in the following section to explore it as an apparatus that connects bodies and establish how these connections direct attention to informing exchanges.⁶⁹

Sculptural apparatuses bridge disparate intensities

I encountered Bartholl's 5v travelling on a bicycle through Munster, focusing on the task of navigating unfamiliar streets while avoiding wandering pedestrians. I saw a gathering of people with an invigilator in a black Munster sculpture project shirt. There was a fire. I could smell the smoke from several blocks away and could see the haze rising over the urban buildings. Dismounting from my bicycle, I walked towards the fire pit. I watched at first, looking to see what other people were doing. I was already aware from the exhibition's program notes that I could charge my phone there. It was partly why I sought this artwork at that particular time and location, because using GPS to locate myself at every block in that unfamiliar place had been sapping my phone's battery. I walked up to an open camp fire burning in the middle of a patch of bare earth near the Munster community gardens, on an otherwise desolate patch of ground. Wood from a large pile burned in a fire pit providing a shared heat source and locus for the artwork. The sculpture turned out to be a small soot marked dish at the far end of a long roughly sawn branch, with wires leading to a small USB hub and digital display near where I grasped the branch. The heat of the fire was the source of potential difference that Bartholl's apparatus is designed to exploit.

The voltage and amperage produced by the heat exchange were shown on the USB hub, which did not begin charging until it built up the required five volts. The act of wrestling with the branch and balancing it on one of the intervening logs to support some of the weight took some time to get right. I had my phone plugged in, and the heat exchange device was positioned in the fire where I hoped it was bathed in the heat without singeing the exposed electronics. I wanted to take photos, but my phone screen was using more power than the slow trickle generated by the heat exchanger. The entire process was messy and provisional. There was an element of uncertainty in

⁶⁹ Bartholl's artworks for the 2017 Munster sculpture project make evident the dependent connection between technology and its associated energy supply. We were invited to visit a closed off commuter tunnel illuminated by book lights (3v), charge our phones at a communal fire pit (5v), and download documents from an off-grid Wi-Fi node (12v). The titles of each of the three installations in Munster relate to the energy produced at each location; 3 volts is the voltage level used to power LED book lights, 5 volts is the USB universal standard and 12 volts is equivalent to the power supply for a network router. All three sites offered an encounter between bodies and milieu that revealed the connection between the apparatus of energy production and its relationship to the technology we use every day.



Figure 4. Aram Bartholl, installation view of *5v* photographed by Sophie Takách at 14:43 on June 26, 2017.

Skulptur Projekte Münster, Münster.

the exact way to correctly place the device in the flames to produce the necessary heat differential and a concomitant bodily manoeuvre in an attempt to stay out of the direct heat and smoke. The sculptural apparatus orientated the observer's body in relation to the fire as they grappled with an unwieldy branch attempting to poke one end in a fire pit radiating heat on an already warm day. Positioning the branch placed my body in close relation to the energy source, and the corresponding shift in the orientation of the apparatus enabled it to extract power from the heat differential. The interaction also involved a flow between the discussion it engendered within the participants on how best to position the apparatus. The flow of interactions leads eventually to relinquishing your place at the circle to newcomers, who had first observed the work at a slight remove.

Bartholl's work used a localised heat differential to generate a chain of exchanges that include the observer's body and technological devices. A device recharges while the wood burns. The apparatus became a connective device exploiting a differential in heat between the fire and the relatively colder air of Münster. The observer's engagement with the extraction process generates awareness of the complexities in

energy production and consumption. My attention was directed to the cost of charging my phone with a sharpened sense of how much time and effort that action requires when separated from the city's infrastructure that usually supplies power. The sculpture also connects and orientates the observer's body in relation to the apparatus and its milieu. This is a common thread that runs through Bartholl's practice.⁷⁰ The sculptural apparatus of Bartholl's artwork generate connective exchanges that direct attention to habitual patterns of consumption. The components become sculptural apparatus that enable a specific process of energy extraction from a heat source and orientating my body in the process of engaging with the apparatus while shifting my awareness of the intertwined relation of heat, energy and potential disparity.

5v exploited a potential disparity in order to convert heat into energy. The artwork bridged this differential by bringing into correspondence a heat source (the fire) and the surrounding cooler air with an apparatus. The apparatus amplified and connected a reservoir of difference, analogous to the workings of batteries and cellular membranes. This difference is not a differentiation between two things, and it does not refer to likeness. Simondon positions individuation as the partial resolution of incompatible tension between terms of extremely disparate dimensions or states.⁷¹ In a pragmatic sense, difference can be marked by the threshold between incompatible states of matter, described by the laws of thermodynamics.⁷² Heat flows from the hotter body to a colder body until the incompatible difference is equalised. Incompatibility may be temporary and dissipated through expansion or diffusion as when water evaporates into a surrounding air volume, but potential difference exists while there is tension within the system. Movement is absorbed or transmitted through molecular motion and structuration within the consolidated body. This transmission of energy as movement between bodies can also be explored through the artwork of Cameron Robbins's drawing machines, such as *Creek thing*.

⁷⁰ Bartholl's sculpture *Keepalive* (2015) also orientates the body in proximity for exchange. After obtaining the location coordinates from the gallery, visitors must trek out to locate the boulder that houses a disk drive loaded with survivalist PDF documents. To activate the sculpture, a fire is built against the boulder, and the heat of the fire generates the electricity that powers the Wi-Fi node. To experience the artwork is to engage directly with the construction of the work in a very physical, practical sense. Further images: <https://arambartholl.com/keepalive/>.

⁷¹ Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans., Cécile Malaspina and John Rogove (Minneapolis: Univocal, 2017), 221.

⁷² Bijvoet, 64.

Water works on the landscape—a river or creek is part of a more extensive system that is the life cycle of water. Water evaporates into the atmosphere then condenses into clouds to fall as rain. The rain is pulled by gravity to the earth where it gathers and pools, always falling to the lowest point. Gravity continues to operate on the gathering flows and the force of its momentum, as it travels toward the deepest levels generating movement. As a body of water in motion, a creek has a current and specific capacity of potential energy. It is this current that *Creek thing* registers. *Creek thing* plunges blades into the turbulent water while the tripod legs stabilise the entire mechanism against the flow. The combined operation of resistance and yielding is transmitted along a slender arm that rests against a sheet of paper. For a specific duration, the pen secured to the end of the twisted wire skitters along the paper surface, tracing the eccentric motion within



Figure 5. Cameron Robbins, installation view of *Creek thing* (2014) exhibited in FLOW 21 April–21 May 2017, Counihan Gallery, Brunswick. Photographed 13 May 2017 by Sophie Takách.

the limit of the sprung steel as it is propelled by the gyrating blades. The location and duration of that interaction are noted on the resulting drawing. The drawing emerges from the contingent systems of force operating within a specific locality or milieu. All of these processes converge onto the point of the stylus vibrating against the page, capturing the conditions within this specific space and time. Whilst these operations of forming are not taking place within the gallery when the work is encountered, it is implicitly evoked in the body of the apparatus exhibited alongside the resulting drawings.

I encountered *Creek thing* when it was displayed as part of a group show at Counihan Gallery in Brunswick, 2017. *Creek thing* was positioned in the centre of the rear gallery, along with two framed drawings generated by the apparatus, which were installed on a nearby wall. The provisional assembly was still, not activated by flow or movement, yet it quivered with anticipation. Each component gestured toward its potential for action, from the long arc of twisted wire clasping the pen to the bearings supporting the suspended fan blades. *Creek thing* expresses the capacities of bodies to be in tension. Movement is captured as held tension by the internal structuration of the apparatus, not requiring literal movement to be activated but containing movement as a capacity. The stillness of the sculptural apparatus in the gallery continued to signal potential energy, the tool-apparatus becoming the instrument-apparatus. What was a tool for creating a drawing became an instrument for making perceptible the potential of turbulent flow. The potential is expressed within the apparatus as a previous activity and in relation to the drawings exhibited adjacent to the sculpture. The information of energetic potential is only signalled as it corresponds to the system the apparatus generates in relation to its prior positioning in the creek.⁷³ Robbins's artwork stems from the energetic potential of the creek, that is its capacity for turbulent flow, which the apparatus of *Creek thing* goes on to access and amplify within a new location. The apparatus can generate new metastable states within the gallery, triggering new individuations within the bodies of observers.

The operation of the apparatus is directing attention as it lifts an aspect of the surroundings out of the general undifferentiated sphere of experience. The body of

⁷³ Simondon refers to systems and structures in his explanations of metastable states as they relate to individuation. The process of individuation for Simondon proceeds between structuration and metastable states, the excess potential energy of each state triggering an intervening structure with the capacity to produce a new metastable state. Simondon, *On the Mode of Existence of Technical Objects*, 169.

the sculpture has connective capacity; conducting information through transduction.⁷⁴ An apparatus can amplify a potential difference and transmit it as intensity. The apparatus as an instrument leverages the human tendency for attention to be drawn to intensity. One measure of intensity is the compression or expansion of matter, its excitation and the associated properties of heat or movement that directly correlate with the movements of individual particles making up a body. Intensity can also refer to frequency in volume or duration; as in the intensity of light or sound. The peaks and troughs of the oscillating particles are analogous to waves or displacements in water. Visualisation of these changes can be mapped in two dimensions as an undulating line. When directly encountered as intensities the loudness of a sound or brightness of light corresponds to the frequency and amplitude of the wave form. The sculptural apparatus of Robbins's drawing machines map the specific conditions of their milieu as transmissions of variable speeds and slowness, the pressures and tensions directed into an interaction between stylus and paper.

A milieu emerges from the configuration of elements that come together within the boundaries of any encounter. Understanding our presence within an associated milieu shifts the register of an encounter with a sculpture as being one that is generative of new individuations. Robbins's *Creek thing* set up an associated milieu that brought to my awareness an absent energy potential. I did not have to physically engage with the sculpture to register that potential, instead it was brought to my attention through the performativity of the sculptural apparatus. In contrast, during my encounter with Bartholl's installation my body was the bridge that activated the apparatus. I plugged in my smart phone to the USB hub, but I also expended energy in manipulating the apparatus to exploit the heat differential contained in the flames. I needed to maintain a delicate balance between the radiant heat and surrounding air in order to extract electricity and charge my phone. The work required my physical engagement and it did not end at its own physical boundaries. The apparatus connected me to that specific set of conditions and generated an awareness of the complex mechanism required to generate power that usually goes unconsidered.

Bartholl's sculptural apparatuses exploit potential difference to reveal the greater built infrastructure of energy production and produce an awareness of imperceptible

⁷⁴ Adrian Mackenzie defines 'transduction' in Simondon's individuation as it relates to the propagation of information between different zones of a given domain. Transduction also is relevant to Hinterding's artwork which is discussed in chapter two of this exegesis. Adrian Mackenzie, *Transductions: Bodies and Machines at Speed* (New York: Continuum, 2002), 16.

interactions that otherwise may have gone overlooked.⁷⁵ I have recounted my encounter with Bartholl's work in Munster and the degrees by which I began to perceive it in order to describe the way I became aware of the conditions and consequences of obtaining energy and my consumption of it. I first smelled the smoke and saw the haze over the buildings as I closed in on the installation coordinates using my GPS on my phone. I happened to physically engage with the work whereas in another context I may have just observed. However, the moment that my attention was captured was when I began to focus on the production of that slow trickle of voltage. I began to associate the difficulty and slowness of getting my battery charged with the awkward, analogue interface of the sculptural apparatus. The smoke did not change, but my sense of the impact of that smoke was directly altered. We plug our devices in every day, often without considering the source of the power obtained. The difference between the usual means of charging a mobile phone and doing so in the context of Bartholl's work is the intensity of that encounter, the contrast between an invisible distant power plant and the messy facticity of using fire to make a current. My awareness of an imperceptible exchange, in this case of energy production and transduction, emerged from my encounter with the apparatus and the sensory process of engaging with the installation. Being physically present with the apparatus enabled the interconnected exchange between the components of the apparatus and the heat differential. My awareness is brought to the transaction of power extraction through the orientation of my body within the process and shifting the register of the encounter.

In this first chapter, I have elaborated how a sculpture may act as an instrument, directing awareness to the imperceptible disparities and potentials of a given milieu. The components of an apparatus emerge from the particular circumstances of ongoing forming processes; subsequent interactions between the apparatus and the immediate environment define the associated milieu for the observer and the sculptural body. Interactions between bodies within a milieu, shapes awareness of the potential disparation of a milieu for the observer and this productive tension is the basis of further individuations. In the example of Bartholl's 5v, the apparatus both directed attention towards potential disparity and orientated bodies in response to that disparity. The potential energy of the fire was directed into a flow of energy that enabled my phone to charge. My response incorporated the totality of the encounter as an alteration of the patterns I associate with energy use and consumption. The encounter with Bartholl's sculptural apparatus generated new productive tensions emerging from the temporary

⁷⁵ Aram Bartholl et al., *The Speed Book* (Berlin: Gestalten, 2012), 110.

configurations of consolidated bodies. In contrast, Robbins's artwork approaches the productive tension of potential disparity through the activation of larger systems of energy, in this particular case a flowing creek.⁷⁶ These two examples differ in modality from of my own artwork *handlings* (as discussed in the introduction) which brings the human body in direct alignment with a performative sculptural apparatus, triggering conversation along a chain of encounters with differently consolidated bodies. Despite the formal dissimilarities I have been able to trace an underlying operation of potential disparity leading to forming exchanges as it takes place within each artwork. In each case, it was the development of productive tensions directing flows leading to the shaping of bodies. The activity of directing flows, both of attention and of productive tensions, is how the sculptural apparatus produces changes through encounters.

The next chapter deals closely with this last concept of productive tension and encounters with processes of consolidating bodies leading to changes. I discuss how the positions and ordering of molecular structures lead to a macroscopic orientation of bodies.⁷⁷ The sculpture operates as an apparatus, a tool for producing these fractal relationships both internally and externally between bodies within a milieu.

⁷⁶ Robbins's has developed a thorough investigation of forces and systems in his larger works that spectacularly generate drawings, photographs and sculptures through varied mechanisms exploiting the differentials of electromagnetic and kinetic energy. I focused on this particular artwork as it was my primary encounter with Robbins's practice and the triggering 'germ' of my own individuation. In addition, the scale of the work closely fits with my own interest in the human scaled and the close granular investigation of slight intensities. I am intently engaged with artworks that relate specifically to the scale, activity and capacity of my own body.

⁷⁷ This is not to suggest that the quantum realm is the same as the Newtonian world of our scale, yet there is a causal chain of interactions and emergent properties that may impact our daily reality such as the application of special relativity to the working of GPS. Bijvoet, 64.

THE PERFORMATIVE SCULPTURAL APPARATUS: INTERACTING WITH POTENTIALS

The processes of sculpture meet at a threshold between the forming bodies. In the first chapter, I described an apparatus as components that act together to connect and amplify potential energy within a milieu at that meeting of thresholds. Perceptive sensory limits are set in reference to the threshold of what influences a body, thereby forming the associated milieu of that forming body. This chapter further substantiates that claim and extends the operation to encompass two different modes of amplification. Firstly, the sonic amplification of electromagnetic transmission within Joyce Hinterding's electromagnetically sensitive installations, and the mechanical amplification of tension within an example from my own practice, *fluid balance bodies* (2018–2019). The potential energy that the sculptural apparatus amplifies is an aspect of its associated milieu (the circumstance of the particular context of the site of installation) and contributes to the performative operation of the apparatus. When a sculptural apparatus is made public, it creates opportunities for interactions, both overt and subtle. The overt interactions may include physical touching, transmission of kinetic energy through proximity, or unexpected behaviours not initially considered by the artist. The subtle interactions of in this chapter expand on those physical interactions discussed in the introduction; the displacement of air, generating responsive movement or trembling within the sculptural apparatus, the addition of heat and moisture through radiated bodily metabolic activity, and the destabilisation of the general air volume during the visitor's passage within the room. These interactions combine to effect alterations within the milieu, transmitted through exchanges within the sculptural components of the apparatus at the thresholds of connected bodies. As the sculptural apparatus is itself a body within a milieu, the action of the apparatus influences the body of the apparatus as well as the bodies of the observers. This chapter will tease out how internal and external orientations of bodies respond to the connective interactions produced between bodies, and how this generates individuating participatory encounters that are phases of structuring individuations.⁷⁸ The amplification of an imperceptible force is one way a sculptural apparatus can prime us to perceive conditions, both in the moment of the encounter and afterwards.

⁷⁸ Grosz, "Simondon and the Preindividual," 175.

A living body is continually orientating itself within an associated milieu in response to interactions and in the processes of forming connections. In Simondon's theory, living bodies always retain a reserve of metastability (unstructured potential) that enable them to be open to new dynamic stimulus and undergo further individuations.⁷⁹ A living body also produces metabolic energy that can be expended to alter its position and contribute to the potential energy of its surroundings. While a body can be construed as any grouping of coordinated matter, Simondon makes a distinction between a non-living individual and the living individual.⁸⁰ One of his examples of a non-living individual is a crystal; where all activity is on the limit, at the interface between the interior and the exterior: always peripheral to itself.⁸¹ Whereas the living individual is in permanent communication to itself and its interior is always constitutive of the individual.⁸² This internal constitutive structuration of a living body may not always be visible by external visible shifts and might be evidenced by a difference in behaviour or modes of thinking. Conversely, internal structuration can be accompanied by external changes, such as when a body builder alters both diet and activity to increase their muscle mass and decrease fat deposits effectively. The structuration of bodies is the ongoing consolidation and maintenance of organised structure in relation to the set of conditions that impact its stability.⁸³ In these terms, I do not become an individual because that supposes a static end point, whereas living bodies need to be understood as continual orientations and reorganisations in relation to other bodies and informing interactions. Living individuations enable new iterative progressions as long as they retain the capacity for further adaptations—until death.⁸⁴

An encounter with a sculpture within the gallery space generates a potential forming response between the bodies of that milieu. Any encounter is modified by the changes made to that milieu by the sculptural apparatus. The introduction of a barrier or screen, or the arrangement of the artworks, alters the lines of sight within the room combining to alter the trajectory of movement within the space. Hesitancy in bodily movement occurs when entering a doorway, accommodating the time it takes to perceive and orientate oneself within an unfamiliar room. Even if the site is a familiar space for

⁷⁹ Chabot, 85-86.

⁸⁰ Simondon, *On the Mode of Existence of Technical Objects*, 26.

⁸¹ Chabot, 85.

⁸² Simondon, "The Position of the Problem of Ontogenesis, translated by Gregory Flanders," 7-8.

⁸³ Muriel Combes phrases Simondon's concept as thus: 'Apprehended from the point of view of the individuating process whence it emerges, the individual is not a definitive being, finished upon arrival.' Combes, 15.

⁸⁴ *Ibid.*, 6-7.

the person, the presence of a specific artwork, especially sculpture, will alter the way one negotiates movements and passages within the room. The sculpture occupies and changes the parameters of available space within the gallery necessitating a responsive change, such as altering the pathways taken by the observing body or eliciting motion towards or away from the artwork. The observing body needs to orientate itself in relation to its surroundings in order to move or act within that space. This orientation requires perception. For Simondon, perception is a constructive process, a synthesis of responses.⁸⁵ An organism orientates itself in the world through sensation and tropism—in other words, it feels and turns towards stimuli.⁸⁶ This tendency can be exploited to produce artworks that both make use of this process and create awareness of the synthesis of sensory information, such as in Hinterding's artwork discussed in this chapter. The processing of synthesising the sensory information that is present in an associated milieu contributes to the ongoing individuation of a living body. In order to respond the stimuli needs to register on the perceptual sensory systems of the body. At any given moment streams of particles are flowing past the nerve endings that enable vision, hearing, scent, taste and touch. However, only a tiny portion of those are registered in perception. This both limits and enables perception by filtering out what is not necessary to orientate the organism.⁸⁷

Hinterding's artworks explore the limits and potentials of perception through transduction of an otherwise imperceptible force so it can be registered by a different pathway of the nervous system.⁸⁸ Hinterding engages with electromagnetic energies and conductive materials, producing solo works alongside a collaborative practice with David Haines.⁸⁹ Her artworks orientate human bodies through direct interactions, and also produce a transduction of an imperceptible force amplifying it for human perception.⁹⁰ Positioned between sculptural installation and drawing, the components

⁸⁵ Simondon, "The Position of the Problem of Ontogenesis, translated by Gregory Flanders," 9.

⁸⁶ Ibid., 10.

⁸⁷ If we could perceive all parts of the electromagnetic spectrum with our eyes at one time, for example, we would be blind as the barrage of waveforms, infra- and ultra-, radio and cosmic, would obliterate the visual portion of the spectrum. The result, I imagine, would be a total overload of the sensory nerves resulting in blankness.

⁸⁸ Transduction for Simondon is a process closely aligned with the electromagnetic technical understanding but also as a notion that can be generalised to all machines and living creatures that have a margin on indeterminacy in their functioning. Simondon, *On the Mode of Existence of Technical Objects*, 155.

⁸⁹ Douglas Kahn, *Earth Sound Earth Signal* (Berkeley; Los Angeles; London: University of California Press, 2013), 413.

⁹⁰ Not all her artworks are directly linked to the presence of human bodies, for example, *Aeriology* is a large scale sculptural installation that makes audible the electrical and electromagnetic activity in the room and the surrounding atmosphere, but was not specifically constructed to incorporate the register of the

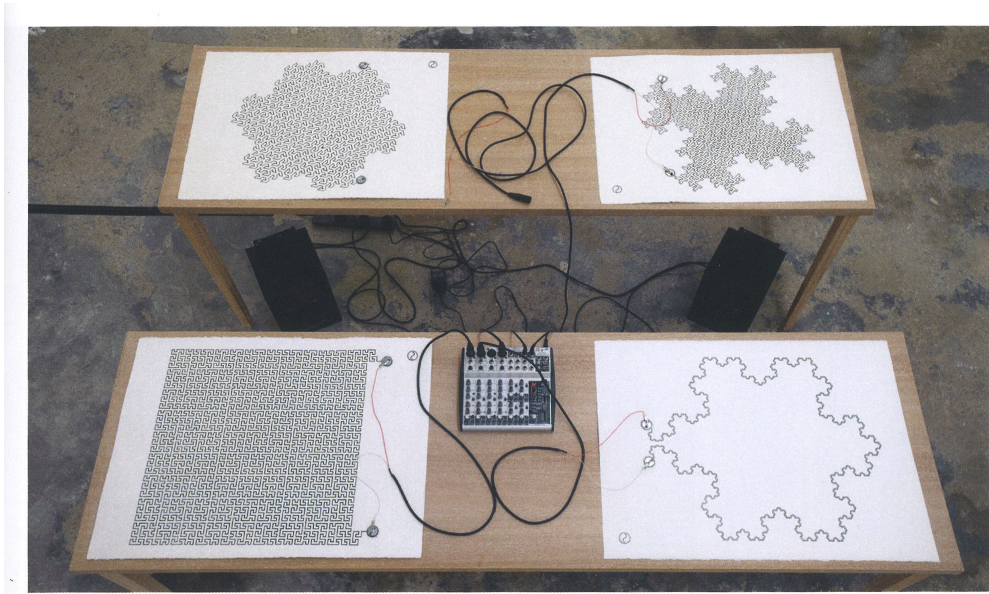


Figure 6. Joyce Hinterding, installation view *Aura*, Breenspace, Sydney, 2009, in Davis, Anna, and Douglas Kahn, *Energies: Haines & Hinterding*. (The Rocks, New South Wales: Museum of Contemporary Art Australia, 2015), 97.

of her artworks take the basic shape of graphite loops drawn either on paper or directly onto walls which are activated in proximity to electromagnetic energy to produce sound waves. By leveraging on the electrical conductivity of graphite, Hinterding generates artworks that ‘draw energy... to *draw* energy’ as Douglas Kahn phrases it.⁹¹ The materials and processes that Hinterding uses in her apparatus are simultaneously invoking the forming of their own substance while functionally operating within the encounter to transmit awareness to those participating in that formation.

Audible frequencies of sound are perceptible via the movement of air and the corresponding sensory nerve stimulation in the inner ear. Humans have no direct access to perceiving frequencies of wavelengths outside a narrow range; however there is a pervasive transmission of waveforms that pass by us undetected.⁹² Hinterding activates this field through the transduction of inaudible waveforms into audible waveforms via an apparatus. The underlying operation is one of movement, even if it is not immediately

human body in the field.

⁹¹ Anna Davis and Douglas Kahn, *Energies: Haines & Hinterding* (The Rocks, New South Wales: Museum of Contemporary Art Australia, 2015), 27.

⁹² *Ibid.*, 6.

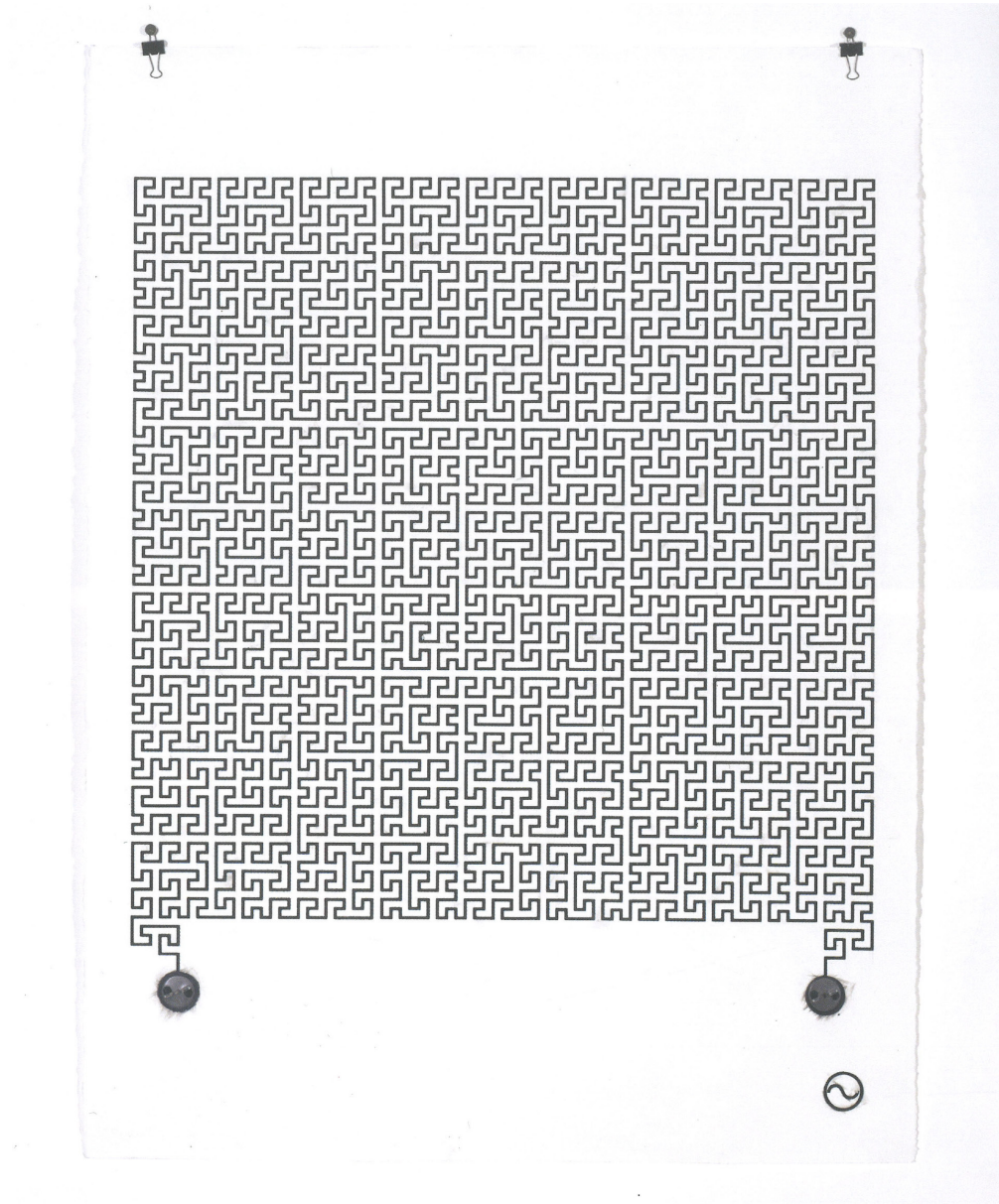


Figure 7. Joyce Hinterding, *Wunderlich curves* (graphite) from Aura Series, 2009–15, in Davis, Anna, and Douglas Kahn, *Energies: Haines & Hinterding*. (The Rocks, New South Wales: Museum of Contemporary Art Australia, 2015), 96.

recognisable as such.⁹³ An installation of one of her drawings invites participation, and through the position of the observing body, it amplifies an electromagnetic field into the audible frequencies of human hearing. Drawings are set on tables along with the wires and mixers, and the observer is invited to touch the conductive surface which subsequently alters the pitch of the tonal vibration. The work is performative through the relations it produces between the bodies that inhabit its milieu, and generates a corresponding action within the human bodies that encounter the work.

An individuation (being shaped by informing forces) is not a singular point of time or a fully formed individual, but a continual emergent process. This process is not unidirectional—the world is not impressed on the self (the mould shaping the clay). It is also inaccurate to state that living individuation is adaptation solely located within the living body; instead, there is a dephasing of the preindividual that individuates body and milieu.⁹⁴ For something to be contained within a specifically associated milieu, it must register (cross the threshold of awareness) for that individuating body or impact the body in some way.⁹⁵ Therefore interactions range in kind and are specific to the body in question. The types of interactions depend on the potential capacities of the body, so for a human body they comprise of stimuli. These stimuli may vary widely; electromagnetic energy on the visual spectrum; kinetic vibration in forms as varied as speech, heat, tactile and haptic stimulation of the nervous system; direct molecular sampling via the sense of smell; and the gravity that anchors us to the surface of the earth.⁹⁶ The notion of a milieu encompasses geographic space and other bodies, and includes all the interactions that can impact the associated body. To impact the body, the interaction needs to exceed the threshold for that body. All interactions do not impact all forming bodies to the same extent, and this difference relates to the degree of intensity of those particular interactions. Within Hinterding's sculptural apparatus is an amplification and transduction of the imperceptible forces—the revealing of action—informing interactions of streams of particles that would otherwise pass undetected. A sculptural apparatus amplifies interactions over the threshold for awareness, revealing them to the observer.

⁹³ Anna Davis sums up Hinterding's works as 'vibrating objects', *ibid.*

⁹⁴ Grosz, *The Incorporeal: Ontology, Ethics, and the Limits of Materialism*, 175.

⁹⁵ Grosz relates this to Bergson's contractile capacities of exterior and interior organisation, the plant in her example '...reaches as far as the sun which it contracts in its organic functions'. *Ibid.*

⁹⁶ I consider this to be analogous to Jakob von Uexkiill's *umwelt* as related in Ronald Bogue's analysis, Ronald Bogue, "Art and Territory," *The South Atlantic Quarterly* 96.3, (Summer 1997): 468-469.

When considered as a body in its own right, a sculpture can be positioned as the nexus of its own milieu that only partially overlaps the milieu of the artist. Once the sculpture is installed at the site of display the artwork has the potential to affect the milieu of each individuating being that encounters it. The sculpture is a conduit or connecting element for subsequent encounters that do not necessarily incorporate the physical presence of the artist.⁹⁷ I will now explore in granular detail some of the methodologies and processes of my creative practice to reveal how corresponding nested forming processes also build limits and express potentials within the forming of sculptural components.

An apparatus for amplifying potential tensions

A recent configuration of my sculptural apparatus titled *fluid balance bodies* (2018–2019) was constructed from an array of components that were developed over the course of this research project. The focus of the version of the work discussed below was to conduct an amplification of mechanical advantage within a system of interacting durations. This enables awareness of otherwise slight relative motions that would be imperceptible due to the gradual duration of evaporative molecular exchanges. The apparatus also develops tension over time as the components reach equilibrium. This tension is transmitted between the components as an internal resonance. *Fluid balance bodies* consists of a linked array of bovine rawhides, bisque fired ceramic vessels holding water via a system of pulleys, clamps and stainless steel rigging leveraged against the existing architecture and two modular steel frames. The slowly contracting hides and vessels holding reservoirs of water shift in relation to each other and against the frame of reference of the built environment as they respond to a gradual dissolution of molecular exchange within the surrounding atmosphere.⁹⁸ The tensions developed within the apparatus directs attention to the slow process of gaseous exchange as the

⁹⁷ One of the key difficulties I have experienced with the reception of performative sculpture is the challenge of inviting participation without imposing overly contrived limits on that interaction. When the bovine rawhide sculptural components were installed as part of *handovers/translations* at Glasshouse in 2016, professional dancers and non-choreographed interactions took place between audience members and the hides, eliciting a diverse range of responses from the participators. In contrast, during the exhibition *from one body to another*, at Casula Powerhouse, the hides and pulley configurations were initially activated through the unsighted interactions of Ben Phillips and Janaleen Wolfe, who were invited to make contact with the hides without instruction. However, in practice the interaction tended towards either habitual behaviours or description. It was very difficult to get subsequent encounters started without direct verbal or written invitation as the learned behaviour of gallery visitors tended to reproduce habitual modes of visual consumption. .

⁹⁸ The hides become malleable as they equalise the presence of water. To soften and activate the rawhide, the skins are submerged in water until they absorb the liquid. When they re-emerge into a relatively dry environment, they gradually give up the absorbed water molecules to the surrounding air volume and harden again.



Figure 8. Sophie Takách, *fluid balance bodies*, 2018, dimensions variable, porosity test.

two disparate bodies equalise, gradually reaching an equilibrium state where the hides and ceramic vessels balance within the relative humidity of the room. The hides return to a rigid state of tautness, and the open vessels lose mass as the water evaporates; each component shifting and changing in capacity with every new phase.

*How matter stabilises and captures its milieu all at once
(making a brick)*

Matter that can change in state from malleable to rigid has the potential to capture a narrow window of the variable interactions generating material shifts within a limited duration. The structured material, for example the rawhide or the clay of the bowls, retains all the information from the moment of stabilisation as the internal resonance of that state.⁹⁹ It records the full modulation in the fixed relations between its constituent parts. This continual evolution of the emerging constituted being passes through stages or thresholds that are marked by temporary stabilisations of consolidated bodies. The operation of any forming process is to stabilise the conditions of a milieu for a duration related to the potential of the material. The artist is working alongside materials, informing the thresholds of the emerging milieu associated with that sculptural body. By working the clay in a series of gestures that compress and apply shear forces to the mass, all air bubbles are collapsed and the inner molecular bonds are aligned. Without this laborious process, a formed shape is liable to crack or deform over the further drying and heating it undergoes in the kiln. A kiln provides the potential differential that triggers a shift in the internal structuration of the clay as it transitions from malleable clay to stabilised ceramic. Therefore, all the interactions that the mass undergoes during active forming either work to consolidate the emerging body or interfere with its sustained coherence as it undergoes the tensions of individuation.

There is a connection between this absorption and elimination within clay forming and at various stages of all processes present within *fluid balance bodies*. While the hides are drying, they are responsive to further pressures and tensions through the localised compression of the securing clamps. The membrane also has the capacity to produce further tension due to the collagen shrinking as it dries. The potential for repeated, non-linear progression through phases of alternating flexibility and rigidity enables the rawhide to record the shifting parameters of successive milieu in the gallery. This adaptability

⁹⁹ The action of internal resonance is described in the example of the brick, but Simondon also uses the notion of internal resonance to describe how only living beings can capture the whole of the milieu as a simultaneous integration and transformation. Simondon, *On the Mode of Existence of Technical Objects*, 140.

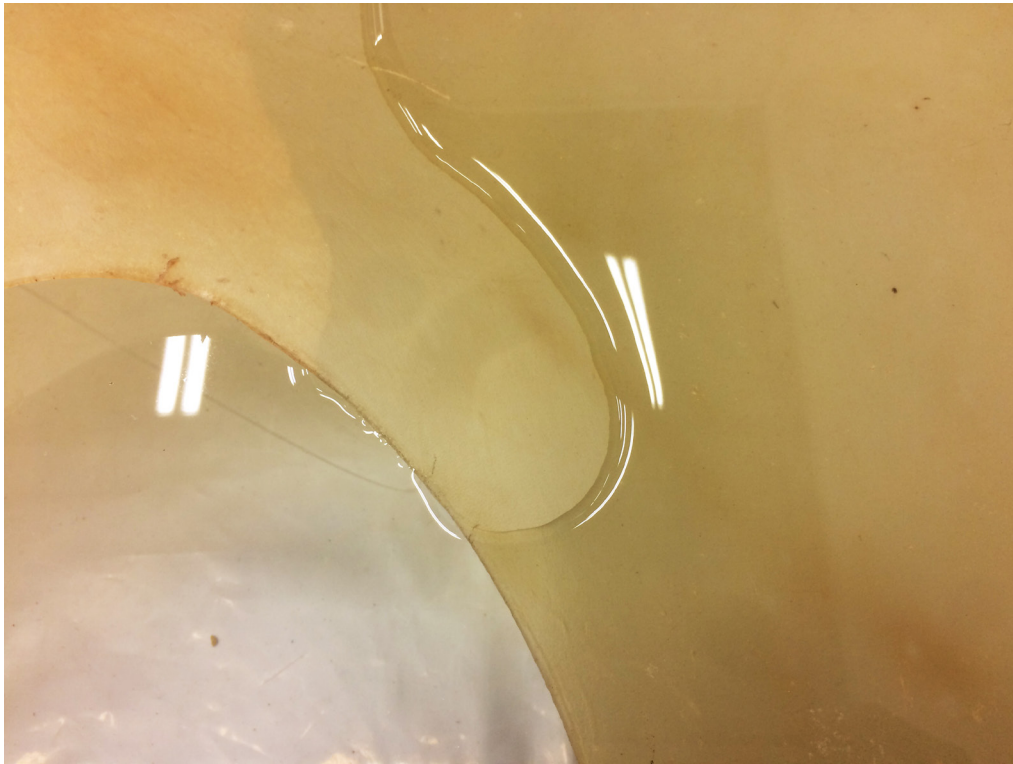


Figure 9. Sophie Takách, *fluid balance bodies*, 2018, soaking bovine rawhide.

also sees the material reproduce similar transitions experienced by the clay vessels as they dried before firing. The hides and clay express differing responsiveness within an underlying capacity for stabilising in reference to an associated set of conditions. Water evaporates from the hides and the ceramic vessels in concert, but at differential rates. Tethering the bowls to the shrinking hides allows that contraction to be registered as the levels, corresponding at the point of installation, begin to diverge.

The specificity of materiality establishes certain modes of potential and not others.¹⁰⁰ This can be seen in the properties and capacities of malleable substances such as plastic clays. Subsequent stabilisation of clay in a kiln alters the types of associations and exchanges that can impact the body, and further modify the capacities and stability of that forming body. The firing process crystallises the internal molecular structure of the clay body as it vitrifies and becomes ceramic. The water that once enabled the plasticity of the mass is driven out, and the ceramic body has consequently smaller spaces between the individual clay particles. The fired vessel is consolidated and takes

¹⁰⁰ 'Clay is reformed according to its own self-forming capacities; the mold is put to use through its reparation, according to its own particular qualities and characteristics.' Grosz, "Simondon and the Preindividual," 177.

on new characteristics. It now rings when flicked. Instead of the soft plasticity of clay that dissolves with excess water, it has porosity. Water passes through its internal molecular structure without destabilising the bonds between each molecule. The vessel can retain its structural integrity and hold liquid without collapse. Depending on the temperature it reaches in the kiln, the vessel attains a specific degree of vitrification. Any subsequent rigidity and organisation of internal structure alters the potential active force of the consolidated body. What was moulded can become mould. The mineral compounds of clay can perform the mould or the moulded; plaster also has that same mutability of capacity. These characteristics lend themselves to capture the forming processes and subsequently emerge as recurring elements of sculptural practice.

The sculptural apparatus consists of internally orientated bodies as discussed above, and the apparatus also affects the orientations between human bodies of observers within its milieu. The interaction of drawing water and lifting it to the clay vessels repositions the person in relation to the apparatus. Even when an observer elects not to physically interact with the apparatus, they are still orientated within the enclosure by avoiding contact with the steel frames, wires, membranes and vessels.¹⁰¹ The apparatus allows certain movements within the room and obstructs others. Passages and conduits open in the absence of interference. These pathways combine with further obstructions generated by the unpredictable movement and presence of observers, limiting the available positions in relation to the boundaries of the room and the body of the sculpture. The tensions produced by the apparatus are conditional to the total contribution of mass and potential difference transmitted through the wires; hence a shift in the position of a singular component of the apparatus corresponds to a difference in the entire arrangement.¹⁰² Any temporary stability of an equilibrium state can be tipped into new action via the introduction of additional components or liquid to the containers, meaning the apparatus can be activated either through the external intervention of human bodies or the gradual dissolution of entropic decay. Energy must be expended by human bodies in order to construct the apparatus and to charge or store that energy within a system in tension. Water finds its level; it equalises at the lowest point and

¹⁰¹ This learned behaviour of not touching, or bumping into, sculpture and the intangible pressure to interact 'correctly' with artworks is both an invisible restriction on bodies emerging from the institution of the white cube. Simondon also accounts for these psychosocial forces in his theory of individuation in his (untranslated) supplementary thesis *L'individuation psychique et collective*.

¹⁰² The addition of an excess of water or kinetic energy transmitted through physical contact can disrupt the balance of the apparatus, however it will always stabilise in the lowest potential energy state. This means that the active tensions within the apparatus will no longer produce movement once the balance of forces has been reached.

the apparatus cannot sustain a responsive state without a continual replenishment of energy such as when the water is replenished in the vessels or a rawhide is replaced with a freshly wetted skin. The productive difference between water held above the floor of the room and the option for that water to evaporate or flow to a lower level allows the apparatus to store energy. Additional interactions with living bodies allow the system to be replenished and reset throughout the duration of the installation. The apparatus produces an awareness of internal tension by bringing disparate bodies into a relation. The apparatus does not measure or act on its surrounding milieu in and of itself, but it is informed by the conditions of the milieu and enables an observation of those conditions.

The re-orientation of bodies takes place in response to pressures and tensions. This orientation can be seen within the sculptural forming of the clay vessels. Forming the clay vessels involves finding a balance between the suspension of clay particles in water and external pressures. As the walls of the vessel take shape, the internal cohesion of those particles either come into an equilibrium that provides structure and stability to the thin spun clay or leads to a collapse. The drying process that takes place before greenware can be fired further consolidates the clay particles as they contract and align

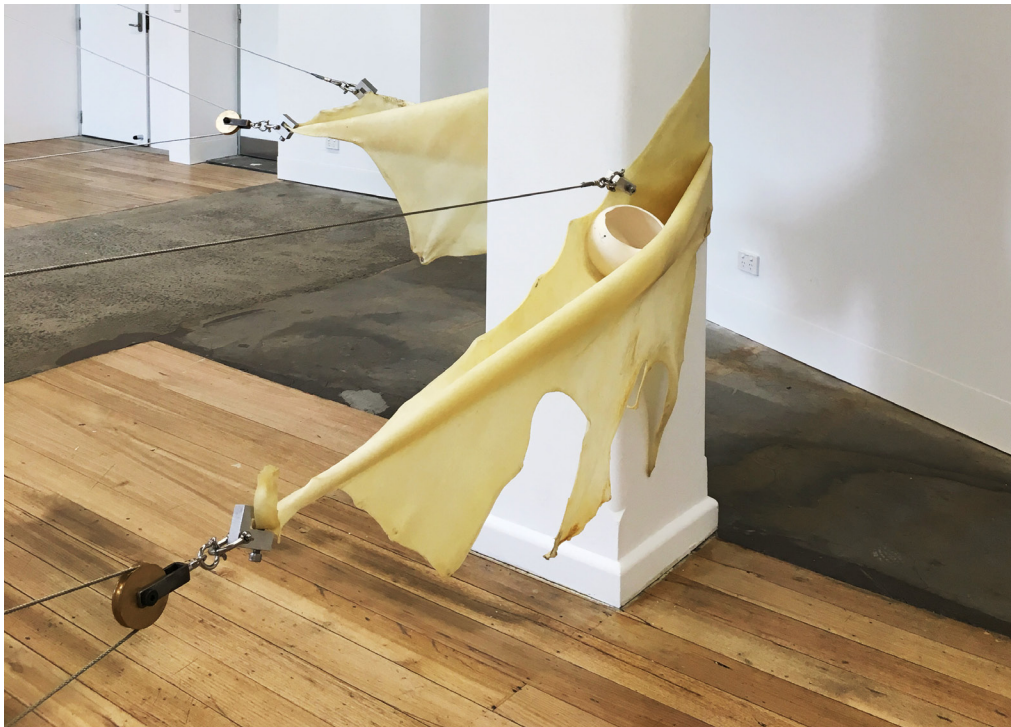


Figure 10. Sophie Takách, *fluid balance bodies*, 2018, testing membranes under tension.

in a structured matrix.¹⁰³ Therefore, structuration of a body emerges from cohesive or dissolutive informing interactions. Pressures and tensions that trigger adaption are found in living and non-living bodies and their associated milieu, both at the scale of human bodies within built environments and the smaller consolidated bodies of matter in relation to the pressures of forming. The same forces of pressure and internal tensions are at work internally within clay bodies as they are thrown on a wheel. The momentum of the wheel generates a centripetal force on the clay particles. This pressure is placed into a point of balance with the application of a point force, a point of pressure that resists and modifies the motion. A vessel emerges in response to these tensions; of the internal coherence of clay particles in colloidal suspension and the interplay of gravity, angular momentum and the applied resisting point force. These processes are reflected and repeated on different scales over a range of bodies; the internal cellular division of biological growth, movement of people in a crowd, a pot thrown on a wheel. The balance of forces produces an emerging consolidated being.

In chapter one, I focused on the apparatus as instrument producing awareness of potential disparity and informing interactions that might otherwise be overlooked. In this chapter, I have elaborated a complementary account of the apparatus producing orientations within bodies and between bodies in relation to a milieu. In describing how the components of sculpture connect and amplify the capacities of a body I have developed an expanded understanding of the body to express how these same processes take place in reference to a sculptural body, as well as the human bodies that encounter the apparatus. To conclude, I will build a constructive synthesis of the way information acts as a structuring force on sculpture but does not presume a codification or message separate to the process of modulation. Forming becomes nuanced by informing, wherein the sculptural components reveal the conditions of a milieu that interacts with all the bodies that encounter it. The final part of this exegesis will examine how the structuring force of information contributes to the incremental and emergent forming of bodies in order to extrapolate a number of concluding points regarding its significance to rethinking how forming takes place in sculptural practice.

¹⁰³ If the clay body is fired before the moisture content has stabilised, the rapid contraction of particles as the water is lost to the kiln can result in cracking. This is most often seen in the base of thrown vessels and can be countered during the process of throwing, as the worker can compress the base of the vessel by applying a point force to the clay that must support the entire mass during the drying and firing operation.

CONCLUSION

Information as informing exchanges

Bringing Simondon's notion of information to sculptural practice enables a more nuanced understanding of the process of forming in the development of sculptural bodies. My emphasis throughout this exegesis has been on understanding the effect of information on a body; using an expanded sense of a body to encompass both living and non-living entities and locating the operation of forming between material processes of sculpture and the various encounters with a living body, either artist or observer. For Simondon, forming is not the case of an active pre-determined form imposing structure on inert, passive matter, but a common operation of modulation between body and milieu.¹⁰⁴ Recall Simondon's example of the brick from the introduction where the interaction between the prepared clay and the modulating force of the mould is the internal resonance of the process of casting. When a body interacts with a sculptural apparatus within the gallery it develops a resonance that modifies both sculpture and observer.¹⁰⁵

The body of an observer is implicated in the ongoing maintenance or dissolution of a sculptural apparatus only when that observer is suitably disposed to engage with the work. Not all observers will interact with all artworks on every occasion to the same extent. Yet, in a subtle way, any encounter is an interaction, either in the slight traces impressed on the sculptural and human bodies alike or the new associations produced between previously disparate notions that happen internally within the body of the observer. Observer and sculpture emerge from the encounter altered, each undergoing an informing exchange with the other. Through Simondon's analysis information alters both a body and its associated milieu, subsequently affecting the individuating body as it carries the traces of the encounter in its ongoing process of forming.

¹⁰⁴ Simondon, *On the Mode of Existence of Technical Objects*, 248-249.

¹⁰⁵ An internal resonance is the interaction between all corresponding elements, the clay, the pressure of the mould, the conditions of both mould and clay. The clay can deform in response to the pressure of the mould only because it has the potential to do so as a consequence of the manner by which it is prepared. This internal resonance is how Simondon designates the limits of individuation. Simondon, "The Position of the Problem of Ontogenesis, translated by Gregory Flanders," 7-8.

The exchange of the encounter may be slight, almost inconsequential, or it can be profound. The point is not the magnitude of the shift, but that forming emerges from the interaction within a milieu where there is a potential disparity signalled through the activity of the sculptural apparatus. The apparatus acts as a tool when it defines the threshold of its milieu, and as an instrument when it generates awareness in the observer. The consolidation and maintenance of bodies involves an exchange between individuating body and contextual milieu. Incompatible tensions provoke greater magnitudes of individuating shifts. The individual perspective of a living body results from a coordinated homeostatic system alongside a perceptual framework that filters and organises sensation into coherence. However, non-living bodies can be said to have a perspective as well in that they are the focal point of their own milieu—the set of conditions that inform them. Sculptural apparatus enters into a plurality of relations including each milieu of the multiple bodies encountering the work. The responses that emerge for bodies within encounters are inevitably shaped by their prior experiences, due to the way bodies incorporate the influences within their milieu.

The apparatus is what establishes connections between a given milieu and individuating body during the encounter. The artist is not solely responsible for individuations in audiences and cannot expect to control all aspects that develop within each encounter. Responsiveness requires a series of coincident elements, a suitable confluence of receptive observer, conditional and durational circumstance and an openness allowing for unexpected interactions. One viewer may only glance at a work and continue on unchanged, while another in a more receptive state might fully engage all their attention and feel deeply moved by the experience. Prior selection and manipulation of the position and condition of the sculpture offer the viewer an experience that is provisionally controllable, yet open to circumstance. There is no guarantee that any one outcome is more likely than another. However, the emergence of interactions is not entirely up to chance either. The influence of the sculpture on encountering bodies is related to the intensity of the potential disparity and capacity of the subsequent shift in awareness of the observing body. The sculptural apparatus is acting as an instrument when it amplifies an aspect of its milieu and sensitises the observer to subtle forming interactions. This amplification and sensitisation may be controlled to an extent by the artist through the materiality of the sculptural apparatus, as potentials develop from the specific capacities of different substances.

Conceiving the operation of forming sculpture through the lens of structuring exchanges allows us to view the methodology and processes that culminate in a

sculptural encounter as continuing beyond the boundaries of the studio. The sculpture and the living body are not preconceived and brought together as relational in some other space but are implicated in a forming orientation together. When an artist or observer engages with a sculptural apparatus, they are not just passively absorbing new stimulation. Ideally, the interaction leads to a shift in perspective for the living body, triggering connections between the processes and instabilities within the body of the artist or observer and generating an awareness of the associated milieu they temporarily inhabit. This process does not require the literal forming of the work to take place in the gallery or site of installation, as I observed during my encounter with *Creek thing* by Cameron Robbins. Simondon's rethinking of forming as information that modulates the individual along with the milieu can be employed to observe otherwise imperceptible potential disparities within a given milieu.¹⁰⁶ Furthermore, if information in Simondon's account is not a codified transmission between emitter and receiver, but a structuring exchange, then the structuring force of information is the impetus for an alteration within a milieu.¹⁰⁷ This then leads to modified bodies in the process of informing structuration. Forming processes may expand and contract, consolidating bodies, but do not terminate in a finished object or individual. The brick does not cease to change after the operation that consolidated its body in the mould. It goes on to be fired and enters into subsequent relations with other bodies and structures. It erodes or joins to other bricks with the addition of mortar. The ceramic bodies incorporated within my sculptural apparatus have undergone multiple transformations during their forming, each stage leaving traces of the accumulated point resistances and interactions between fluids, bodies and gravity crystallised in the extreme conditions of a kiln. Each stage of temporary stabilisation enables a progression into a new configuration but does not seal off the vessel from subsequent alterations. The repeated soaking and evaporation and linkages within the apparatus all leave traces of informing interactions on the body of the ceramic, these traces potentially form an awareness of past, present and future capacities.¹⁰⁸

Recall that for Simondon the individual is always associated with a milieu. It is not possible to isolate the individuating figure from its ground, and the individual does not exist separately as an entity considered apart from its environment. The milieu is enacted by the interaction between elements, not necessarily by spatial or temporal

¹⁰⁶ Ibid., 7.

¹⁰⁷ Combes, 5.

¹⁰⁸ Grosz, "Simondon and the Preindividual," 178.



Figure 11. Sophie Takách, *fluid balance bodies*, 2018, force markings on clamping apparatus.

association.¹⁰⁹ Yet, the proximity in space and time do contribute to the likeliness of any interaction. Potential disparities produce informing exchanges within a milieu. The disparity (as when the relative dryness of the surrounding atmosphere is compared with a wet mass of clay) is only activated when an interaction between those two states is possible. If clay is enclosed within an impermeable barrier, like plastic film, it will not lose moisture to the surrounding air and will not noticeably change in state. The disparity is not in tension until the flow of water molecules is unimpeded. The disparate states need to be in proximity or within the influence of a conduit to be able to interact and enable an informing structuration to take place. Exchanges between bodies can involve the action of a living body, such as an artist applying pressure to a body of clay, however they also take place between non-living bodies without any human or animal intervention. For instance, an exchange that does not directly involve the actions of living bodies includes the evaporation of water over time, due to the differential between the energy of the molecules of the liquid and the relatively dry air of the atmosphere.¹¹⁰ The presence of a draft will increase the rate of evaporation

¹⁰⁹ Chabot, 91.

¹¹⁰ Evaporation is dependent on atmospheric pressure and temperature, and involves the gradual loss of water molecules as water molecules transfer from the consolidated mass of liquid into the relatively drier volume of air due to their velocity. The example of water evaporating reveals how changes take place through incremental exchanges of motion. Michael Mansfield and Colm O'Sullivan, *Understanding Physics. 2nd ed* (Chichester: Wiley, 2011), 265-266.

and the subsequent dispersal of water into the atmosphere. This exchange will happen without intervening human activity but can be accelerated by the addition of extra heat or motion if a living body disrupts the surface of the water. These kinds of exchanges result from the tendency of matter to seek equilibrium, following the axiom of the second law of thermodynamics.¹¹¹ The intervening action of a living body, artist or observer, can also counteract the gradual dispersal and dissolution of tension within a milieu through adding potential energy via the expenditure of extra work.

The flows and interactions that affect the action and movement of matter are often in themselves invisible to the eye. Gravity, the electromagnetic field, the strong and weak interactions at the atomic scale all combine to influence the consolidation of matter.¹¹² The consolidated bodies of sculpture operate under the same conditions of all other matter, and the interactions of components within a sculpture can point towards the operation of those forces. Returning to my example of Aram Bartholl's artwork, *5v*, the interactions that are being revealed are both physical and social. By taking part in the group activity of charging my phone while conversing around a camp fire, my attention was directed to the cost and time required to extract a unit of energy from the combustion of matter. Admittedly, this transaction was not directly equivalent to the usual production of energy, but that is part of its existence as an artwork and not a power station. The encounter with the work did not provide me with the battery charge to continue to use my phone for the rest of the day, though it did direct my attention to the conditions of energy production and the costs and consequences of consumption. The operation of the sculptural apparatus directed my attention to its associated milieu and the structuring force of information. I was made more actively aware of my reliance on a sprawling invisible infrastructure that by its very prevalence has become indiscernible. The ever-present tends to become imperceptible.¹¹³ The imperceptible can either fall below a threshold required to register or it can be so present that it goes overlooked.

The encounter with sculpture generates an awareness of the structuring force of information as it connects and amplifies the conditions of its associated milieu. All

¹¹¹ Ibid., 259-260.

¹¹² These are the fundamental interactions commonly referred to as forces. Ibid., 5.

¹¹³ Vision studies have been conducted to create a stabilised image held over the retina to completely remove all relative motion. Aspects of the subject's visual field faded within minutes, as the sensory receptors of the eye and brain were unable to construct an image without the new stimulus introduced by the normal motion of the eyes. An ever-present field or stimulus becomes imperceptible to the human body. See Pritchard, Roy M. "Stabilized Images on the Retina," *Scientific American* 204, no. 6 (1961): 72-79, accessed December 01, 2018, www.jstor.org/stable/24937490.

matter is in a state of transition, absorbing and releasing energy as the molecular and macroscopic exchanges of momentum and material combines in processes of forming. In the artworks I have examined, the sculptural apparatus is only a subsystem of a more extensive social and physical series of exchanges. Establishing a milieu is a process of combined juxtaposition and cohesion of temporary structures. The structuration of bodies takes place on multiple levels, each tiny shift within a cell, each redistribution of pressures and fluids all stacking towards a macroscopic perceptible response. Shift the scale (and threshold of the sample) and it is evident that the same process takes place between people in social interactions. Small local shifts are amplified or dissipated over the larger area. Patterns emerge from these interactions that redefine bodies and milieu.

A sculptural apparatus emerges from the parts providing a fulcrum for pressures and extractions within the associated milieu. The work of the apparatus is in the gradual (almost imperceptible) shift that emerges from structuring exchanges between each of the components. The artwork enters into a new unstable equilibrium through the addition of energy—not just by the artist acting on materials (one direction of force) but the destabilisation of forces within the milieu and the associated bodily capacity to resist or respond to those interactions. In contrast to Cameron Robbins's drawing machines, these sculptural apparatuses do not produce separate artworks. Instead, the sculptures are temporary configurations of components that direct attention to the conditions of its associated milieu and orientate bodies within the frame of reference of that situation. The apparatus measures and responds to the changing temperatures and humidity of the site, but also gradually dwindles and settles in stable equilibrium. It is a tool for producing orientations between bodies within the confines of its influence.

Connections and orientations

Throughout this exegesis I have investigated how the sculptural apparatus modulates and orientates other bodies by revealing connections and exchanges within forming encounters. The encounter with sculpture enables potential openings for new ways of thinking and moving within the world. In turn, encounters between other observers can connect and orientate them within a shared milieu. Individuation continues to emerge from each successive encounter between sculptural apparatus and observer. Each successive encounter, either with the same body or new bodies, influences and alters possible responses to further encounters. This is the common operation that both allows for and constrains individuation. Individuation is not a leap into a total unknown, but

a slight shift in alignment or perception that is incomplete, leaving a rich metastable potential for further individuations in living bodies.¹¹⁴

Action leads to further action—the link between the sculpture and observer is not an immediate change or difference, but works by producing a new awareness. I am changed by what I see because change is at once a modulation of the immediate past as well as a combination of all influences on my body. Capacities of bodies are altered in response to the influences of their milieu. There is not always a discrete, measurable moment where a change occurs, but there is always a shift that corresponds to alterations in bodies and their milieu. At any point in time, individuation is on a continuum of modulation. As Simondon proposes, living beings are not statically formed after a single individuation, but are always in a prolonged state of becoming.¹¹⁵ I do not become an individual, because that supposes a static end point of completion, whereas bodies are continually adapting to new situations through the synthesis of their interactions.

Any given activity leading to the emergence of a sculptural body is always within a set of relations that shape the sculptural body and alter the texture and coherence of the resulting mass. Sculpture considered as a body can inhabit more than one milieu and could be said to be a nodal point of its own associated milieu. This is not in the sense that sculpture is aware of its own individuation or position, but to the degree that it is a body that can be modulated or affected by exchanges of information. The sum of those exchanges is the milieu of the sculptural body. The body is structured as a nexus of ‘...privileged points of exchange between the being and the milieu.’¹¹⁶ As such, the artwork is not separable from the conditions of its emergence and surroundings. A milieu is not bounded spatially or temporally but instead can be designated as the ‘pure activity of variation within a set of relations’.¹¹⁷ The set of relations for any sculpture include the mental and physical state of the artist as they are manipulating materials. Circumstances, like fatigue, act as modifiers on the capacities of the artist’s body, such as their strength and dexterity. Practice involves a repeated set of gestures that refine and consolidate the muscle memory of the artist. This observation holds true for audiences and participants in that the habitual movements and gestures of their bodies stems from learned (practiced) behaviours that emerge from their previous experience.

¹¹⁴ Combes, 15.

¹¹⁵ Simondon, “The Position of the Problem of Ontogenesis, translated by Gregory Flanders,” 7.

¹¹⁶ Simondon, *On the Mode of Existence of Technical Objects*, 177.

¹¹⁷ Sauvagnargues, 18.

Simondon makes a case for individuating beings whose perceptual systems are organised in order to orientate themselves within their worlds.¹¹⁸ Viewed in this way, perception for a body is framed as a constructive problematic for the organism.¹¹⁹ There are clear differences in the capacities of different bodies to respond to the problems of their environment (their milieu). Nevertheless, both living bodies and non-living bodies enact and incorporate interactions as structuration. Bodies are shaped in response to perception. As an artist working in sculptural forming, I incorporate the problems and solutions of my own bodily perceptions in parallel with the shifting emergence of consolidated non-living bodies that make up my sculptural apparatus. I prefer to consider my sculptures as systems and components that connect to the broader context of their installation rather than self-contained finished objects. This is with the aim of establishing a looseness and openness that accompanies the complexity of lived experience, which ultimately evades attempts to encompass it within a single form. Recollecting Simondon's example of the brick emerging from prepared clay and mould we understand that materials are not passively formless before being made into something formed, but rather are already in a reciprocal state of forming that is the ongoing process of individuation. The ongoing processes of sculptural forming echo the processes of individuating living bodies. These processes do not end with the installation of the artwork, instead, the function of the work in the gallery is to distil intensities in order to set up problematics for further individuations.¹²⁰

The process of individuation is not a singular production of an individual that ends in a stable, unchanging form. The beginnings and endings of individuation are defined retrospectively from the perspective of the forming body; these are not strict markers or endpoints but rather thresholds of discernible change. Given that individuation is taking place over multiple scales and durations simultaneously in an incremental and gradual progression, it follows that the human tendency to define static fixed endings and beginnings are constructed in relation to perceptions of the thresholds and not in terms of any stable external reference. Nonetheless, that does not make bodies solely internal or hermetic. My research and creative practice sought to bridge the distance between static body and body in motion; based on the feeling that any sculpture left in a room remains just that, an object in the room unchanged and unchanging. However, during this research project I have come to understand that a sculptural apparatus can

¹¹⁸ Simondon, "The Position of the Problem of Ontogenesis, translated by Gregory Flanders," 5.

¹¹⁹ Chabot, 97.

¹²⁰ Sauvagnargues, 65.

trigger awareness of potential disparities and informing structuration that emerge from the interaction between incompatible tensions within a milieu. These are the thresholds that are boundaries, edges and membranes that contain and define bodies. By orientating the audience in alignment within a frame of reference, the apparatus directs attention towards the existence of a milieu. All of the operations of the apparatus act on orientating the body, both in the tangible sense of physical motion through space and in the intangible shifts of awareness. The apparatus of the sculpture is not producing states of contemplation or appreciation but revealing the structuration of bodies in relation to a milieu. The sculptural apparatus can alert us to the subtleties of molecular exchange and corresponding potential energy that drives our own individuation by directing our attention to an otherwise imperceptible difference within the milieu or site of the encounter ■

WORKS CITED

- Apter, Emily, Ed Atkins, Armen Avanessian, Bill Brown, Giuliana Bruno, Julia Bryan-Wilson, D. Graham Burnett, Mel Y. Chen, Andrew Cole, Christoph Cox, T. J. Demos, Jeff Dolven, David T. Doris, Helmut Draxler, Patricia Falguières, Peter Galison, Alexander R. Galloway, Rachel Haidu, Graham Harman, Camille Henrot, Brooke Holmes, Tim Ingold, Caroline A. Jones, Alex Kitnick, Sam Lewitt, Suhail Malik, Helen Molesworth, Alexander Nemerov, Michael Newman, Spyros Papapetros, Susanne Pfeffer, Gregor Quack, Charles Ray, Matthew Ritchie, André Rottmann, Amie Siegel, Kerstin Stakemeier, Artie Vierkant, McKenzie Wark, Eyal Weizman, Christopher S. Wood, and Zhang Ga. "A Questionnaire on Materialisms." *October*, no. 155 (Winter 2016): 3-110.
- Barad, Karen. "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter." *Signs* 28, no. 3 (Spring 2003): 801-831.
- Bartholl, Aram, Domenico Quaranta, Manuel Buerger, and Josephine Bosma. *The Speed Book*. Berlin: Gestalten, 2012.
- Bennett, Jane. *Vibrant Matter: a Political Ecology of Things*. Durham N. C.: Duke University Press, 2010.
- Best, Susan. "Elemental Constructions: Women Artists and Sculpture in the Expanded Field." *Australian and New Zealand Journal of Art* 1, no. 2 (2000): 147-162.
- Bijvoet, Marga. *Art as Inquiry: Toward New Collaborations Between Art, Science, and Technology*. Vol. 32 of American University Studies. New York: Peter Lang, 1997.
- Bogue, Ronald. "Art and territory." *The South Atlantic Quarterly* 96, no. 3, (Summer 1997): 465-482.
- Burnham, Jack. "Systems Esthetics." In *Esthetics Contemporary*, edited by Richard Kostelanetz, 160 - 171. Buffalo, New York: Prometheus Books, 1978).
- Chabot, Pascal. *The Philosophy of Simondon: Between Technology and Individuation*. Translated by Aliza Krefetz. London: Bloomsbury Academic, 2013.

-
- Combes, Muriel. *Gilbert Simondon and the Philosophy of the Transindividual*. Translated by Thomas LaMarre Technologies of Lived Abstraction, edited by Brian Massumi and Erin Manning. Cambridge, Massachusetts: The MIT Press, 2013.
- Coole, Diana, and Samantha Frost, eds. *New Materialisms: Ontology, Agency, and Politics*. Durham & London: Duke University Press, 2010.
- Cox, Christoph, Jenny Jaskey, and Suhail Malik, eds. *Realism Materialism Art*. Annandale-on-Hudson, NY Center for Curatorial Studies, Bard College Berlin: Sternberg Press, 2015.
- Davis, Anna, and Douglas Kahn. *Energies: Haines & Hinterding*. The Rocks, New South Wales: Museum of Contemporary Art Australia, 2015.
- Deleuze, Gilles, and Felix Guattari. *What is Philosophy?* Translated by Hugh Tomlinson and Graham Burchell European Perspectives, edited by Lawrence D. Kritzman. New York: Columbia University Press, 1994.
- Dolphijn, Rick, and Iris Van Der Tuin. *New Materialism: Interviews & Cartographies*. Ann Arbor, Mich.: Open Humanities Press, 2012.
- Eliasson, Olafur. "Ice Watch" Accessed December 23, 2018. <https://olafureliasson.net/archive/artwork/WEK109190/ice-watch>.
- Fer, Briony. "Objects Beyond Objecthood." *Oxford Art Journal* 22, no. 2 (1999): 27-36.
- Foster, Hal. "The Un/making of Sculpture." In *Richard Serra*, edited by Hal Foster and Gordon Hughes, 175-200. Cambridge, MA: MIT Press, 2000.
- Foucault, Michel. "The Confession of the Flesh" [Interview, 1977]. In *Power/Knowledge: Selected Interviews and Other Writings*, edited by Colin Gordon, 194-228. Brighton, Sussex: Harvester Press, 1980.
- Fried, Michael. *Art and Objecthood: Essays and Reviews*. Chicago: University of Chicago Press, 1998.
- Grosz, Elizabeth. *The Incorporeal: Ontology, Ethics, and the Limits of Materialism*. New York: Columbia University Press, 2017.
- _____. "Simondon and the Preindividual." In *The Incorporeal*, 169-208. New York: Columbia University Press, 2017.

Grubinger, Eva, and Borg Heiser, eds. *Sculpture Unlimited*. Berlin: Sternberg Press, 2011.

Haacke, Hans. *Working Conditions: the Writings of Hans Haacke*, Writing Art, edited by Roger Conover. Cambridge, MA: MIT Press, 2016.

Kahn, Douglas. *Earth Sound Earth Signal*. Berkeley; Los Angeles; London: University of California Press, 2013.

Krauss, Rosalind. "Sculpture in the Expanded Field." *October* 8, (1979): 31-44.

Lippard, Lucy R. *Six Years: the Dematerialization of the Art Object from 1966 to 1972*. Berkeley: University of California Press, 1997.

Mackenzie, Adrian. *Transductions: Bodies and Machines at Speed*. New York: Continuum, 2002.

Mansfield, Michael, and Colm O'Sullivan. *Understanding Physics*. 2nd ed. Chichester: Wiley, 2011.

McLuhan, Marshall. *Understanding media: the Extensions of Man*. Reprint, Cambridge, Mass.: MIT Press, (1964) 1994.

Morris, Robert. *Continuous Project Altered Daily: the Writings of Robert Morris*. Cambridge, Mass.: MIT Press, 1993.

Potts, Alex. "Disencumbered Objects." *October* 124, (Spring 2008): 169-189.

Sauvagnargues, Anne. *Artmachines*. Translated by Suzanne Verderber and Eugene W. Holland. Edinburgh: Edinburgh University Press, 2016.

Simondon, Gilbert. *Being and Technology*. Translated by Arne De Boever. Edinburgh: Edinburgh University Press, 2012.

_____. *On the Mode of Existence of Technical Objects*. Translated by Cécile Malaspina and John Rogove. Minneapolis: Univocal, 2017.

_____. "The Position of the Problem of Ontogenesis, translated by Gregory Flanders." *Parrhesia*, 07, (2009): 4-16.

APPENDIX

The following artworks were developed or exhibited as part of this research:

wound/unwind, 2016, rubber bands, milk crate, stored kinetic energy, dimensions variable.

In exploring ways to activate materials and set up responsive states, I hand wound an elastic strand that connected a found object to the architecture of the project space. This was released as the audience entered the space and continued to unwind over a sustained duration. Another form was wedged against the project space walls and connected with a slack line of adhesive tape—if enough people lent against the walls the tension holding the form was lessened and it would fall, limited by the line of tape. The work had to be reset for each encounter.



Figure 12. Sophie Takách, *wound/unwind*, 2016, installation view.



Figure 13. *wound/unwind*, 2016, detail.

57 seconds of static charge, 2016, single channel video, duration 00:57.

57 seconds documents the temporary attraction generated by the static charge of 8 metres of packing tape extended in the gallery space, tethered only at its extremities. The tape is loosely suspended between the walls of the room, allowing the charge to levitate the tape when in proximity of other objects. My hand approaches the tape, playing with the responsive charge which alternately attracts and repels the thin film.

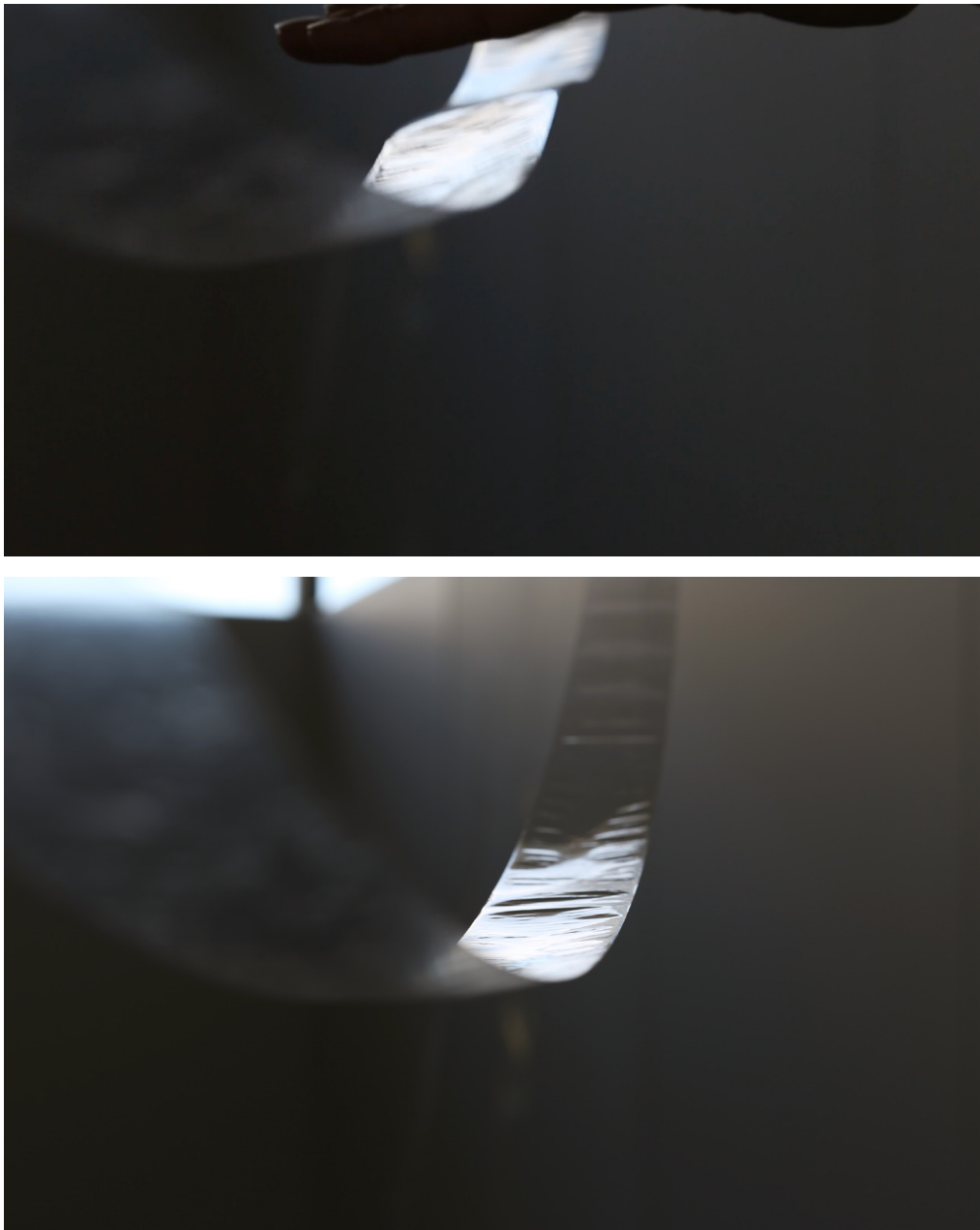


Figure 14. Sophie Takách, *57 seconds of static charge*, 2016, video stills.



Figure 15. Sophie Takách, *life/live*, 2016, installation view, c3 contemporary art space, Collingwood.



Figure 16. *life/live*, 2016, salts, aluminium.

life|live. Plate glass, aluminium sheet, stainless steel lamp, pallet, actinic T5 light, Yarra River water, 120 x 110 x 80 cm. Exhibited at c3 contemporary art space, September 2016.

Thin layers of water collected from the nearby Yarra River were sandwiched between sheets of plate glass. Light was emitted from an overhead fluorescent fixture continuously over the period of the exhibition, generating an algae growth on the surface of the glass, while the open layer evaporated and was replenished by gallery staff on a daily basis. The work explored direct and indirect means of generating activity and responsiveness to the site through the addition of energy and repeated gesture. The surface collected the remains of the insect life drawn to the light, and left a salt residue as it dried, the effect equating to tidal forces in miniature. The cyclical processes of life and death played out on small scale, echoes of microscopic slides and petri dishes on a macro scale.

Gallery text: *life|live* began with a found object; a stack of 12 plates of glass sitting on a pallet in the sun, slicked with rain and new growth blooming between layers. Relocated to c3 contemporary art space, the surface dries up and is rewetted. The water sourced is from the river that flows past the gallery; water that is carried up a hill and evaporates within a shallow pond. The actinic light supplies energy to an otherwise closed loop, providing any cyanobacteria that is present in the water the means to reproduce. The glass both provides the substrate and the limit, with each successive layer receiving a reduced level of photosynthetically useful radiation. The work is life and energy cycling live, the microscopic made visible, happening at one second per second. 600 hours of artificial light over the duration of the exhibition leaves a scum of evaporated salts and algae on the aluminium and glass plates.

handlings (2015–ongoing), bronze, dimensions variable. Exhibited as part of Human Commonalities, V.A.C. and the State Museum of Vadim Sidur, Moscow, 10 Sep–30 Oct 2016 and the Gertrude Contemporary Studio Artists Exhibition, Gertrude Contemporary, Melbourne, 28 Oct–10 Dec 2016.

Handlings are part of an ongoing series of small bronze cast objects that emerge from multiple encounters. The form is a direct live casting of the space between two clasped hands, bearing the traces of two individual palm prints. They capture two conscious bodies meeting at a boundary, their extremities, and their skin. Each form results from the combination of differently sized hands held together, finding the configuration that enables the enclosure of the casting material and adapting that hold for the duration of the setting. That particular encounter also hovers at the threshold of perception, with

the subtle creeping of the material as it sets, producing a chemical heat by-product. The de-moulding reveals unexpected forms, the process of responsive forming emerging from a mutual dialogue between the two individuals.

They have been the seed or kernel for a number of encounters. Their first public exhibition was in a haptic dialogue that Fayen d'Evie developed for the V.A.C. exhibition *Human Commonalities*; where she questioned the history of touch in the museum to direct attentiveness, through expanded movement improvisations in the handling of artworks and encouraged embodied listening. The bronzes were handled in a tactile dialogue led by Fayen, and I constructed cases that both encapsulated and held the objects in transit, also functioning as display and holding structures for the encounter with the audience.

Three of them were also exhibited in the Gertrude Studio Artist exhibition. The *handlings*, once cast in bronze, are handled again but offered without a direct intervening human action. At Gertrude Contemporary they were placed on a movable platform rigged with pulleys to a counterweight so they could be shifted to respond to the height of the audience, inviting engagement with both the bronzes and the display device.



Figure 17. Sophie Takách, *handlings v 1*, 2015, bronze.



Figure 18. Sophie Takách, *handlings* [encased for V-A-C], 2016, bronze, leather, modified slinky, copper.



Figure 19. Sophie Takách, *handlings v 1, 2 & 3*, 2016, bronze, marine rope and pulleys, stainless frame, leather.



Figure 20. Sophie Takách, *[...] {...} [...]*, 2016, installation view, Gertrude Glasshouse, Collingwood.



Figure 21. Sophie Takách, *[...] {...} [...]*, detail, Gertrude Glasshouse, Collingwood.

[...] {...} [...] *handovers + translations*, 2016, stainless steel articulated frames, bovine rawhide, with human movement encounters choreographed by Fayen d'Evie and Prue Lang, dimensions variable. Gertrude Glasshouse, 21–29 Oct 2016.

The forms developed for Gertrude Glasshouse captured the incremental movements and additions of embodied encounters with material. Working with other collaborators, the sculptural apparatus responds to the question of what it actually means to be differently embodied, and constructs a negotiated space. The apparatus enabled ways of thinking more about the range of differing human variation, in ways of moving and paths of perception. The delays and collapses that unfolded during the interactions with the materials opened up conversations about the capacity of objects, their literal oscillation between charged and exhausted. To allow further encounters, I had to generate the potential energy available for work each day by resetting the initial conditions, which sometimes erased the previous activity.



Figure 22. Sophie Takách, *[...] {...} [...]*, performative movement encounter (Ben), Gertrude Glasshouse, Collingwood.

From one body to another, 2017, stainless steel articulated frames, bovine rawhide, bronze pulleys, aluminum clamps, stainless cable and fixings (alongside movement score by Fayen d'Evie, audio description by Bryan Phillips, forming encounters with Janaleen Wolfe and Ben Phillips), dimensions variable. Exhibited at Casula Powerhouse, 29 Apr 2017–2 Jul 2017.

From one body to another uses materials that can be activated in a space to allow for unforeseen outcomes from the successive encounters with the installation. A system of hand turned bronze pulleys are rigged to the architecture of the building, using both found holes and the reconfigurable I-beam clamps of the gallery. The placement of the rigging follows the existing logic of the available points of leverage in the site. Soaked, wet rawhides are then attached to the rigging using custom fabricated clamps that allow for infinite readjustment both during the performative workshop and later after the hides have dried. The potential for physical movement, as well as vibrational and resonant properties, were to be explored. One of the aims of the project was to punctuate and interrupt habitual, visually dominated ways of encountering art. Fayen d'Evie invited Ben Phillips and Janaleen Wolfe (from the Theatre of the Blind) to work with the wet hides. The forms emerged from their playful encounter with the materials, as opposed to being imposed on the material solely by the artist. During the workshop with Ben and Janaleen, sound artist Bryan Phillips made field recordings using contact mics to listen through the building and the materials. These vibrations are returned to the gallery space in a four channel audio track that allows space for live sound to mingle with the memories of previous action.

The works are poised between movement and rest, resonant materials stretched from fixed points ready to capture and transmit touch. The audience is invited to interact with the work during guided tours led by Ben and Janaleen, who encountered the sculptural forms again and offered their own translation of the material. Deaf performer Kate Matairavula also lead tours in Auslan. *From one body to another*, the material captured and transmitted other qualities alongside the visual, not to restrict or cut off that access but to open up to other, differently embodied perspectives. The information became tactile, transmitted to another body by means of vibration. When standing inside the structure, hands or bodies may be in contact with any part of the forms or lines. These forces and movements are received as tensions and thrumming, conducted through the material.



Figure 23. Sophie Takách, *From one body to another*, 2017, installation view, Casula Powerhouse, Casula.



Figure 24. Sophie Takách, *From one body to another*, 2017, Kate Matairavula encounter.



Figure 25. Sophie Takách, *sub/supra-threshold*, 2017, installation view, [not|fair] Windsor.

sub/supra-threshold [*found heave lit hide*], 2017, repurposed stainless steel pipe and fittings, white concrete with marble aggregate, 24v LED capacitive touch light, bovine rawhide, 235 x 100 x 60 cm. Exhibited at [not|fair] 2017, Windsor, 11–19 Nov 2017.

sub/supra-threshold converts the noisy power supply of an industrial site into a variable intensity luminescence. It was installed on the second floor of the partially decommissioned Nuttalex factory in Windsor for [not|fair] 2017. The shifting parameters of the space, as conductive bodies enter and leave the field, are converted to light and transmitted to the eye as light intensities. The power circuits flutter and flicker throughout the building, and the pulsing exit sign behind the work echoed the frequency of the LED lamp. Capacitors and resistance of the metals and insulators in the sculpture work together to enable a specific process. They were tuned to resonate with the fluctuations and interference of the local power supply, responding to the presence of the building itself. The filament flickered uncertainly in response to the noise generated from the local electromagnetic field, translating that noise into variable intensities. The presence of a human body near the work is still reflected and incorporated in a variation in brightness, however it is in a non-linear and unpredictable way. The stainless steel of the apparatus was scavenged from the soon to be demolished pipe network of the decommissioned Nuttalex factory. The hide wraps around the stainless pipe acting as intersection and fulcrum. Without the complementary forces of contracting hide and rigid pipe the structure would not resist the force of gravity and stay upright.



Figure 26. Sophie Takách, *Close Approach*, 2018, installation view, Monash University, Caulfield.

Close Approach [apparatus for Evert Manifold 95cc], 2016, bronze, repurposed stainless pipe, bovine rawhide, concrete, 300 x 210 x 60 cm.

Close Approach was developed out of a series of small scale balance explorations. A horizontal cross beam sweeps a radius just inside the limits of the room, balanced on a single point fulcrum. A counterweight and pivot allow the horizontal beam to rotate within a defined area, maintaining an unstable orbit. The total length of the balanced beam is slightly less than the distance between the closest points of the room, and the height is set in relation to the height of my body. The centre of gravity of the counter weight is lower than the pivot point, generating a downward force that keeps the beam hovering above the single point of the fulcrum. This allows the minimum degree of friction, and sets up conditions where the slightest air movement will unsettle the apparatus generating a trembling motion. When unaffected by air currents, the mass finds a stable balance point at a random location within the 360 degrees of angular range. The balance beam just fits the span of the enclosing space, approaching contact but carefully positioned to just evade collision with the wall. The asymmetry of the pivot results in a singular moment within the rotation where the bronze held at one end comes within millimetres of scraping the plaster. The slight gap is barely perceptible unless approached very closely. The work is not just about magnifying the event—making the spectacular movement—but also about intensifying the potentials of otherwise insignificant motions. The subtleties of physical tension can emerge slowly and become apparent after close attention is paid to the conditions of the work.



Figure 27. Sophie Takách, *Evert Manifold (95cc)*, 2018, installation view.

Evert Manifold (95cc), 2018, bronze, stainless support apparatus for unfinished business, 140 x 33 x 27 cm. Exhibited at Unfinished Business, ACCA, 5 Dec 2017–25 Mar 2018.

Evert Manifold begins with a cast in alginate of the void space of my vagina. It gives mass and form to what is otherwise intangible, an elusive space that is ever present yet directly inaccessible. The non-space is made physical in bronze, hard and heavy, sharp and soft, becoming a potential weapon and a tool for the hand. The flexible membrane of a negative void is cast in metal, the inner surface everted. To invert is to turn upside down or to turn inward; evert is a turning out, the internal pushed out into the world. Manifold is both multiple and varied, resonant of engine and intestinal organs. Each iteration of casting is both repetition and difference of the same space, affected by the position of my body and the timing within my cycle. The volume of alginate inserted to take the initial cast is recorded in the title. Differing amounts of material alters the contours and shape of the cast form, the skin expanding to accommodate the gel before it sets. Multiple casts have been taken, beginning in 2012; *Evert Manifold 95cc* (2017) is the fourth in the series.

BIBLIOGRAPHY

- Agamben, Giorgio. "What is an Apparatus." In *What is an Apparatus? and Other Essays*. Stanford: Stanford University Press, 2009.
- Alloa, Emmanuel, and Judith Michalet. "Differences in Becoming: Gilbert Simondon and Gilles Deleuze on Individuation." *Philosophy Today* 61, no. 3 (2017): 475-502.
- Apter, Emily, Ed Atkins, Armen Avanessian, Bill Brown, Giuliana Bruno, Julia Bryan-Wilson, D. Graham Burnett, Mel Y. Chen, Andrew Cole, Christoph Cox, T. J. Demos, Jeff Dolven, David T. Doris, Helmut Draxler, Patricia Falguières, Peter Galison, Alexander R. Galloway, Rachel Haidu, Graham Harman, Camille Henrot, Brooke Holmes, Tim Ingold, Caroline A. Jones, Alex Kitnick, Sam Lewitt, Suhail Malik, Helen Molesworth, Alexander Nemerov, Michael Newman, Spyros Papapetros, Susanne Pfeffer, Gregor Quack, Charles Ray, Matthew Ritchie, André Rottmann, Amie Siegel, Kerstin Stakemeier, Artie Vierkant, McKenzie Wark, Eyal Weizman, Christopher S. Wood, and Zhang Ga. "A Questionnaire on Materialisms." *October*, no. 155 (Winter 2016): 3-110.
- Arnheim, Rudolf. *Entropy and Art: an Essay on Disorder and Order*. Berkeley: University of California Press, 1971.
- Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham: Duke University Press, 2006.
- _____. "On Touching: the Inhuman That Therefore I Am." *differences* 23, no. 3 (2012): 206-223.
- _____. "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter." *Signs* 28, no. 3 (Spring 2003): 801-831.
- Bardin, Andrea. *Epistemology and Political Philosophy in Gilbert Simondon: Individuation, Technics, Social Systems*. Vol. 19 Philosophy of Engineering and Technology. London: Springer, 2015.

- Bartholl, Aram, Domenico Quaranta, Manuel Buerger, and Josephine Bosma. *The Speed Book*. Berlin: Gestalten, 2012.
- Bennett, Jane. *Vibrant Matter: a Political Ecology of Things*. Durham N. C.: Duke University Press, 2010.
- Bertalanffy, Ludwig von. *General System Theory*. New York: George Braziller, 1968.
- Best, Susan. "Elemental Constructions: Women Artists and Sculpture in the Expanded Field." *Australian and New Zealand Journal of Art* 1, no. 2 (2000): 147-162.
- Bijvoet, Marga. *Art as Inquiry: Toward New Collaborations Between Art, Science, and Technology*. Vol. 32 of American University Studies. New York: Peter Lang, 1997.
- Bogue, Ronald. "Art and territory." *The South Atlantic Quarterly* 96, no. 3, (Summer 1997): 465-482.
- _____. *Deleuze on Music, Painting, and the Arts*. London; New York: Routledge, 2003.
- Bowden, Sean. "Lautman and Simondon—Problematic Ideas and Singularities." In *The Priority of Events: Deleuze's Logic of Sense*, 95-151. Edinburgh: Edinburgh University Press, 2011.
- Buren, Daniel. "Function of the Museum." In *Theories of Contemporary Art*, edited by Richard Hertz, Englewood Cliffs, N.J.: Prentice Hall, 1993.
- Buren, Daniel, and Thomas Repensek. "The Function of the Studio." *October* 10 (Autumn 1979): 51-58.
- Burnham, Jack. *Beyond Modern Sculpture: The Effects of Science and Technology on the Sculpture of This Century*. London: Allen Lane, 1968.
- _____. "Systems Esthetics." In *Esthetics Contemporary*, edited by Richard Kostelanetz, 160-171. Buffalo, New York: Prometheus Books, 1978.
- Chabot, Pascal. *The Philosophy of Simondon: Between Technology and Individuation*. Translated by Aliza Krefetz. London: Bloomsbury Academic, 2013.
- Colebrook, Claire. *Deleuze and the Meaning of Life*. Continuum Studies in Continental Philosophy, edited by James Fieser. London: Continuum, 2010.

- Combes, Muriel. *Gilbert Simondon and the Philosophy of the Transindividual*. Translated by Thomas LaMarre Technologies of Lived Abstraction, edited by Brian Massumi and Erin Manning. Cambridge, Massachusetts: The MIT Press, 2013.
- Coole, Diana, and Samantha Frost, eds. *New Materialisms: Ontology, Agency, and Politics*. Durham & London: Duke University Press, 2010.
- Cox, Brian, and Jeff Forshaw. *Why Does $E=mc^2$? (And Why Should We Care?)*. Cambridge, MA: Da Capo Press, 2009.
- Cox, Christoph. "Beyond Representation and Signification: Toward a Sonic Materialism." *Journal of Visual Culture* 10, no. 2 (2011): 145-161.
- Cox, Christoph, Jenny Jaskey, and Suhail Malik, eds. *Realism Materialism Art*. Annandale-on-Hudson, NY Center for Curatorial Studies, Bard College Berlin: Sternberg Press, 2015.
- Davis, Anna, and Douglas Kahn. *Energies: Haines & Hinterding*. The Rocks, New South Wales: Museum of Contemporary Art Australia, 2015.
- De Boever, Arne. "Technology, Ontology, Politics." In *Plastic Sovereignities: Agamben and the Politics of Aesthetics*, 182-224. Edinburgh: Edinburgh University Press, 2016.
- De Boever, Arne, Alex Murray, Jon Roffe, and Ashley Woodward, eds. *Being and Technology*. Edinburgh: Edinburgh University Press, 2012.
- DeLanda, Manuel. "Assemblages and Realist Ontology." In *Assemblage Theory*, 137-64. Edinburgh: Edinburgh University Press, 2016.
- Deleuze, Gilles. *Difference and Repetition*. New York: Columbia University Press, 1994.
- _____. *Empiricism and Subjectivity: an Essay on Hume's Theory of Human Nature*. Translated by Constantin V. Boundas. New York: Columbia University Press, 1991.
- _____. "Review of Gilbert Simondon's *L'individu et sa Genèse Physico-biologique* (1966)." *Pli: The Warwick Journal of Philosophy* 12, (2001): 43-49.
- Deleuze, Gilles, and Felix Guattari. "10,000 B.C.: The Geology of Morals (Who Does the Earth Think It Is?)." In *A Thousand Plateaus: Capitalism and Schizophrenia*, 39-74. London: Athlone Press, 1987.

-
- _____. "Proposition VIII. Metallurgy in itself constitutes a flow necessarily confluent with nomadism." In *A Thousand Plateaus: Capitalism and Schizophrenia*, 404-415. London: Athlone Press, 1987.
- _____. *What is Philosophy?* Translated by Hugh Tomlinson and Graham Burchell. European Perspectives, edited by Lawrence D. Kritzman. New York: Columbia University Press, 1994.
- Doidge, Norman. *The Brain That Changes Itself: Stories of Personal Triumph From the Frontiers of Brain Science*. New York: Penguin, 2007.
- Dolphijn, Rick, and Iris Van Der Tuin. *New Materialism: Interviews & Cartographies*. Ann Arbor, Mich.: Open Humanities Press, 2012.
- Eastman, Timothy E., and Hank Keeton, eds. *Physics and Whitehead: Quantum, Process, and Experience*. Albany: State University of New York Press, 2003.
- Eliasson, Olafur. "Ice Watch." Accessed December 23, 2018. <https://olafureliasson.net/archive/artwork/WEK109190/ice-watch>.
- Evens, Aden. *Sound Ideas Music, Machines, and Experience*. Vol. 27 Theory out of Bounds. Minneapolis, Minn.: University of Minnesota Press, 2005.
- Fer, Briony. "Treading Blindly, or the Excessive Presence of the Object." *Art History* 20, no. 2 (1997): 268-288.
- _____. "Objects Beyond Objecthood." *Oxford Art Journal* 22, no. 2 (1999): 27-36.
- Feynman, Richard P., and Fred Hoyle. "An Interview on Discovery in Physics with Richard P. Feynman and Fred Hoyle." *Leonardo* 9, no. 2 (1976): 143-146.
- Finkel, Leif. "The Construction of Perception." In *Incorporations*, edited by Jonathan Crary and Sanford Kwinter Zone 6, 392-405. New York: ZONE, 1992.
- Foster, Hal. "The Un/making of Sculpture." In *Richard Serra*, edited by Hal Foster and Gordon Hughes, 175-200. Cambridge, MA: MIT Press, 2000.
- Foucault, Michel. "The Confession of the Flesh" [Interview, 1977]. In *Power/Knowledge: Selected Interviews and Other Writings*, edited by Colin Gordon, 194-228. Brighton, Sussex: Harvester Press, 1980.

- Fraser, Mariam, Sarah Kember, and Celia Lury. "Inventive Life: Approaches to the New Vitalism." *Theory, Culture and Society* 22, no. 1 (2005): 1-14.
- Fried, Michael. *Art and Objecthood: Essays and Reviews*. Chicago: University of Chicago Press, 1998.
- Grosz, Elizabeth. *Becoming Undone: Darwinian Reflections on Life, Politics, and Art*. Durham [N.C.]: Duke University Press, 2011.
- _____. *Chaos, Territory, Art: Deleuze and the Framing of the Earth*. New York: Columbia University Press, 2008.
- _____. *The Incorporeal: Ontology, Ethics, and the Limits of Materialism*. New York: Columbia University Press, 2017.
- _____. "Refiguring Bodies." In *Volatile Bodies: Toward a Corporeal Feminism*, 3-24. Bloomington: Indiana University Press, 1994.
- _____. "Simondon and the Preindividual." In *The Incorporeal*, 169-208. New York: Columbia University Press, 2017.
- Groys, Boris. *In the Flow*. London; New York: Verso, 2016.
- Grubinger, Eva, and Borg Heiser, eds. *Sculpture Unlimited*. Berlin: Sternberg Press, 2011.
- Haacke, Hans. *Framing and Being Framed: 7 Works 1970-75*, edited by Jack Burnham and Howard Saul Becker. Halifax, NS: The Press of the Nova Scotia College of Art and Design, 1975.
- _____. *Working Conditions: the Writings of Hans Haacke*, Writing Art, edited by Roger Conover. Cambridge, MA: MIT Press, 2016.
- Halewood, Michael. "On Whitehead and Deleuze: the Process of Materiality." *Configurations* 13, no. 1 (2005): 57-76.
- Halsall, Francis. *Systems of Art: Art, History and Systems Theory*. Oxford: Peter Lang AG, 2008.
- Herbert, Martin. *The Uncertainty Principle*. Berlin: Sternberg Press, 2014.
- Hughes, Joe. *Deleuze's Difference and Repetition: A Reader's Guide*. London; New York: Continuum, 2009.

-
- _____. *Philosophy After Deleuze: Deleuze and the Genesis of Representation II*, Deleuze Encounters, edited by Ian Buchanan. London; New York: Bloomsbury, 2012.
- Ibrahim, Dina. "Immaterial art." *Contemporary Practices* 12, (2013): 62-65.
- Ingold, Tim. "Materials Against Materiality." *Archaeological Dialogues* 14, no. 01 (2007): 1-16.
- Irwin, Robert. *Notes Toward a Conditional Art*, edited by Matthew Thomas Simms. Los Angeles: Los Angeles: J. Paul Getty Museum, 2011.
- Johnson, Ryan J. "Differentiation, Individuation, Dramatisation and Actualisation." In *The Deleuze-Lucretius Encounter*, 120-160. Edinburgh: Edinburgh University Press, 2017.
- Kahn, Douglas. *Earth Sound Earth Signal*. Berkeley; Los Angeles; London: University of California Press, 2013.
- Kahn, Douglas, and Gregory Whitehead. *Wireless Imagination: Sound, Radio, and the Avant-garde*. Cambridge, Mass.: MIT Press, 1992.
- Kirby, Vicki. *Telling Flesh: the Substance of the Corporeal*. New York; London: Routledge, 1997.
- Krauss, Rosalind. "Sculpture in the Expanded Field." *October* 8, (1979): 31-44.
- Lapworth, Andrew. "Habit, Art, and the Plasticity of the Subject: the Ontogenetic Shock of the Bioart Encounter." *Cultural Geographies* 22, no. 1 (Jan 2015): 85-102.
- _____. "Theorizing Bioart Encounters after Gilbert Simondon." *Theory, Culture and Society* 33, no. 3 (May 2016): 123-150.
- Lippard, Lucy R. *Six Years: the Dematerialization of the Art Object from 1966 to 1972*. Berkeley: University of California Press, 1997.
- Mackenzie, Adrian. *Transductions: Bodies and Machines at Speed*. New York: Continuum, 2002.
- Mansfield, Michael, and Colm O'Sullivan. *Understanding Physics*. 2nd ed. Chichester: Wiley, 2011.

- Marjorie Gracieuse, Alex Tissandier and University of Warwick, ed. *Deleuze and Simondon*, Pli: *Warwick Journal of Philosophy*, Special Volume 2012. Coventry: Department of Philosophy, University of Warwick, 2012.
- Massumi, Brian. "Force." In *A User's Guide to Capitalism and Schizophrenia: Deviations From Deleuze and Guattari*, 10-46. Cambridge, Mass.: MIT, 1992.
- _____. *Parables for the Virtual: Movement, Affect, Sensation*, Post-Contemporary Interventions, edited by Stanley Fish and Fredric Jameson. Durham & London: Duke University Press, 2002.
- McLuhan, Marshall. *Understanding Media: the Extensions of Man*. Reprint, Cambridge, Mass.: MIT Press, (1964) 1994.
- Meillassoux, Quentin. *After Finitude: an Essay on the Necessity of Contingency*. London; New York: Continuum, 2008.
- Morris, Robert. *Continuous Project Altered Daily: the Writings of Robert Morris*. Cambridge, Mass.: MIT Press, 1993.
- O'Doherty, Brian. *Inside the White Cube: The Ideology of the Gallery Space*. Berkeley: University of California Press, 1986.
- O'Sullivan, Simon. *Art Encounters Deleuze and Guattari: Thought Beyond Representation*. Renewing Philosophy. Basingstoke; New York: Palgrave Macmillan, 2006.
- O'Sullivan, Simon, and Stephen Zepke. *Deleuze and Contemporary Art*. Deleuze Connections. Edinburgh: Edinburgh University Press, 2010.
- _____. *Deleuze, Guattari and the Production of the New*. Continuum Studies in Continental Philosophy. London; New York: Continuum, 2008.
- Ott, Brian L. "Affect in Critical Studies." *Oxford Research Encyclopedia of Communication* (July 2017). Accessed August 01, 2017. <http://oxfordre.com/communication/abstract/10.1093/acrefore/9780190228613.001.0001/acrefore-9780190228613-e-56?rskey=Z8WNtk&result=1>.
- Oxford English Dictionary, "apparatus, n.", *Oxford University Press*. Accessed August 01, 2017. <http://www.oed.com/view/Entry/9508?redirectedFrom=apparatus+>.

-
- Peckham, Morse. "Art and Disorder." In *Esthetics Contemporary*, edited by Richard Kostelanetz, 85-102. New York: Prometheus Books, 1989.
- Penny, Simon. "Modern Machine Art." *Artlink* 20, no. 3 (2000): 44-49.
- Potts, Alex. "Disencumbered Objects." *October* 124, (Spring 2008): 169-189.
- Reynolds, Jack, and Jon Roffe. "Deleuze and Merleau-Ponty: Immanence, Univocity and Phenomenology." *Journal of the British Society for Phenomenology* 37, no. 3 (2006): 228-251.
- Roffe, Jon, and Hannah Stark, eds. *Deleuze and the Non/Human*. London: Palgrave Macmillan, 2015.
- Sauvagnargues, Anne. *Artmachines*. Translated by Suzanne Verderber and Eugene W. Holland. Edinburgh: Edinburgh University Press, 2016.
- _____. *Deleuze and Art*. Translated by Samantha Bankston Bloomsbury Studies in Continental Philosophy. London: Bloomsbury, 2013.
- _____. "Design Machines and Art Machines." In *Deleuze and Design*, edited by Jamie Brassett and Betti Marenko, 65-83. Edinburgh: Edinburgh University Press, 2015.
- _____. "Simondon, Deleuze, and the Construction of Transcendental Empiricism." *Pli: The Warwick Journal of Philosophy*, Special Volume. Deleuze and Simondon, (2012): 1-21.
- Schreel, Louis. "The Work of Art as Monument: Deleuze and the (After-) Life of Art." *Footprint (1875-1490)* 8, no. 1 (2014): 97-108.
- Scott, David. *Gilbert Simondon's Psychic and Collective Individuation: a Critical Introduction and Guide*. Edinburgh: Edinburgh University Press, 2014.
- Shavero, Steven. "Actual Entities and Eternal Objects." In *Without Criteria Kant, Whitehead, Deleuze, and Aesthetics*, 17-46. Cambridge, Mass.: MIT Press, 2009.
- Simon, Penny. "Systems Aesthetics + Cyborg Art the Legacy of Jack Burnham." *Sculpture (Archive: 1987-2005)* 18, no. 1 (1999): 36-41.
- Simondon, Gilbert. "The Genesis of the Individual." In *Incorporations*, edited by Jonathan Crary and Sanford Kwinter, 296-319. New York, NY: ZONE, 1992.

_____. "The Limits of Human Progress: A Critical Study." *Cultural Politics* 6, no. 2 (2010): 229-236.

_____. *On the Mode of Existence of Technical Objects*. Translated by Cécile Malaspina and John Rogove. Minneapolis: Univocal, 2017.

_____. "The Position of the Problem of Ontogenesis, translated by Gregory Flinders." *Parrhesia* 07, (2009): 4-16.

_____. "Simondon and the Preindividual." In *The Incorporeal*, edited by Elizabeth Grosz, 169-208. New York: Columbia University Press, 2017.

_____. "Technical Individualization." In *Interact or Die!*, edited by Arjen Mulder and Joke Brouwer, 206-213. Rotterdam: V2 Publishing, 2007.

Simondon, Nathalie. "Gilbert Simondon, Biography, Some Reflections on the Life and Work of Gilbert Simondon." Gilbert Simondon. Accessed December 8, 2018. <http://www.gilbert.simondon.fr/content/biography>.

Skrebowski, Luke. "All Systems Go: Recovering Hans Haacke's Systems Art." *Grey Room*, no. 30, (Winter 2008): 54-83.

Uicker, John Joseph. *Theory of Machines and Mechanisms*. 3rd ed., edited by G. R. Pennock and Joseph Edward Shigley. New York, NY: Oxford University Press, 2003.

University of Queensland, "The Pitch Drop Experiment." Accessed March 1, 2016. <http://smp.uq.edu.au/content/pitch-drop-experiment>.

Weschler, Lawrence, and Getty Foundation. *Seeing is Forgetting the Name of the Thing One Sees: Over Thirty Years of Conversations with Robert Irwin*. Expanded ed. Berkeley: University of California Press, 2008.

Williams, James. *Gilles Deleuze's Logic of Sense: a Critical Introduction and Guide*. Edinburgh: Edinburgh University Press, 2008.

Wood, Jon, David Hulks, and Alex Potts. *Modern Sculpture Reader*. Leeds; Los Angeles: Henry Moore Institute; J. Paul Getty Museum, 2012.

Zourabichvili, François, and Kieran Aarons. "Becoming." In *In Deleuze: a Philosophy of the Event: Together with The Vocabulary of Deleuze*, edited by Gregg Lambert and Daniel W. Smith. Edinburgh: Edinburgh University Press, 2012.