



MONASH University

PHENOMENOLOGY AND **ARTIFICIAL HEARTS**

Patrick Terrence McConville

BA(Hons) *Tas.* MBioethics *Monash*

A thesis submitted for the degree of Doctor of Philosophy at
Monash University in 2022
Monash Bioethics Centre, School of Philosophical, Historical, and International Studies

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Abstract

This dissertation seeks to answer the question: how is lived experience conditioned by receiving an artificial heart? It is informed by a theoretical analysis of the objects and operation of these devices and an extensive literature of patient and consumer experiences of living with an artificial heart. I start from and in the thought of classical phenomenologist Maurice Merleau-Ponty and his account of the body-subject. I supplement this account with other scholarship in phenomenology, including the resources of phenomenology of health and illness. This dissertation seeks to contribute to the study and use of artificial hearts by developing and applying a framework for identifying, articulating, and organising the phenomenology of living with an artificial heart.

The framework for bringing out these experiences is based on three key features of the body-subject along which possibilities for experience can be conditioned. I analyse artificial hearts across axes informed by these features: incorporation, motor intentionality, and temporality. I argue that the first – incorporation – is both a phenomenological and clinical concern. The risks of artificial hearts undermine patient trust in them, and the social and gendered connotations of these technologies impair patients' affective tolerance of them. Significantly, artificial hearts are not able to match the literal or metaphorical resonances and feedback expected of the heart. On the second – motor intentionality – I argue that artificial hearts lock-in a base level of bodily doubt and prevent the normalisation of motor possibilities. By presenting internal bodily states in the form of real-time representations, artificial hearts also transform patients' epistemic relationships to their bodies and interrupt skilled coping with the world. On the third – temporality – I argue that artificial hearts disrupt cardiac rhythms and cause patients to understand time differently at short-, medium- and long-term scales.

Patients for whom artificial heart treatment is indicated and their carers deserve to know the ways in which their lives, their possibilities, will be altered by receiving a device. It is a bioethical imperative to make available information about the risks and realities of living with an artificial heart, including when these factors are not obviously clinical in nature or when they are unlikely to be decisive for clinical decision-making. A phenomenology of artificial hearts helps do this by providing a framework, prompt, and vocabulary for expressing these oft-neglected experiences.

Declaration

This thesis is an original work of my research and 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 thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

[SIGNATURE REMOVED FOR ARCHIVAL]

Pat McConville

16 March 2023

Publications during enrolment

Mills, Catherine and Pat McConville. "Phenomenology and Poststructuralism" in Rogers, Wendy A., Jackie Leach Scully, Stacy M. Carter, Vikki Entwistle, Catherine Mills (eds) *The Routledge Handbook of Feminist Bioethics*. Routledge: Abingdon (2022).

McConville, Pat. "Asteroids, Holoblack and Clearance Futurism", *The British Journal of Aesthetics* (2022).

Emmerich, Nathan and Pat McConville, "Reverse Triage and People Whose Disabilities Render Them Dependent on Ventilators: Phenomenology, Embodiment and Homelikeness," *Etikk I Praksis - Nordic Journal of Applied Ethics* 15, no. 2 (2021).

McConville, Pat. "Toward a Phenomenology of Congenital Illness: A case of single-ventricle heart disease", *Medicine, Health Care and Philosophy* 24 no. 4 (2021).

McConville, Pat. "Phenomenology and Medical Devices" in Ferrarello, Susi. (ed). *Phenomenology of Bioethics: Technoethics and Lived-Experience*. Springer: Cham (2021).

Acknowledgments

Writing this dissertation has been a great joy and intellectual adventure. I have relished the opportunity to dedicate time and energy to think through challenging and meaningful questions. I hope that this dissertation makes a contribution to the great tradition of scholarship and understanding in which I have had the privilege of participating. Already, though, undertaking this work has profoundly enriched my life.

Over this time, I have encountered mentors, colleagues, and comrades who have accompanied, influenced and supported me in myriad ways.

I was fortunate that Catherine Mills was prepared to take on a rather naïve doctoral candidate. She provided me with sound counsel, guidance and valuable opportunities throughout my candidature. I am deeply grateful for her investment in me and my work. Many of her earliest suggestions and predictions about the scope and shape of this project were ultimately irresistible, but I appreciate her respect for my need to make my own mistakes. The errors, gaps and non-sequiturs which remain are my own.

Michael Selgelid supported me as an intern at the World Health Organization prior to my candidature and made me feel welcome to the Monash Bioethics Centre as my associate supervisor. When Michael departed, Justin Oakley took on this role. Justin must surely be the kindest man in Australian philosophy. I am grateful to both.

Prior to taking on the role of associate supervisor, Justin had followed my work as a panel member for my various milestone reviews. He and my other panellists, Suzy Killmister and Chris Watkin, were consistently constructive in their feedback. Graham Oppy and Jacqueline Broad chaired these panels. Along with Monima Chadha, they must be noted for their support of me and other graduate students.

I have learned from colleagues including Nathan Bell, Peter Douglas, Ainsley Newson, Mary Walker and Narelle Warren. I also benefited from thoughtful explorations of my work in podcast conversations with Courtney Hempton and Christopher Mayes, and Claire Hansen, Bríd Phillips and Michael Stevens. Marilyn Stendera has been a supporter and occasional correspondent throughout this project and her advice and prompting helped greatly to motivate it, especially aspects of my work on temporality.

I remained oriented to graduate student life by the dynamic community of peers in philosophy, bioethics and beyond. I have especially appreciated the friendship of Alex Cain, Andrew Corcoran, Isabelle Ford, Samiksha Goyal, Felicity Gray, Josh Hatherley, Courtney Hempton, Pei-hua Huang,

David McDonnell, James McGuire, Courtney McMahon, Kelsey Perrykkad, Scott Robinson, Maksymillian Sipowicz, Craig Stanbury, Kai Tanter, James Wells and Iwan Williams. Participating in a peer-led reading group on ancient Chinese philosophy was a particular highlight.

The academy continues a long history of knowledge creation and dissemination. Maintaining our universities as places of inquiry, inspiration and integrity requires not only a receptive society but also a scholarly community bound by solidarity. Part of this research was supported by an Australian Government Research Training Program (RTP) Scholarship. Another part was undertaken alongside work with the trade union for higher education workers, the National Tertiary Education Union (NTEU). There is power in a union.

The above accounts for (some of) the academic contributions to completing this dissertation. But this work could not have been started, much less completed, without my family.

The support of my parents, Margaret and Terry, meant that my sister Claire and I were encouraged in all our choices, including to be the first generation in our family to gain a university education. I owe to them both so many things. My father died during my candidature. I know that he would have been proud, as he always was.

My partner Liz and I took the decision to move so that I could commence doctoral studies. These years have involved recalibrating both of our lives and work, charting a course through early parenthood of our inspiring daughter Artemis, responding to serious health challenges, supporting each other through grief and opportunity, navigating a global pandemic, and generally sharing all that is required to keep three lives moving forward. None of these things would have been possible without our partnership. More, she has had to read this dissertation at various stages, affirming and moderating in equal measure. My greatest thanks go to her. We are learning to make fire.

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INTRODUCTION

Artificial hearts are remarkable devices. Part of a mechanical system is hidden in the patient's chest where it either attaches to the organic heart or takes its place completely. A driveline perforates the patient's body either at their abdomen or behind their ear, carrying power and instructions from a small control and battery unit which the patient totes about with them. This is literally a lifeline without which the patient's circulation would cease and the patient die. Artificial hearts are a response to serious heart failure, an incurable condition which can only be managed medically to a limited extent.

For some patients, artificial hearts are a bridge on the way to receiving a transplant heart from a deceased person. Heart transplantation remains the optimal response to serious heart failure, but the need for replacement hearts far outstrips the availability of suitable organs. For other patients, including those eligible for transplantation but for whom a heart never becomes available, artificial hearts are a destination therapy. Faced with alternatives of further deterioration or death, patients and carers are often grateful for the opportunity to receive these incredible interventions. But gratitude for an artificial heart does not mean that it resolves once and for all the drama of heart trouble. One young patient reports to paediatrician and phenomenologist Michael van Manen:

My dad plays hide-and-seek with me. I am much better at hiding than him although sometimes I think he lets me find him. My mom once cleaned out one of the closets so I had a new hiding spot. At first my dad just looked in my usual spaces, in the shower and behind the couch. But he could not find me. His voice changed and he began calling my name really loud. "Here I am!" I answered. He ran and gave me a huge hug. We have not played hide-and-seek since.¹

The new life heralded by an artificial heart is hugely complicated: medically, socially, culturally, and experientially. These complications keep open the question of the *meaning* of the artificial heart. While this question can no more be answered once and for all by philosophy than it can by medicine, it can at least be explored by thinking through the possibilities for experiences of artificial heart bearers and their carers: that is, their phenomenology.

This dissertation seeks to answer the question: how is lived experience conditioned by receiving an artificial heart? It is informed by both a theoretical analysis of the objects and operation of these devices and an extensive literature of patient and consumer experiences of living with an artificial heart. The approach I take is a phenomenological one. Phenomenology can refer to at least four

¹ Michael A. Van Manen, "The Ventricular Assist Device in the Life of the Child: A Phenomenological Pediatric Study," *Qualitative Health Research* 27, no. 6 (2017): 801.

distinct notions. First and most obviously, it can refer to the family of philosophical approaches that have taken up the challenges and constraints inaugurated by philosopher-mathematician Edmund Husserl and that make up the phenomenological tradition, the fundamentals of which I outline in this introduction. This sense of the term is frequently encountered in philosophy and history of philosophy. Second, phenomenology can refer to experience as experienced from a privileged, first-person perspective. Cultural historian Jonathan Sterne regards this use as “simply... a fancy term for *experience*”.² This may sometimes be accurate but also underplays its value in recovering a place for subjective perspectives in many disciplines, particularly the life sciences.

Third, phenomenology can refer to methodologies or products which seek to describe, record, interpret or centre lived experience. Rather than experiences themselves, this sense of the term refers to narratives about experiences, often with the goal of elevating such narratives and renewing practice as informed by phenomenological accounts. Phenomenology is frequently cast this way in qualitative research like that undertaken in sociology and anthropology. It has also been important in nursing where it has been used to support patient-centred approaches to healthcare.³ This is the most applied sense of the term and Dan Zahavi has argued that such applications of phenomenology are most effective when distanced from its more abstract, philosophical aspects.⁴ Philosophical aspects feature most prominently in the fourth sense of phenomenology which refers to a method and study aiming to discover the conditions of possibility for experience, not just to describe or interpret experience. On this more abstract reading phenomenology names an attempt to disclose the originary, *a priori* structures and forms of experience, not only their actual, accidental or *a posteriori* contents.

This dissertation makes use of all four of these senses of phenomenology to some extent. It is immersed in the tradition and heritage of philosophical phenomenology. I start from and in the thought of classical phenomenologist Maurice Merleau-Ponty and his account of the body-subject. I supplement this account with other scholarship in phenomenology, including the resources of phenomenology of health and illness. This dissertation is concerned with experience, and in particular the experiences of patients implanted with artificial hearts and their families. It is informed by narratives of relevant patient experience drawn from diverse medical, scientific and qualitative sources, including nursing studies, medical anthropology and elsewhere. And ultimately this dissertation aims to demonstrate the conditions of possibility for experience within the context

² Jonathan Sterne, *Diminished Faculties: A Political Phenomenology of Impairment* (Durham: Duke University Press, 2021), 10.

³ Dan Zahavi and Kristian M. M. Martiny, "Phenomenology in Nursing Studies: New Perspectives," *International Journal of Nursing Studies* 93 (2019): 156.

⁴ Dan Zahavi, "Applied Phenomenology: Why It Is Safe to Ignore the Epoché," *Continental Philosophy Review* 54, no. 2 (2021).

of bearing an artificial heart. Grounded in the embodied phenomenology of Merleau-Ponty, this goal might be reformulated as discovering the way that the possibility for experience is conditioned by an artificial heart. This project thereby seeks to contribute to the study and use of artificial hearts by developing and applying a framework for identifying, articulating, and organising the phenomenology of living with a device.

The changes wrought by clinical interventions do not just appear when called at medical appointments or during acute episodes, then disappear in ordinary life. Healthcare practice and culture sets medical and physiological factors alongside or even above patient experience. While this is not entirely unreasonable within the scope of medicine, it can result in the narrow or even exclusive focus of healthcare professionals *qua* healthcare professionals on clinical encounters and interventions. Meanwhile, the larger part of patients' and carers' lives are lived outside the clinic. Patients for whom artificial heart treatment is indicated and their carers deserve to know the ways in which their lives, their possibilities, will be altered by receiving a device. It is a bioethical imperative to make available information about the risks and realities of living with an artificial heart, including when these factors are not obviously clinical in nature or when they are unlikely to be decisive for clinical decision-making. A phenomenology of artificial hearts helps do this by providing a framework, prompt, and vocabulary for expressing these oft-neglected experiences.

The development of such a framework has not yet been attempted. Despite a number of qualitative studies claiming to be phenomenological, the influence of phenomenology is typically limited to a general interest in patient descriptions of everyday experience. Philosophers have sought to bring phenomenology into considerations of medicine, healthcare and bioethics in ways I have already mentioned and draw on throughout this dissertation. Some more comprehensive efforts at integrating phenomenology and bioethics have also been made, particularly Fredrik Svenaeus's production of a phenomenological bioethics. These have typically attempted to align these fields globally rather than offer focused appraisals of specific interventions or strategies. Svenaeus, for example, argues that a phenomenological orientation to medicine would cultivate a certain wariness to medical technologies which could "tend to block life-world concerns." He notes that the implications of such an orientation may be clear in so-called "easy cases", such as the uploading of brains.⁵ I suggest that artificial hearts are an instance of what he calls "hard cases". They require an extended study of phenomena produced by the heart, whether these are sacrificed or transformed by artificial hearts, and any collateral or sequel phenomena which might be introduced by artificial hearts.

⁵ Fredrik Svenaeus, *Phenomenological Bioethics: Medical Technologies, Human Suffering, and the Meaning of Being Alive* (London: Routledge, 2018), 84.

The bioethics of artificial hearts have been debated since the early stages of their development. The United States government commissioned a report dealing with both technical and ethical matters relating to artificial hearts in the early 1970s.⁶ Among its considerations were the balancing of risks and benefits, criteria for patient selection, distributive justice, the acceptability of nuclear-powered devices, and the conduct of clinical experimentation. Another report followed a decade later.⁷ Nuclear options were no longer considered, but its topics were otherwise similar to its predecessor. Devices were reframed as innovative rather than experimental. Artificial hearts became an increasingly prominent topic in bioethics throughout the 1980s, especially whether they could really offer reasonable therapeutic benefit or social value. Cardiologist Thomas Preston's scepticism about the medicine, science and public interest of artificial hearts was representative of bioethical discomfort with the enthusiasm of device advocates.⁸ What this debate nonetheless largely missed was the *Status and Issues* report's linking patient quality of life to phenomenological issues, such as "internal sensations... quite different from those evoked by a natural heart", "range of activities", and "protocol to reenergize the device and the need for periodic checkout of the internal and external systems".⁹

Artificial heart research remains an active field and many designs and models remain investigational. As a class, however, artificial hearts are no longer experimental, and their clinical validity is no longer contested. The use of artificial hearts in planned and emergency settings is unexceptional: about 100 Total Artificial Hearts (TAHs) and 15 000 Ventricular Assist Devices (VADs) are implanted annually worldwide.¹⁰ Bioethical considerations have moved from the permissibility of artificial hearts toward a more nuanced discussion about how they are used: whether as bridging or destination therapies; and in paediatric or geriatric settings. Debate now tends to be concerned with both patient decision-making and quality of life. The ability of artificial hearts to prolong life in a liminal state, for example, was the Target Article for an issue of the *American Journal of Bioethics*.¹¹ The ironic role of cardiac devices in complicating death has also been treated by medical

⁶ Artificial Heart Assessment Panel, "The Totally Implantable Artificial Heart: Economic, Ethical, Legal, Medical, Psychiatric, Social Implications," (Bethesda: National Heart and Lung Institute, 1973).

⁷ The running head identifies this as the Status and Issues report. Robert L. Van Citters et al., "Artificial Heart and Assist Devices: Directions, Needs, Costs, Societal and Ethical Issues," *Artificial Organs* 9, no. 4 (1985).

⁸ Thomas A. Preston, "Who Benefits from the Artificial Heart?," *The Hastings Center Report* 15, no. 1 (1985): 7.

⁹ Van Citters et al., "Artificial Heart and Assist Devices: Directions, Needs, Costs, Societal and Ethical Issues," 390-91.

¹⁰ NYU Langone Health, "Cardiac Surgeons Save a Patient's Life by Implanting an Artificial Heart—& Then a Real One " <https://nyulangone.org/news/cardiac-surgeons-save-patients-life-implanting-artificial-heart-then-real-one>.; Sian E. Harding, "In Search of the Impossible Machine, the Artificial Heart," The MIT Press Reader, <https://thereader.mitpress.mit.edu/in-search-of-the-impossible-machine-the-artificial-heart/>.

¹¹ David Magnus and Danton Char, "CPR and Ventricular Assist Devices: The Challenge of Prolonging Life without Guaranteeing Health," *The American Journal of Bioethics* 17, no. 2 (2017): 1-2.

anthropologist Sharon Kaufman and colleagues.¹² These matters are, arguably, already implicitly phenomenological, and I pursue and bring out some of these phenomenological implications in Chapter 6.

The permissibility of removing or deactivating artificial hearts is a topic of ongoing bioethical debate. Internist Neil Wegner and bioethicist Katrina Bramstedt argue that VADs should be regarded as a life-sustaining therapy which can be withdrawn, an argument that Bramstedt maintains for TAHs.^{13,14} For clinician and bioethicist Jeremy Simon and bioethicist Ruth Fischbach, whether the deactivation of a VAD is an act of active or passive euthanasia turns on whether it should be regarded as an internal or external device.¹⁵ Bioethicist Felicitas Kraemer argues that such distinctions are better made on the phenomenological grounds of “*what is [an LVAD] experienced as*” rather than the ontological “*what is an LVAD*”.¹⁶ Although I am not motivated by distinguishing varieties of euthanasia, I explore how such a phenomenological judgement might be made in Chapter 5. Bioethicist Mary Jean Walker considers some of the normative implications of regarding prostheses, including artificial hearts, as body parts, including by exacerbating impersonal and mechanistic care relations.^{17,18} Similarly, bioethicists Katrina Hutchinson and Rob Sparrow consider the complex consequences of artificial organ maintenance for clinical relationships and advocate responsible design and development.¹⁹ Design work for artificial hearts increasingly includes “human factors,” but has not been phenomenologically minded.²⁰

As I have indicated, the qualitative research on patient and carer experiences with artificial hearts is rich and substantial. This research often elicits open-ended patient narratives and sometimes begins with reference to classical or hermeneutic phenomenology, but rarely proceeds along axes of interest to or in dialogue with findings in philosophical phenomenology. Studies by nursing researchers

¹² Sharon R. Kaufman et al., “Ironic Technology: Old Age and the Implantable Cardioverter Defibrillator in Us Health Care,” *Social Science & Medicine* 72, no. 1 (2011).

¹³ Katrina A. Bramstedt and Neil S. Wenger, “When Withdrawal of Life-Sustaining Care Does More Than Allow Death to Take Its Course: The Dilemma of Left Ventricular Assist Devices,” *The Journal of Heart and Lung Transplantation* 20, no. 5 (2001).

¹⁴ Katrina A. Bramstedt, “Contemplating Total Artificial Heart Inactivation in Cases of Futility,” *Death Studies* 27, no. 4 (2003).

¹⁵ Jeremy R. Simon and Ruth L. Fischbach, “Case Study: “Doctor, Will You Turn Off My LVAD?”,” *Hastings Center Report* 38, no. 1 (2008).

¹⁶ Felicitas Kraemer, “Ontology or Phenomenology? How the LVAD Challenges the Euthanasia Debate,” *Bioethics* 27, no. 3 (2013).

¹⁷ Mary Jean Walker, “On Replacement Body Parts,” *Journal of Bioethical Inquiry* 16, no. 1 (2019).

¹⁸ “A Heart without Life: Artificial Organs and the Lived Body,” *Hastings Center Report* 51, no. 1 (2021).

¹⁹ Katrina Hutchinson and Robert Sparrow, “What Pacemakers Can Teach Us About the Ethics of Maintaining Artificial Organs,” *ibid.* 46, no. 6 (2016).

²⁰ Sean Peel et al., “A Systematic Review of Psychosocial Design Considerations for the Next Generation of Mechanical Circulatory Support,” *Heart & Lung* 50, no. 3 (2021).

Jessie Casida et al and Maddi Olano-Lizarraga et al are typical of this.^{21,22} Medical sociologist Holly Standing and colleagues offer a notable exception.²³ Extended, book-length analyses of other cardiac devices have been undertaken by science and technology scholars Gill Haddow and Nelly Oudshorn.^{24,25} These studies do not aim to be phenomenological. Their lack of engagement with phenomenology in no way diminishes the value of this work, on which I draw liberally throughout this dissertation. However, these methods can yield *ad hoc* or idiosyncratic findings which are difficult to place in more broadly relevant structures of experience. It is my hope to interrogate this literature in a way which is grounded in philosophical phenomenology. In doing so, I hope to develop a framework which is theoretically robust and likely to yield insights of phenomenological value to patients, clinicians and other stakeholders.

Important work in phenomenology considers the effect of medical technologies in and on the body. This includes the postphenomenology inaugurated by Don Ihde, which I discuss later in this introduction, and continued by others. Robert Rosenberger and Peter-Paul Verbeek, themselves leaders among this group, summarise some of this work on medical imagining and implantation.²⁶ They particularly note the contribution of Helena de Preester in bringing together issues in phenomenology and cognitive science, especially regarding prosthetics and, I would add, interoception.^{27,28} These concerns are shared by Frédérique de Vignemont, albeit weighted toward the representational self-understandings of cognitive science.²⁹ Kirk Besmer gives an analysis of cyborg embodiment and intentionality generated by cochlear implants.³⁰ Analyses of neuromodulation technologies have been made by Lucie Dalibert.³¹ I take up similar work by Sadaf

²¹ Jesus M. Casida et al., "Lifestyle Adjustments of Adults with Long-Term Implantable Left Ventricular Assist Devices: A Phenomenologic Inquiry," *ibid.* 40, no. 6 (2011).

²² Maddi Olano-Lizarraga et al., "Redefining a 'New Normality': A Hermeneutic Phenomenological Study of the Experiences of Patients with Chronic Heart Failure," *Journal of Advanced Nursing* 76, no. 1 (2020).

²³ Holly C. Standing et al., "'Being' a Ventricular Assist Device Recipient: A Liminal Existence," *Social Science & Medicine* 190 (2017).

²⁴ Gill Haddow, *Embodiment and Everyday Cyborgs: Technologies That Alter Subjectivity* (Manchester: Manchester University Press, 2021).

²⁵ Nelly Oudshoorn, *Resilient Cyborgs: Living and Dying with Pacemakers and Defibrillators* (Singapore: Palgrave Macmillan, 2020).

²⁶ Robert Rosenberger and Peter-Paul Verbeek, "A Field Guide to Postphenomenology," in *Postphenomenological Investigations: Essays on Human–Technology Relations*, ed. Robert Rosenberger and Peter-Paul Verbeek (Lanham: Lexington Books, 2015), 32–37.

²⁷ Helena De Preester, "Technology and the Body: The (Im)Possibilities of Re-Embodiment," *Foundations of Science* 16, no. 2 (2011).

²⁸ Helena de Preester and Manos Tsakiris, eds., *The Interoceptive Mind: From Homeostasis to Awareness* (Oxford: Oxford University Press, 2018).

²⁹ Frédérique de Vignemont, *Mind the Body: An Exploration of Bodily Self-Awareness* (Oxford: Oxford University Press, 2017).

³⁰ Kirk Besmer, "Embodying a Translation Technology: The Cochlear Implant and Cyborg Intentionality," *Techné: Research in Philosophy and Technology* 16, no. 3 (2012).

³¹ Lucie Dalibert, "Living with Spinal Cord Stimulation: Doing Embodiment and Incorporation," *Science, Technology, & Human Values* 41, no. 4 (2016).

Soloukey and colleagues in Chapter 5.³² Jenny Slatman and colleagues have considered various permutations of external organ transplantation.^{33,34} Slatman has additionally considered the notion of identity given the inherent strangeness of human embodiment as crystallised in medical intervention.³⁵ These works develop understandings of embodiment and incorporation based on new or existing experiential accounts of non-cardiac technologies.

In this dissertation, I seek to address gaps in the bioethical, qualitative and phenomenological literatures by offering an account of how well-defined axes of lived experience are conditioned by receiving an artificial heart. The framework I develop is based on three key features of the body-subject. I analyse artificial hearts across axes informed by these features: incorporation, motor intentionality, and temporality. The first, incorporation, I argue is both a phenomenological and clinical concern. The risks of artificial hearts undermine patient trust in them, and the social and gendered connotations of these technologies impair patients' affective tolerance of them. Significantly, artificial hearts are not able to match the literal or metaphorical resonances and feedback expected of the heart. On the second, motor intentionality, I argue that artificial hearts lock-in a base level of bodily doubt and prevent the normalisation of motor possibilities. By presenting internal bodily states in the form of real-time representations, artificial hearts also transform patients' epistemic relationships to their bodies and interrupt skilled coping with the world. On the third, temporality, I argue that artificial hearts disrupt cardiac rhythms and cause patients to understand time differently at short-, medium- and long-term scales.

The choice of these three features is based on the major intersections of the body-subject and artificial hearts. I have arranged and selected them because I believe they capture substantial themes of the body-subject. I do not claim them to mark out domains with any bright lines and matters in one domain will frequently be implicated in others. I have judged these themes to be appropriate for bringing out the phenomenological aspects of artificial hearts with which I am most concerned, which relate mostly to the experiences of artificial heart users. The inclusion of these three features has necessarily excluded other features which are also, perhaps equally or more important, to phenomenology, artificial hearts, and bioethics. I am particularly mindful that this dissertation does not explicitly include an analysis along the major axis of intersubjectivity. Throughout this dissertation, I sometimes refer to patients and sometimes, where both convenient and appropriate,

³² Sadaf Soloukey Tbalvandany et al., "Embodiment in Neuro-Engineering Endeavors: Phenomenological Considerations and Practical Implications," *Neuroethics* 12, no. 3 (2019).

³³ Gili Yaron, Guy Widdershoven, and Jenny Slatman, "Recovering a "Disfigured" Face: Cosmesis in the Everyday Use of Facial Prostheses," *Techné: Research in Philosophy and Technology* 21, no. 1 (2017).

³⁴ Jenny Slatman and Guy Widdershoven, "Hand Transplants and Bodily Integrity," *Body & Society* 16, no. 3 (2010).

³⁵ Jenny Slatman, *Our Strange Body: Philosophical Reflections on Identity and Medical Interventions* (Amsterdam: Amsterdam University Press, 2014).

to patients and carers. That my principal focus is patient experience should not be taken to diminish the importance of the experiences of carers or other stakeholders, but merely to reflect practical needs and my particular interest in the experience of bearing an artificial heart.

Similarly, I do not discuss a number of matters of justice and political economy relating to artificial hearts which are undoubtedly of bioethical interest. These include concerns about privacy and security; commercial interests; fair social and international access; prioritisation of healthcare resources; and the relationships of patients to institutions in light of artificial heart therapies. It is time, space, and the priorities of this study which prevent me from considering these matters rather than any judgement that they are less important. My decision to focus on phenomenology rather than justice reflects my academic interests and my judgement of the present gaps in research on artificial hearts and medical devices. It also reflects my own position and experience. I am an economically-secure male in an advanced urban society with a relatively egalitarian public healthcare system. Although I do not expect to be indicated for an artificial heart, a congenital condition has given me a familiarity with adjacent cardiovascular issues and a particular concern for individual experience.³⁶ My hope is to sketch out a phenomenology which might help inform future discussions, not least on these important matters of justice.

While my analyses may not necessarily yield firm normative conclusions, their potential uses are manifold. An understanding of the phenomenology of artificial hearts, as they exist now and as they are likely to exist in the reasonably foreseeable future, could help to inform the plans and decisions of many stakeholders. Understanding receptions and meanings of artificial hearts among end-users should enable engineering and design stakeholders to consider barriers to incorporation and tolerance, the resonances of different device siting options, and the utility of real or simulated pulsatility and heart-rhythm. The lived implications of artificial heart interventions should already be central to the practice of clinician stakeholders. A better understanding of the difficulties of normalisation and the transformation of patient understandings of their bodies should help clinicians to understand the implications of their prescriptions both inside and outside the clinic. Without insisting that non-clinical information must be included in informed consent protocols, some of what is revealed by a phenomenology of artificial hearts may be influential to well-known bioethical considerations of indications for treatment, disclosure for consent, and developing more sympathetic clinical pathways. Certainly, patients deserve an opportunity to be aware of such considerations.

³⁶ My experience of this condition does not directly inform this dissertation, but it has informed my work elsewhere: Pat McConville, "Toward a Phenomenology of Congenital Illness: A Case of Single-Ventricle Heart Disease," *Medicine, Health Care and Philosophy* 24, no. 4 (2021).

In this introduction, I briefly sketch the case of artificial hearts which is the central topic of this study. A more detailed exposition of hearts and artificial hearts comes in a later chapter, between the conceptual framework I am using and its application to the case. I situate my approach within the phenomenological tradition and outline the particularly embodied inflection this tradition receives when interpreted by Merleau-Ponty, on whose thought my analysis is founded. I provide a brief overview of two ways in which medical devices in general can be understood phenomenologically. First, the device paradigm expresses phenomenologically what medical devices are meant to do according to approaches more typical in medicine and the life sciences. It is on the basis of the paradigm's denuding of the organic heart that artificial hearts can transform or reconstruct conditioned possibilities for experience. Second, a postphenomenology of human-machine relations makes the case that technology complicates human existence. This postphenomenology includes useful resources for later in the dissertation. Finally, I survey the structure of the dissertation to follow.

0.1 Artificial hearts in brief

Cardiovascular diseases are the leading cause of death globally.³⁷ Cardiac injury is frequently serious or fatal and for much of the history of medicine, death was defined by the cessation of circulation or respiration. One major pathology, heart failure, is a condition in which one or both ventricles do not adequately fill with blood or are unable to pump a sufficient fraction of their contents to the rest of the body.³⁸ This can cause fluid to be backed up in the veins, and heart failure is sometimes known as congestive heart failure. In cases of left heart failure, fluid can build-up in the lungs, causing shortness of breath and respiratory issues. Right heart failure is often accompanied by fluid build-up and swelling in the abdomen, legs and impairing vital organs. Heart failure can also cause the dilation of the ventricle, resulting in an enlarged but weakened heart. Heart failure is measured in four stages and while there are treatments, there is no cure.

Developing therapies for cardiovascular disease has been a priority in economically advanced countries over the course of the twentieth century. The increasing use of the heart-lung machine in the 1960s transformed the relationship between cardiac health and threats to life and expanded the reach of medicine. Cardiopulmonary bypass enabled complex surgery, including heart repair, to be undertaken without necessarily causing death or serious injury. The first organic heart transplantation was undertaken in 1967. The possibility of heart and other organ transplants, the

³⁷ World Health Organization, "The Top 10 Causes of Death," (Geneva: World Health Organization, 2018).

³⁸ John J. Atherton et al., "National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand: Guidelines for the Prevention, Detection, and Management of Heart Failure in Australia 2018," *Heart, Lung and Circulation* 27, no. 10 (2018): 1137-38.

delinking of death from its traditional definition as the cessation of circulation, and the increasing problem of permanently comatose “hopeless” cases in hospitals led to the development in 1968 of a new set of criteria for death: brain death.³⁹ With the refinement of immunosuppressant medication in the late 1970s, heart transplantation has become more common. According to International Society for Heart and Lung Transplantation (ISHLT) reports, between 2009 and 2017 over 35,000 heart transplants were undertaken.⁴⁰ As historian Shelley McKellar notes in her definitive history of the artificial heart in North America, these changes coincided with growing expectations and achievements in technology and engineering generally.

By 1965, concern about heart disease resulted in a US government sponsored programme to develop artificial hearts. This programme adopted a funding model employed in space and military development. The result was the early scientific and political framing of cardiac devices as principally a matter of efficacy and engineering, rather than of effectiveness at addressing pathetic criteria or a patient’s overall subjective wellbeing.⁴¹ One of McKellar’s principal observations about the history of artificial hearts is that their success has always been ambivalent: fitful, perpetually promissory, and troubled by a disjunction between physiological and pathetic criteria.⁴² Almost 20 tumultuous years after the first US government sponsorship, in 1982, the Jarvik-7 total artificial heart was approved and implanted into a patient named Barney Clark. Clark lived for almost four months with the artificial heart before succumbing to infection and multi-organ failure. His case was covered extensively in the media and led to intense bioethical debate, apparently totally unanticipated by the surgeon responsible.⁴³ ISHLT reports that between 2006 and 2017 over 25,000 artificial hearts were implanted, about 60 percent of the number of heart transplants over a comparable period.⁴⁴

As I use the term, artificial heart refers to both Total Artificial Hearts (TAHs), which replace the entire organic heart, and partial artificial hearts, called Ventricular Assist Devices (VADs), which either replace or attach to and assist a single ventricle to pump blood by performing some of its pumping function. Since a VAD leaves the organic heart in place they can have the therapeutic purpose of being a temporary bridge-to-recovery as well as bridge-to-transplantation and destination therapies. Typically, however, artificial hearts require substantial diseased heart material, sometimes

³⁹ "A Definition of Irreversible Coma: Report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death," *JAMA* 205, no. 6 (1968): 85-86.

⁴⁰ Kiran K. Khush et al., "The International Thoracic Organ Transplant Registry of the International Society for Heart and Lung Transplantation: Thirty-Fifth Adult Heart Transplantation Report—2018; Focus Theme: Multiorgan Transplantation," *The Journal of Heart and Lung Transplantation* 37, no. 10 (2018): 1158.

⁴¹ Shelley McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology* (Baltimore: Johns Hopkins University Press, 2018), 31-46.

⁴² *Ibid.*, 21.

⁴³ Gregory E. Pence, *Classic Cases in Medical Ethics* (New York: McGraw-Hill, 2008), 244.

⁴⁴ Robert L. Kormos et al., "The Society of Thoracic Surgeons Intermacs Database Annual Report: Evolving Indications, Outcomes, and Scientific Partnerships," *The Journal of Heart and Lung Transplantation* 38, no. 2 (2019): 118.

including the entire heart, to be removed from the patient's body. The artificial heart is placed orthotopically: that is, where the organic heart would ordinarily be, making both patient and device size important to eligibility for device interventions. Artificial hearts can be pulsatile, pumping in the periodic way characteristic of the heartbeat or rhythm. Other, newer devices instead impel blood with a spinning rotor. In these cases, blood is moved by the constant spinning of the rotors at a given speed, rather than by periodically ejecting the contents of the artificial ventricle: hence, these are called continuous-flow devices.

While the pumping component is implanted in a patient's chest, it receives both power and programming from an external unit. These are joined by a number of wires enclosed within a sheath, known as a driveline, which exits the patient's body either through the abdomen or, less commonly, at a pedestal screwed into the skull behind the ear. The driveline runs to an external unit comprising a controller unit and batteries which the patient carries in a belt, holster or backpack. Controllers vary but typically display heartrate or equivalent, fill volume, cardiac output and pressures. As well as displaying on the unit, controllers interface with monitors used by clinicians to review recorded data and set haemodynamic parameters. Artificial hearts keep blood circulating and patients alive. Batteries must be charged regularly and patients typically plug their wearable components into a wall outlet when stationary or sleeping. Power depletion causes the artificial heart to stop, usually resulting in death. Driveline exit sites are vulnerable to infection, which can in turn cause infection of the device requiring its removal. Devices are associated with a risk of blood clots, which can result in strokes or serious other adverse events.

The availability of suitable hearts recovered from deceased persons continues to outstrip waiting lists of heart disease patients eligible for transplantation, a situation to which many cardiovascular physicians are more or less resigned. Many patients and physicians, at least in economically advanced countries, view artificial hearts as the best realistic hope for responding to heart failure. Research and development of artificial hearts continues to be a prominent public and clinical health priority, an attractive medical and technical challenge, and a lucrative commercial prospect. Artificial hearts are an increasingly common intervention and research and clinical programmes are established across the world, including but not limited to Australia, China, France, Germany, Japan, Sweden and the US. Different models of devices have slightly different characteristics. Some are pulsatile; some use bioprosthetic materials such as animal valves; some are small enough for children; some can exit at multiple locations; some aspire to be wireless. In this dissertation, I am concerned with the shared characteristics of these devices. Though this study is not dependent upon them, I make two educated presumptions: that most artificial hearts will remain wired and that continuous-flow devices will become more prevalent.

0.2 Phenomenology

In the history of philosophy, phenomenology begins to emerge with the mathematician-philosopher Edmund Husserl around the turn of the twentieth century. Husserl's use of the term is unconnected with prior uses by Immanuel Kant or G. W. F. Hegel.⁴⁵ Instead, he was inspired by Franz Brentano's attempt to establish a rigorous, scientific philosophy based in an empirical and purely descriptive listing of the fundamental components of internal perception: of psychology. Husserl embraced Brentano's project and at the same time railed against the idea that logic could be founded on something so subjective and relative as psychology. For Husserl, logical validity was dependent on a relationship to truth: a relationship that is imperilled by the unreliability of psychology. Out of this critique of psychologism, Husserl salvages a role for descriptive psychology in shedding light on the constitution and laws of knowledge rather than explaining knowledge or grounding logical validity. By studying phenomena, that which appears, phenomenology orients itself away from describing the contents of mental representations as envisaged by Brentano, and toward appearances as they function as normative claims. That is, phenomenology discloses knowledge in its constitution as meaning.⁴⁶

Husserl borrows Brentano's key tool for his ambitious cataloguing of mental life: intentionality. Husserl places intentionality at the centre of phenomenology. Later phenomenologists transform this core notion to suit their own purposes, such that Paul Ricoeur notes that the history of phenomenology is a history of Husserlian heresies.⁴⁷ Joel Smith claims this history to be of various interpretations of intentionality.⁴⁸ Fundamentally, intentionality refers to the fact that our consciousness is always directed at or intended towards something: consciousness is always consciousness-of, experience is experience-of.⁴⁹ This should not imply that intentionality requires that we intend a real thing, or that we have a faithful impression of it but merely that we have our intention toward it. Husserl retains for phenomenology Brentano's aspiration to a rigorous and empirical science of the essence of pure consciousness and its phenomena. To achieve this seeming contradiction – that phenomenology should be all-at-once essential and empirical – Husserl has a novel methodology in mind. He suggests that we accept all intuitions presented to us as equally authoritative or true but suspend or bracket our judgements concerning existence and the contingent.

⁴⁵ Herbert Spiegelberg, *The Phenomenological Movement* (The Hague: M. Nijhoff, 1971), 12-15.

⁴⁶ Steven Crowell, "Husserlian Phenomenology," in *A Companion to Phenomenology and Existentialism*, ed. Hubert L. Dreyfus and Mark A. Wrathall (Malden: Blackwell, 2006), 11-13.

⁴⁷ Paul Ricoeur cited in Saulius Geniusas, *The Phenomenology of Pain* (Athens: Ohio University Press, 2020), 13.

⁴⁸ Joel Alexander Smith, *Experiencing Phenomenology* (Abingdon: Routledge, 2016), 30.

⁴⁹ *Ibid.*, 31-45.

Husserl labels this bracketing an attitude of *epoché*.⁵⁰ It may seem counterintuitive to simultaneously “put out of action” the existence of a thing while making a study of it but the object of study Husserl has in mind is the intentional object, not a real or actual object. What is intended should be able to survive the bracketing of the contingent. Contingency so excised, what remains are the structural features of the object. Husserl claims that phenomenology thus returns, “to the ‘things themselves’”.⁵¹ This triumphant pronouncement is based in his very particular sense of the things as they are given in experience. It is the intended object as it is intended which reveals the pure meanings of things.⁵² Having bracketed questions of existence and accepted all intentions as being as truthful as they appear to be, there appear any number of possible real and conceptual varieties of that intention. Cycling through this array of potential variations of an experience, those features which appear consistently are essential to the experience.⁵³ This method of encountering or imagining – which amount to the same thing within the domain of intentionality – reveals the conditions of possibility of things.

An implication of this method is that the things that appear to us are always and already immersed in meaning and many times multiple meanings. The milieu of meaning in which phenomena are grounded are expressed as worlds or lifeworlds, examples of which for Husserl include the natural world and the arithmetic world “there for me only when and so long as I occupy the arithmetical standpoint.”⁵⁴ For a method which aspires to scientific rigour, one might doubt exactly how controlled, universal or transcendent this phenomenological thought-experimentation can be. One might also question the scope of the phenomenological project, simultaneously having the audacity to define the conditions of possibility of meaning and yet the humility to recognise that the contents of phenomena cannot be collected dispassionately. Perhaps as a result of this fundamental tension, phenomenology has been a movement of oscillating breadth and near-constant reinvention. Even Husserl, in his later work, reinvents his phenomenology with a new focus on genesis, or the ways in which things are shaped by history and contingency.⁵⁵

Two figures are dominant in Merleau-Ponty’s thought. The first is Descartes, whose mind-body dualism approximates Merleau-Ponty’s central problematic of the intellectualism-empiricism dichotomy. The second is Husserl, whose lectures Merleau-Ponty attended in 1929 in Paris and

⁵⁰ Edmund Husserl, *Ideas: General Introduction to Pure Phenomenology* (Florence: Routledge, 2012), §30-§32, 55-60.

⁵¹ *Logical Investigations*, trans. J. N. Findlay, 2 vols., vol. 1 (London: Routledge, 2001), 1, 168.

⁵² Martin Jay, “The Lifeworld and Lived Experience,” in *A Companion to Phenomenology and Existentialism*, ed. Hubert L. Dreyfus and Mark A. Wrathall (Malden: Blackwell, 2006), 93-94.

⁵³ Don Ihde, *Experimental Phenomenology* (New York: Putnam, 1977), Chapter 2.

⁵⁴ Husserl, *Ideas: General Introduction to Pure Phenomenology*, §28, 54.

⁵⁵ Jeffrey Yoshimi, *Husserlian Phenomenology: A Unifying Interpretation* (Cham: Springer, 2016), 67-68.

whose published and unpublished work he read throughout the 1930s.⁵⁶ Merleau-Ponty drew not only on Husserl's type of inquiry but also much of his conceptual equipment. Husserl had been reluctant to dilute the purity of a transcendent, philosophical phenomenology out of concern that it would be tainted by psychologism. Merleau-Ponty prefaces his major work with a happy concession that the phenomenological reduction entailed by the *epoché* can never be complete.⁵⁷ In light of this he attempts to escape the *a priori* and ground his phenomenology in embodied reality. Husserl had already considered and articulated important features of the human body, but for Merleau-Ponty the body becomes fundamental. For him, the subject is not only a perspective on the world. It is a material thing with space, time, and a real bodily configuration and facticity. Later interpreters attribute the hyphenated term "body-subject" to the figure at the centre of his investigations.

The materiality of the body-subject renders its phenomenology one of actuality, rather than pure possibility. A. David Smith argues that Merleau-Ponty existentialises the image of embodiment offered by Husserl by positing a body which necessarily acts in a unified and synaesthetic way, but which varies according to its actual and accidental parts.⁵⁸ Merleau-Ponty puts it that, "the unity of the senses, which was taken as an *a priori* truth is no longer anything but the formal expression of a fundamental contingency: the fact that we are in the world."⁵⁹ Such fundamental contingency or facticity is a product of existence of the human body, and

... there is no unconditioned possession in human existence, and yet neither is there any fortuitous attribute. Human existence will lead us to revisit our usual notion of necessity and of contingency...⁶⁰

According to Andrew Inkpin, it is this confusion of necessity and contingency in the body that leads Merleau-Ponty to correct the course of his phenomenology. Inkpin argues convincingly that Merleau-Ponty's adapted aim is to discover the necessary predicates of intentionality in light of the actuality of human existence, rendering Merleau-Ponty's method non- or anti-transcendental.⁶¹ Alternatively, Merleau-Ponty's thought can be placed within what Cressida Heyes calls

⁵⁶ Donald A. Landes, "Translator's Introduction," in *Phenomenology of Perception* (Abingdon: Routledge, 2012), xxxv-xxxvi.

⁵⁷ Maurice Merleau-Ponty, *Phenomenology of Perception*, trans. Donald A. Landes (Abingdon: Routledge, 2012), lxxvii.

⁵⁸ A. D. Smith, "The Flesh of Perception: Merleau-Ponty and Husserl," in *Reading Merleau-Ponty: On Phenomenology of Perception*, ed. Thomas Baldwin (London: Routledge, 2007), 18-20.

⁵⁹ Merleau-Ponty, *Phenomenology of Perception*, 229.

⁶⁰ *Ibid.*, 174.

⁶¹ Andrew Inkpin, "Was Merleau-Ponty a 'Transcendental' Phenomenologist?," *Continental Philosophy Review* 50, no. 1 (2017): 44.

“posttranscendental” phenomenology.⁶² Rather than seek to discover the conditions of possibility for experience *per se*, Merleau-Ponty adjusts his goal to discovering the conditions of actuality.

Grounding phenomenology in actuality prepares it for application. Jessica Stanier proposes an engaged phenomenology in which research is not just a conversation between philosophers or even interdisciplinary researchers, but a dialogue with the participants whose experience has informed qualitative research.⁶³ Merleau-Ponty’s research draws on a plurality of sources of lived experience but it does not seek to serve or address these sources. His phenomenology is for philosophical, theoretical reasons, not to be engaged or applied. But it could be. When turned to a community of interest it could be used to discover not just the conditions of possibility for experience, but how possibilities for experience are conditioned in the situation of that community. It is this kind of investigation in phenomenological bioethics which I undertake in this dissertation. It is phenomenological in that it applies key insights from this tradition in seeking to identify how patients’ and carers’ possibilities for experience are conditioned by artificial hearts. It is bioethical not because it is straightforwardly directive but because it develops a resource which bears on the conduct of multiple stakeholders in healthcare, not least consumers. This understanding enables stakeholders to better grasp, weigh, balance and generally improve bioethical decisions.

0.3 Medical devices

Bioethics remains motivated in large part by advances in medical technology. New, life-sustaining interventions have resulted in new ethical challenges and the development of bioethics is often intertwined with the emergence of novel healthcare possibilities. Phenomenology, too, has been responsive to technology broadly construed and to issues in health, illness and patient experience. Phenomenology has arguably been less attentive to the intersection of these, especially to medical technologies construed in their narrower, artefactual sense: the medical devices on which doctors and patients increasingly rely to respond to illness and manage health conditions. This seeming oversight might be explained by the heterogeneity of medical devices. Many devices are specifically designed for, and known only to, those patients and physicians with clinical reasons for their use. Another explanation might be a preoccupation among phenomenologists with technology as a global mode of interpreting the world. How technology as interpretation bears on the healthy can overshadow how it bears on the ill, as well as relegating specific instances of technology to mere

⁶² Cressida J. Heyes, *Anaesthetics of Existence: Essays on Experience at the Edge*, (Durham: Duke University Press, 2020). 16-19.

⁶³ Jessica Stanier, "An Introduction to Engaged Phenomenology," *Journal of the British Society for Phenomenology* 53, no. 3 (2022): 235-36.

second-order concern. Don Ihde introduces his phenomenology of human-machine relations as already “terribly mundane and almost too obvious”.⁶⁴

Nonetheless there are, to my mind, good reasons to consider the phenomenology of medical devices. Medical devices are increasingly present in the lives of all people, not just those for whom they are indicated by illness. It may be even be accurate to observe that with the growth of activity trackers and health applications on smartphones, medical devices have infiltrated the global mode of technology. For those for whom more elaborate devices are indicated, devices make a significant, sometimes decisive, contribution to their health and wellbeing. The power and scope of such devices is only increasing along with the associated bioethical concerns. Phenomenology has always been well-placed to offer critical perspectives on bioethical issues. Returning the patient and the situation to the frame of reference for medical device manufacturers and technology entrepreneurs, as well as informing users and patients, should be pressing concerns for both bioethics and philosophers of lived experience. In this introduction I seek some basic ways of phenomenologically characterising medical devices which can be reconciled with approaches in medicine and the life sciences.⁶⁵

I have referred already to the wide range of devices which are captured by the term “medical devices”. This breadth is well captured in regulatory frameworks. To paraphrase the relevant Australian statute, the *Therapeutic Goods Act 1989*, a medical device is any article and its accessories or software intended by its supplier for diagnosis, prevention, monitoring, treatment, alleviation of or compensation for disease, injury or disability; investigation, replacement or modification of the anatomy or of a physiological process; or control of conception, that does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means.⁶⁶ This definition is expansive. Devices run the gamut from monitoring devices like activity trackers, to medical utilities and single-use equipment, to artificial organs and prosthetics. My interest is particularly on portable end-user devices rather than products used by healthcare workers or in hospitals. This definition is also especially useful in highlighting the importance of intention. Not merely a quirk of legal drafting, many basic theories of made-object functioning in philosophy of engineering and design emphasise the value, uses and intentions ascribed to those objects by agents.⁶⁷

⁶⁴ Don Ihde, "The Experience of Technology: Human-Machine Relations," *Cultural Hermeneutics* 2, no. 3 (1975): 267.

⁶⁵ I have published an expanded version of this section elsewhere: Pat McConville, "Phenomenology and Medical Devices," in *Phenomenology of Bioethics: Technoethics and Lived-Experience*, ed. Susi Ferrarello (Cham: Springer, 2021).

⁶⁶ *Therapeutic Goods Act 1989* (Cth) s 41BD

⁶⁷ Wybo Houkes and Pieter E. Vermaas, *Technical Functions: On the Use and Design of Artefacts*, (Dordrecht: Springer, 2010).

0.3.1 Borgmann: Device paradigm

Classical phenomenologist Martin Heidegger developed a characteristically existential notion of intentionality, encompassing a multitude of aspects of being in the world. In his prominent contribution to philosophy of technology, *The Question Concerning Technology*, Heidegger describes how a whole context of material, form, purpose and means are gathered together by a shipwright to bring about and reveal a ship. Technology, on the other hand, is a mode of revealing and ordering by which “Everything everywhere is ordered to stand by, to be immediately on hand, indeed to stand there just so that it may be called on for a further ordering.”⁶⁸ Albert Borgmann applied Heidegger’s description of technology as a standing-reserve to what he calls the device paradigm. Whereas what Borgmann calls a “thing” requires of us a manifold bodily and social engagement with its world or context, a “device”:

... disburdens us of all other elements. These are taken over by the machinery of the device. The machinery makes no demands on our skill, strength, or attention, and it is less demanding the less it makes its presence felt. In the progress of technology, the machinery has therefore a tendency to become concealed or to shrink. Of all the physical properties of a device, those alone are crucial and prominent which constitute the commodity that the device procures.⁶⁹

What is important in this paradigm is that devices are separated from the phenomenal context of the thing on which the device is based. In furnishing a commodity they obscure or erase a world. As I use it throughout this dissertation, the term commodity refers to this phenomenological sense of a discrete resource produced by a device. I seek to separate this term from its potential political-economic or Marxist connotations, though I acknowledge that the device paradigm may be amenable to political critique. The device paradigm already requires other types of clarification. It may not always be possible to identify the commodity or bundle of commodities procured by a given device. This issue is especially challenging in the context of medical devices, since philosophers of body, biology and medicine continue to contest concepts of health, disease, and organic functioning.

One prominent non-phenomenological account of health, disease and physiological functioning is Christopher Boorse’s biostatistical theory of health. Rather than concede to evaluations of health and disease as subjectively positive or negative states, biostatistical theory aims to offer a value-free, naturalistic description of what comprises a healthy or diseased state of affairs. Boorse measures the

⁶⁸ Martin Heidegger, “The Question Concerning Technology,” in *Basic Writings: From Being and Time (1927) to the Task of Thinking (1964)*, ed. David Farrell Krell (Abingdon: Routledge, 2011), 225.

⁶⁹ Albert Borgmann, *Technology and the Character of Contemporary Life* (Chicago: University of Chicago Press, 1984), 42.

health of parts or processes of a biological system from a baseline of its species-typical contribution to certain goals at the apex of the physiological hierarchy. The goals identified as apical or highest in physiology are those of individual survival and reproduction.⁷⁰ This account has been challenged. Elseltijn Kingma, for example, argues that biostatistical theory smuggles normative assumptions into its selection of reference classes.⁷¹ But its axiomatic valuing of biology for its contribution to survival and reproduction helps clarify how we might read onto biology a certain allegorical intention. Talk of intention in connection with impersonal processes such as evolution is fraught. Yet, intention can be read onto the field of medical device design. Intentions represent the reduction of the parameters of biomimicry to an individual or small cluster of functional products. These are the commodities of medical devices.

Medical devices carve out commodities related to intentions derived from an assessment of biological function. As Justin Garson has observed in the case of the heart, some features make a negligible contribution to its identified fitness-related function.⁷² Features of the heart unrelated to its pumping blood, such as a palpable and audible pulse, can be ignored by biologists. Subsequently they can be excised from the intentions of medical device designers seeking to act medically in relation to the heart. Hence, some ventricular assist and artificial heart devices have focused on the heart's circulatory function and shifted from pulsatile to continuous-flow mechanisms. Some of what is lost is expressed in Jean-Luc Nancy and Maria Zambrano's essays "L'Intrus" and "The Metaphor of the Heart", on both of which I draw in later chapters.^{73,74} Medical devices can, in this way, be brought within the device paradigm. What is lost in the transformation from thing to device is the network of personal, social, affective, and ultimately phenomenal qualities surplus to biology.

0.3.2 Ihde: Human-machine relations

The postphenomenologist Don Ihde articulates a phenomenology of machine-human relations. Ihde divides the relations of "embodied technics" into three basic types. "Background relations" indicates relations between machines which contribute to environmental conditions such as heating and lighting. The human is more peripheral to this relation than is the case of most medical devices. Next, "embodiment relations" involves experiencing the world through machines. Here a machine assumes a partial transparency and joins with the human to act as integrated origin of intention. Since the intentional end is the world, the human and their machine partner's status as objects in

⁷⁰ Christopher Boorse, "Health as a Theoretical Concept," *Philosophy of Science* 44, no. 4 (1977): 555-56.

⁷¹ Elseltijn Kingma, "Health and Disease: Social Constructivism as a Combination of Naturalism and Normativism," in *Health, Illness and Disease : Philosophical Essays*, ed. Havi Carel and Rachel Cooper (Abingdon: Routledge, 2014), 40.

⁷² Justin Garson, *A Critical Overview of Biological Functions*, (Cham: Springer, 2016). 70.

⁷³ Jean-Luc Nancy, "L'intrus," *CR: The New Centennial Review* 2, no. 3 (2002).

⁷⁴ María Zambrano, "The Metaphor of the Heart," *History of European Ideas* 44, no. 7 (2018).

the world escapes attention and is disclosed only secondarily, through an intentional echo.⁷⁵ Cultural critic Vivian Sobchak has explored the implications of echo focus in her autoethnographic accounts of prosthesis use.⁷⁶ Machine embodiment is not merely a neutral facilitator of engagement with the world but rather transforms naked experiencing, effecting what Ihde calls a sensory-extension-reduction. Ihde gives the example of a telephone which at once extends audibility while reducing the broader phenomenon of presence to audibility.⁷⁷ In a similar vein Hubert Dreyfus, a prominent critic of artificial intelligence, offers an analysis of other forms of telepresence in terms of reducing risk.⁷⁸

Ihde last considers “hermeneutic relations”. In this, rather than a machine joining the human as an integrated origin, the machine becomes a conduit for or component of the intentional end of the world. A machine becomes something like a text about the world which transforms access to, and interpretation of, it. Ihde gives the example of gauges displaying the functioning of a heating system: experiencing these machine-gauges relieves the need to visit the various rooms and check their temperature.⁷⁹ A bodily example might be real-time monitoring of visceral states. Ordinarily, there is considerable latency between visceral changes and their symptoms which Drew Leder calls spatiotemporal discontinuity.⁸⁰ Point-of-care blood sugar monitors offer real-time, quantified access to our metabolic state before the onset of hypoglycaemic symptoms. Machines can also disclose previously inaccessible parts or understandings of the world. Since these cannot be verified by ordinary experience, they are genuinely to be interpreted. A medical device offering such access might be a point-of-care blood coagulation monitor which discloses a clotting property which itself is never experienced *qua* property. Hermeneutic relations complicate what it is actually intended: the world, the machine, or the machine-as-proxy.

There is much in Ihde’s phenomenology of human-machine relations which is sympathetic to and even assumes an acquaintance with Merleau-Ponty’s work in phenomenology. But while Ihde outlines a series of correlations in which partially transparent machines modify and ambiguate the relatively well-defined variables of human or world, perhaps the distinctive feature of Merleau-Ponty’s is an original and originary ambiguity, what he refers to as a “genius for ambiguity that might well serve to define man”.⁸¹ The implications of medical devices will therefore be different for Merleau-Ponty’s body-subject than it is for Ihde’s human. I argue that this constitutive ambiguity

⁷⁵ Ihde, “The Experience of Technology: Human-Machine Relations,” 271-72.

⁷⁶ Vivian Sobchak, ““Choreography for One, Two, and Three Legs” (a Phenomenological Meditation in Movements),” *Topoi* 24, no. 1 (2005): 57-58.

⁷⁷ Ihde, “The Experience of Technology: Human-Machine Relations,” 273-74.

⁷⁸ Hubert L. Dreyfus, *On the Internet* (Abingdon: Routledge, 2009), 57-60.

⁷⁹ Ihde, “The Experience of Technology: Human-Machine Relations,” 275-76.

⁸⁰ Drew Leder, *The Absent Body* (Chicago: University of Chicago Press, 1990).

⁸¹ Merleau-Ponty, *Phenomenology of Perception*, 195.

may be destabilised by the comparative resolution of certain medical devices. Machine mediation does not introduce vagueness but rather requires of human ambiguity something artificially definite. In the next chapter, I consider some of the key dimensions of Merleau-Ponty's phenomenology through which medical devices and artificial hearts in particular might be evaluated using three key features of the body-subject: incorporation; motor intentionality; and temporality.

0.4 Structure

So far, I have sought to show that this dissertation is undertaking a close study of a medical intervention deserving of closer examination, the case of artificial hearts which I have thus far only briefly outlined. I have also tried to show that this dissertation is at once firmly founded in the philosophical tradition of phenomenology and contributes to bioethics, whether or not firm normative conclusions can be derived from its investigations. I have also provided some basic ways of thinking about medical devices phenomenologically, including the device paradigm by which biological functions might be aligned with device purposes and commodities and the postphenomenological approach of human-machine relations. This dissertation proceeds as follows:

Chapter 1: Features of the Body-Subject

I establish the theoretical basis and structure of this study by surveying Merleau-Ponty's notion of the body-subject and extracting from it three key features. I take each of these to be important to describing the experience of artificial hearts: incorporation, or the way in which people respond to changes to their bodies, including the use of medical devices; motor intentionality, or the relationship between the body-subject and their world; and temporality, or a person's lived relationship with time.

Chapter 2: Normalising the Body-Subject

Although Merleau-Ponty draws on pathological cases to develop his account of the body-subject, he remains neutral as to the value of health. I seek to reconcile the body-subject with the vital normativity of philosopher of medicine Georges Canguilhem, to which it is typically opposed. I make an intervention in the literature on these two influential figures in French philosophy by arguing that Merleau-Ponty and Canguilhem correspond in important ways. Outlining the compatibility of the body-subject with vital normativity allows me to speak of normal and normative experiences later in the dissertation.

Chapter 3: Varying the Body-Subject

I integrate important developments relating to bodily variation into my working account of the body-subject. I consider criticism that the body-subject presumes a monolithic norm of primordial being which is masculine, white, heterosexual, able-bodied and generally stripped of characteristics of difference. In this context, I consider the phenomenology of feminine comportment discussed by Iris Marion Young. I consider Jackie Leach Scully's disability phenomenology and embodied cognition as grounding the importance of metaphor in body-subjectivity. I show that Merleau-Ponty's account is receptive to expressive metaphor like that of phenomenologist María Zambrano, to whose essay "The Metaphor of the Heart" I later refer. I also consider more recent contributions to phenomenology of health and illness, particularly S. Kay Toombs and Havi Carel, by explicating their positions on illness as loss, spatiotemporal transformation, and bodily doubt.

Chapter 4: Hearts and Artificial Hearts

I introduce the technologies and devices with which the whole dissertation is concerned: the artificial heart. I start by considering how phenomenologists have understood the organs and offer a reading of the heart in the context of a replaceable thing. I survey the history and current technologies of artificial hearts in order to describe the key elements of their design and operation. I go on to consider in detail the ways that pulsatility – a feature of the heart which can be changed by artificial hearts – might be understood phenomenologically. This is particularly brought out in a comparative phenomenology of the heartbeat in Western and Chinese traditions. The next three chapters each apply a prominent feature of the body-subject to artificial hearts.

Chapter 5: Incorporation

I show that incorporation is an important clinical consideration and that there are challenges to the incorporation of artificial hearts across three key clinical criteria: trust, affective tolerance, and proprioceptive feedback. I describe the physical and material elements of artificial hearts, then compare complications of these devices with complications of organic transplants as described by phenomenologist-patients. Whereas organic transplants raise complications of immunity and boundary of the self, artificial hearts raise injury, infection and identity issues, including gendered problems of cyborg sexism. These are obstacles to the trust and affective tolerance criteria for incorporation. I consider the altered haptic feedback produced by artificial hearts as an obstacle to the proprioceptive criterion for incorporation. I additionally draw on the expressive resources in the transplant phenomenologies, Zambrano's essay "The Metaphor of the Heart", and an illustrative early modern *noli me tangere* painting to consider how artificial hearts undermine or alter metaphorical resonances of the heart. In particular, I argue that artificial hearts transform

prereflective understandings of the heart as a place of passage between interior and exterior and raise fundamental questions about the structure of the body-subject.

Chapter 6: Motor Intentionality

I show that the illness which indicates the implantation of an artificial heart – heart failure – already changes the motor possibilities of a body-subject. Interventions aimed at adapting patients to new relationships to the world are likely to be more successfully normalising than those which seek to rehabilitate prior relations. Within a restorative treatment frame, the normalising potential of artificial hearts is limited both by practical efficacy and by the static cardiac output which devices are programmed to produce. Bearers of artificial hearts are restricted in their movements by the literal limits of external components and the inculcation in patients of an existentially bounded, positional spatiality rather than a more expansive, situational spatiality. I have also shown that artificial hearts disrupt the prereflective relation of the body-subject to their own body and the world. New, reflective representations about internal cardiac states can crowd out important interoceptive experience and interrupt prereflective coping. Patients are nonetheless made responsible for retrieving and reconciling both ways of understanding their cardiology for integration in their healthcare.

Chapter 7: Temporality

I return to some of Merleau-Ponty's comments on temporality and the organs, especially the heart. These comments point to an important role for the viscera in the temporalisation of the body-subject but fail to specifically elaborate this role. I supplement these comments with a reading of María Zambrano, whose complementary description of the heart brings out more clearly the ways in which the heart can be both prepersonal and connected to personal circumstances. I document three scales of temporal change. Short-term time perceptions are affected by changes in cardiac rhythm which are generated by all models of artificial heart. Medium-term changes come from restructuring days and weeks around the demands of machines. Long-term temporal changes occur over months or years as a result of patients' objectification and suspension on a timeline or, just as often, a loop of interventions resulting from uncertain clinical pathways and the research, development and deployment cycles of artificial heart devices. I argue that patients and carers should be aware of the ways in which the times made available to them by artificial heart interventions will be defined, or refined, by these devices.

Concluding remarks

I revisit the dissertation as an exercise in phenomenological bioethics. I recapitulate the main findings on incorporation, motor intentionality, and temporality before situating the dissertation

within both bioethics and phenomenology. Some matters raised in this dissertation relate to familiar issues in bioethics, clinical practice, and health-related fields. I hope that practitioners in these fields receive these observations as making explicit some of the challenges of artificial hearts to which they are well-disposed to respond. Other matters raised by these analyses may appear more obscure or esoteric to the healthcare professional or the normatively focused bioethicist. These point to the continued importance of patient and consumer experience and expertise with artificial heart interventions. I outline how aspects of my approach may be useful for the phenomenological analysis of other medical devices, including highlighting the supplements I make to the body-subject to enable it to account for variations in health and illness and to bring in expressive resources.

CHAPTER 1: FEATURES OF THE BODY-SUBJECT

As I earlier introduced, Maurice Merleau-Ponty responds to the phenomenological goal of uncovering the conditions of possibility with a posttranscendental turn. For him, subjectivity is grounded in the particular perspective of one who lives in the world. The horizons of this subjectivity are so much determined by the structure of the human body that his phenomenology is often attributed to the “body-subject”. This embodied phenomenology provides a rich and thoughtful account of the way the world is experienced, at least by some people. Its emphasis on actuality and contingency also makes it particularly useful for a study of experience in light of medical changes, such as implantation with an artificial heart. This dissertation is grounded in and refers throughout to the body-subject, supplemented by additional resources introduced in the next two chapters. This chapter considers some fundamental theoretical insights on which the body-subject is based. I begin by considering two notions of spatiality – positional and situational – which are central to the body-subject. These underwrite the transition from objective body to phenomenal body, and the body’s special and ultimately ambiguous character as neither pure object nor subject. The body-subject is the zeropoint of space and the horizons of experience.

I go on to draw out three of the key features by which Merleau-Ponty’s body-subject is conditioned: incorporation; motor intentionality; and temporality. First, I consider the process of incorporation, by which the phenomenal body is shaped and varied. I describe how incorporation operates, and I pay particular attention to the unity of the resulting phenomenal body and how internal organs might feature in this account. Second, motor intentionality describes how body-subjects relate to and act in the world through bodily awareness. I consider Merleau-Ponty’s claim that motor intentionality is basic intentionality, how it implies prereflective awareness of the world, and how it relates to the kind of transparency and horizon also important to phenomenal body. Third, temporality is how time is lived by body-subjects. I consider the double horizons of the present – protention and retention – and the way that rhythm extends the notion of bodily awareness into the domain of time. These three features guide more detailed consideration of artificial hearts in later chapters since they are fundamental ways in which possibilities for experience is conditioned. They are also domains which could be, and as I later argue are, altered by implantation of artificial hearts.

1.1 Merleau-Ponty and the body-subject

Merleau-Ponty is rightly considered the philosopher of the body *par excellence* but the basic architecture of his notion of embodiment is transposed from Edmund Husserl. Husserl distinguishes between the attitude adopted by the natural scientist or observer and the attitude we adopt in everyday living. In the scientific attitude we “experience merely material things,” abstracting away

from them meaning and subsuming them under general and objective laws. The body is perceived from this standpoint as *Körper*, objective body. But it is inconceivable that we could understand ourselves only in this abstract way since “every ego must build up a real world.”¹ We live lives of meaning, which means that we primarily experience our bodies not as objective but rather as *Leib*, lived body. The lived body typically accompanies the objective body but is imbued with a certain power from which perception originates and which enables us to experience fields of sensation and spontaneously commence free movement.² As the origin of perception, our lived body is also the source of conscious experience, a zeropoint and turning point from the physical to the psychic, “from the start interwoven with the constitution of a body.”³

Merleau-Ponty’s most important innovation is to strengthen the claim that a subject just is their body. This claim is initially grounded in Husserl’s multiple senses of body and the body’s special originality. Merleau-Ponty also concurs that the subject is inseparable from and must always have a world.⁴ He cites classical phenomenologist Max Scheler in agreement with the idea that a body understood as a scientific “mere collection of eyes, ears, tactile organs... to whom ‘sensations’ are ‘given’ not only have no world, but also have nothing of the world.”⁵ He adopts the body understood as origin or zeropoint. In Merleau-Ponty’s phenomenology this origin becomes the “pivot” and “unperceived term at the centre” of, and the “vehicle of being in” the world.⁶ Yet such is the concordance between Husserl and Merleau-Ponty that A. David Smith argues that at this stage Merleau-Ponty adds nothing.⁷ Sara Heinämaa points out, however, that Husserl’s notion of lived body stands in a complex, spatially-overlain coincidence with the objective body which is hardly explicit.⁸ Merleau-Ponty seeks to bring out this coincidence.

I follow many scholars in attributing to Merleau-Ponty’s fusion of body and subject the new term “body-subject”. Though Merleau-Ponty himself never uses the term, a key achievement is his identification of body and subject as two aspects of a single being.⁹ For him, body and subject are definitively merged:

¹ Smith, “The Flesh of Perception: Merleau-Ponty and Husserl,” 5.

² Sara Heinämaa, *Toward a Phenomenology of Sexual Difference: Husserl, Merleau-Ponty, Beauvoir* (Lanham: Rowman & Littlefield Publishers, 2003), 28-29.

³ Smith, “The Flesh of Perception: Merleau-Ponty and Husserl,” 5.

⁴ Merleau-Ponty, *Phenomenology of Perception*, 204.

⁵ *Ibid.*, 334-35.

⁶ *Ibid.*, 83.

⁷ Smith, “The Flesh of Perception: Merleau-Ponty and Husserl,” 4-5.

⁸ Heinämaa, *Toward a Phenomenology of Sexual Difference: Husserl, Merleau-Ponty, Beauvoir*, 28.

⁹ Merleau-Ponty offers *corps-sujet* only as a translation of Husserl’s *Subjekt-leib*, not as an original contribution.

... I have no other means of knowing the human body than by living it, that is, by taking up for myself the drama that moves through it and by merging with it. Thus, I am my body, at least to the extent that I have an acquisition, and reciprocally my body is something like a natural subject, or a provisional sketch of my total being.¹⁰

Merleau-Ponty may have felt that the vocabulary of body and subject burdened his phenomenology with the prejudices of an isolable consciousness.¹¹ He introduces the term *chiasm*, or flesh, in his uncompleted and posthumously published *The Visible and the Invisible* to try to overcome these linguistic limitations describe the intertwining of subject and object. I will mostly avoid this later terminology, since flesh can obscure what is special about the body-subject already in Merleau-Ponty's early work.

Merleau-Ponty's next aim is to understand the orientation of body-subject within the world, a perspective he ultimately labels its being in the world. He notes wistfully that the problem of the world is that everything resides within it, a problem which he believes theorisation does little to solve.¹² In his sights are empiricism and intellectualism since they theorise about consciousness and, as Taylor Carman puts it, forget their own phenomena.¹³ That is, they tend to reduce life to subject or object where Merleau-Ponty seeks to affirm the "genius for ambiguity that might well serve to define man."¹⁴ His goal is to bracket these theories and analyse phenomena prior to theory.¹⁵ He replaces the intellectualist preoccupation with consciousness "with existence, that is, with being in the world through a body."¹⁶ The body reveals reflex and perception to be "modalities of a pre-objective perspective that we call 'being in the world.'"¹⁷ Even pre-objectively, being cannot be pure perspective since it is grounded in existence and body. Nevertheless as some kind of perspective, albeit impure, being in the world implies a structure of horizons which I consider with greater specificity throughout this chapter: horizons of spatiality, intentionality, and temporality.

1.1.1 Spatialities: positional and situational

¹⁰ Merleau-Ponty, *Phenomenology of Perception*, 205.

¹¹ *The Visible and the Invisible*, trans. Alphonso Lingis (Evanston: Northwestern University Press, 1968), 183.

¹² *Phenomenology of Perception*, 204.

¹³ Taylor Carman, "Between Empiricism and Intellectualism," in *Merleau-Ponty: Key Concepts*, ed. Rosalyn Diprose and Jack Reynolds (Stocksfield: Acumen, 2008), 55-56.

¹⁴ Merleau-Ponty, *Phenomenology of Perception*, 195.

¹⁵ It seems to me that Merleau-Ponty adheres to Husserl's phenomenological reduction in this, but the scholarly orthodoxy seems to hold that Merleau-Ponty abandons epoché by bringing in empirical evidence. Joel Smith is uncommon in defending the view that Merleau-Ponty is no less phenomenological for being empirical. Joel Alexander Smith, "Merleau-Ponty and the Phenomenological Reduction," *Inquiry* 48, no. 6 (2005).

¹⁶ Merleau-Ponty, *Phenomenology of Perception*, 548.yon

¹⁷ *Ibid.*, 81.

Spatiality is central to the body-subject. Merleau-Ponty describes the meaning of spatiality throughout *Phenomenology of Perception*, most particularly in the methods of projection, expression, and most of all habit.¹⁸ It is most important to note two key characteristics of this spatiality. First, it is egocentric. The perceiving body-subject serves as the frame of reference for all spatiality. Not only does space move and skew with the body-subject but the spatiality it instantiates is the source of all space which can be occupied and taken up by the world. The body-subject is the source of that perspective which, imposed on the world, places and shapes objects in space. Second, it is based on movement: it is, in contemporary terms, sensorimotor. It relies on a “constitutive interdependence between perception and action” in which “perceptual experiences are said to be inseparable from the perceiver’s bodily activities.”¹⁹ Contingent objects exist as things, rather than mere thoughts or ideas, by being the kinds of things that can grow, shrink, show, hide, and generally change in and through different perspectives.

By anchoring perspective, the body-subject coordinates the spatiality into which objects can be placed and appear. Not only do objects take up the spatiality issued from the body-subject, they can even be said to participate in the original structure of the body. Objects are the kinds of things that I perceive “with my body, I handle them, inspect them, and walk around them” and ultimately that are “rediscovered by each of their movements.”²⁰ The handling, motion and change of perspective suggested here need not be realised or actualised in order to place objects in space. Virtual movement, or movement not dependent on the actual shifting of locations, is also capable of generating spatiality. Especially with this caveat it is tempting to read spatiality as an extended metaphor: as symbolic rather than real. Perhaps conscious of this risk Merleau-Ponty draws on his lapsed Catholic heritage and invokes an analogy: the transubstantial sacrament is communion between God and the faithful, just as being in the world proposed from a point in space is literal communion between body-subject and things as sensation.²¹

The very definition of a perceptible spatiality in which the body-subject is the reference point means that it is never perceived in the manner of objects. The body-subject is a horizon: what Merleau-Ponty calls a “border that ordinary spatial relations do not cross.”²² Since objects are defined by their behaviour in spatiality brought forth by the body-subject, the body is therefore not an object. This logic forms part of Merleau-Ponty’s argument for the unified and ambiguous body-subject. This

¹⁸ Ibid., 243.

¹⁹ Vignemont, *Mind the Body: An Exploration of Bodily Self-Awareness*, 73-74.

²⁰ Merleau-Ponty, *Phenomenology of Perception*, 92-93.

²¹ Ibid., 219.

²² Ibid., 100.

seeming paradox should not be taken to imply that the body is not real or placed in the world. The body-subject surely does exist in a tangible, material way. By organising in advance a space for itself and forcing a kind of recursive spatial dialectic, the body-subject is able to be viewed as “the objective body described by physiology textbooks.”²³ Yet the claim that the body-subject is the “unperceived term” from which perceptible spatiality issues, itself cloaked in invisibility, is sincerely made. The body-subject is never observed *qua* body-subject. However, it is perceived by participating in a spatiality which is neither allocentric nor egocentric but innate and non-positional.

This bodily space is instead given primordially as a spatiality of situation. It is revealed and built up, constantly, by proprioceptive and kinaesthetic information.²⁴ Proprioception takes in the immediate and unmediated awareness of where one and each of their parts are: posture, bearing and comportment, the arrangement and location of limbs or extremities. Kinaesthesia takes in the immediate and unmediated awareness of movement. The ensemble of these internal senses form what Merleau-Ponty calls the phenomenal body [*corps propre* or *corps phénoménal*]. He sometimes also employs the more expansive term lived or living body [*corps vivant*], in line with Husserl’s notion of *Leib*, when the specifically phenomenal body is meant. This information anchors relations of situation which spread from the body-subject over and across the totality of the projects, attitudes, and intentions with which they are and have been concerned. This spatiality thus originated and coordinated orients things in meaning. By participating in a spatiality of position, things are made substantial. By participating in a spatiality of situation, things are made significant.

The phenomenal body and the spatiality of situation are the primary sites of perception and action. Understanding these two types of spatiality underpins the different aspects of the body since the correspondence and contradiction of the lived and objective bodies are important and complex. The phenomenal body includes all the things which underpin or act as the horizon of the body-subject. The phenomenal body is what is meant when one refers to oneself and is the site of immediate awareness: “the truth of the body such as we experience it”.²⁵ Merleau-Ponty gives the instructive example of reacting to a mosquito bite. The body-subject which has been bitten reaches with their phenomenal hand to a painful place on their phenomenal body.²⁶ Both sensation and action are matters of meaning and occur principally and primordially within the spatiality of situation. The body-subject does not, at least initially or deliberately, manipulate their objective body within the

²³ Ibid., 104, 367.

²⁴ Shaun Gallagher and Dan Zahavi, *The Phenomenological Mind* (Abingdon: Routledge, 2012), 161-67.

²⁵ Merleau-Ponty, *Phenomenology of Perception*, 465.

²⁶ Ibid., 108.

spatiality of position. In order to do so their commands would need to be translated, clumsily, slowly, from the mother tongue of situation and rearticulated in position.

Movement in phenomenal space is ordinarily immediately trailed by movement in positional space. Theories of objective thought see in this harmonious movement “the suturing of my phenomenal onto the primordial world.”²⁷ Outside theory, in experience, these sutures can open. Merleau-Ponty discovers in clinical and experimental psychology a genre of cases of phantom limbs, in which awareness of and a sense of belonging in a limb persists despite its objective absence.²⁸ In phantom limbs, the body-subject tends to “remain open to all of the actions of which the [limb] alone is capable” having grown accustomed and habituated to moving and operating in a certain phenomenal way.²⁹ Merleau-Ponty presents the disjunction between awareness of a limb and its actual absence to illustrate the separability of body into phenomenal and objective, but also the importance of motor intentionality and habit. Phantom limbs are pathological both because they are regularly accompanied by pain and unpleasant sensation and also because they express an existential desolation and lament. Our capacity to accomplish our projects depends on the mutuality of our lived and objective bodies as one synergetic whole.³⁰

1.2 Incorporation

1.2.1 Unity

The sting of the mosquito and the phantom limb support the spatial primacy of the combined body-subject. Merleau-Ponty is careful not to elevate the phenomenal over the objective since doing so would succumb to intellectualism, and he frequently emphasises the co-naissance of the body and world. Spatiality is not created but is rather accomplished by the unified body-subject. Nonetheless, situational spatiality has a particular role in meaningfully defining the places which “inscribe around us the variable reach of our intentions and our gestures.”³¹ The two variables bearing on reach mentioned by Merleau-Ponty do not exhaust the determinants of situation, but they are indicative. They are those intentions, awarenesses and perceptions to which a body-subject is sensitised by

²⁷ Ibid., 366.

²⁸ Phantoms are regularly reported after limb amputation but also among those for whom a limb is congenitally absent. Congenital phantoms complicate both scientific and phenomenal explanations. Explaining congenital phantoms is beyond my purpose here but I imagine a phenomenological account consistent with the body-subject is possible and would draw on the many facets of the intentional arc. Elfed Price offers a biological hypothesis. Elfed Huw Price, "A Critical Review of Congenital Phantom Limb Cases and a Developmental Theory for the Basis of Body Image," *Consciousness and Cognition* 15, no. 2 (2006): 320.

²⁹ Merleau-Ponty, *Phenomenology of Perception*, 83.

³⁰ Ibid., 330.

³¹ Ibid., 144.

disposition, understanding, or modality; and the gestures for which they are capacitated by physiology, equipment, or training. Having informed the phenomenal body and the situation of the body-subject these factors make meaningful the spaces of the body-subject, turning x, y, and z metres to hither, thither, and yon.

The variables which determine situation can be altered through a process of incorporation. An object may be grasped by a body-subject as an ordinary object. If both body-subject and object have the requisite characteristics, the object might alternatively be understood as a modification of situation. Merleau-Ponty gives a well-known example of a blind man adeptly making use of a cane. His cane disappears as an object. Instead, the cane becomes “analogous to a gaze” joining him as adjunct modality through which he is enable to both perceive and achieve his projects of navigating, of travelling, of visiting a friend. So too might other devices and additions come to “participate within the voluminosity of one’s own body”, “dilating our being in the world or altering our existence through incorporating new instruments.”³² An incorporated object is brought behind and enlarges or generally redeploys the “border that ordinary spatial relations do not cross” which defines the contours of the phenomenal body.³³ In doing so, an incorporated object also tends to disappear as an object in positional, at least insofar as it functions as part of the phenomenal body. What is incorporated is enveloped in the ambiguity which is characteristic of the body-subject.

Incorporation also implies a secondary disappearance in which the object, even in its novel sense of a modulation of situation, is wholly folded into and unified in the body-subject. Incorporated matter is not bolted onto and does not accrete to the phenomenal body. Rather, it becomes a transparent and anonymous power assimilated into the unified phenomenal body, in which “the operations of different organs appear equivalent within the unity of an ‘I can.’”³⁴ The capacities of the phenomenal body are not employed separately or serially but activate all-at-once toward a certain possibility. Our perceptual apparatus is similarly unified and interchangeable. Perception is always a synaesthetic activity: “my gaze, my touch, and all of my other senses are, together, the powers of a single body integrated into a single action”.³⁵ Synaesthesia expresses our encounter with the world as a unified phenomenal body, where visual resonances can be equivalent to aural or tactile or olfactory resonances in that they are all adumbrations or modes of a unified existence. A. David Smith

³² Ibid., 144-45.

³³ Ibid., 100.

³⁴ Ibid., 328.

³⁵ Ibid., 331-32.

concludes that this framing of bodily unity as synaesthetic rather than syncretic is Merleau-Ponty's true extension of Husserlian embodiment.³⁶

The unification of the phenomenal body enables the body-subject to exercise the powers of each incorporated part without specifically attending to or thematising it. This includes those parts already pre-admitted to the phenomenal body, such as the innate or physiological body.

Notwithstanding the two stages of disappearance implied within the phenomenal body, Merleau-Ponty claims that the body-subject can "instantly 'visualize' the parts of my body that it conceals from me. As I clench my foot inside my shoe, I can see it. I have this power even for parts of my body that I have never seen."³⁷ The ability to picture each part does not reduce the transparency of the phenomenal body. It is meant to underline the equivalence of the parts of the unified phenomenal body, any of which can be called upon through their common signification. Merleau-Ponty follows this with the claim that we recognise "immediately the visual representations of what is invisible in one's own body." The little evidence he adduces relates to gaits, silhouettes and to the face "seen from within". Familiarity with these kinds of forms might be built up by an abundance of kinaesthetic and proprioceptive information.

Incorporation is neither automatic nor guaranteed and many objects remain outside the phenomenal body and the body-subject. Incorporation and the disappearance of objects *qua* objects underwrites the relative independence of the world constituted by the body-subject and objective stimuli outside the phenomenal.³⁸ But there are objects which cannot be incorporated or, alternatively, can only be incorporated with a certain negative valence. These remain "restrictive powers".³⁹ Vivian Sobchack notes that her lower limb prosthetic oscillates between a synecdochic, all but transparent, relation to her body and a metonymical opacity.⁴⁰ Don Ihde has observed that machines typically achieve only a partial transparency and that a residual "echo focus" complicates their incorporation.⁴¹ Enactivists commonly distinguish between their enactive views and extended mind theories. The former maintains a special role to the body and what is incorporated. The latter recognises the contribution of a wide range of external, un-incorporated and environmental supports to cognitive and affective processes. To these enactivists, only things under "active regulation by the

³⁶ Smith, "The Flesh of Perception: Merleau-Ponty and Husserl," 18-20.

³⁷ Merleau-Ponty, *Phenomenology of Perception*, 150-51.

³⁸ *Ibid.*, 81-82.

³⁹ *Ibid.*, 144.

⁴⁰ Vivian Sobchack, "A Leg to Stand On: Prosthetics, Metaphor, and Materiality," in *The Prosthetic Impulse: From a Posthuman Present to a Biocultural Future*, ed. Marquard Smith and Joanne Morra (Cambridge: MIT Press, 2006), 26-27.

⁴¹ Ihde, "The Experience of Technology: Human-Machine Relations," 271-72.

body” can meet a “transparency constraint” which permits incorporation.⁴² As I discuss in Chapter 5, Sadaf Soloukey advances three criteria – trust, affective tolerance, and proprioceptive feedback – leading to a “patient transparency diagnosis” for medical devices.⁴³

1.2.2 Viscera

It is not clear to what extent the fundamental substrate of the body-subject, the internal organs and viscera, might be made available through common intention. As Drew Leder observes, Merleau-Ponty is mostly concerned with the body’s surface.⁴⁴ The internal organs and viscera are among those parts and powers originally behind perception and presumably pre-admitted to the phenomenal body. Yet, it is not at all clear that the viscera are available to the unified body-subject in the way Merleau-Ponty outlines. Leder and Richard Zaner offer perhaps the two most prominent phenomenological accounts of the visceral body. Zaner’s notion of the “body uncanny” seems generally appropriate to the viscera. This includes the body-subject’s being limited by and implicated with the internal organs. For their part, the viscera appear to manifest both a hidden and alien presence, in which processes go on quite of their own accord and seem simultaneously both intimate and inexplicable.⁴⁵ The viscera cannot be directly acted upon or with, and do not produce the kinds of data expected of elements of the phenomenal body. Leder characterises visceral motility as narrowly functional and independent of free action and visceral perception as blunt, spatially ambiguous and spatiotemporally discontinuous.⁴⁶

Insightful as these accounts of the viscera are they seem neither comprehensive nor entirely accurate. On bluntness, for example, Leder compares the qualitative richness of the surface senses, including interactions between modalities, to what he describes as a limited interoceptive or internal sensory vocabulary. He illustrates this claim with the example of digestion.⁴⁷ He describes the process from a hunger pang through eating, digesting, and evacuating. The initial prompt to eat is accompanied by a range of bodily sensations, including a “gnawing in [his] stomach, a longing, seemingly emanating from [his] mouth, for something to eat.” Despite this layered experience, Leder notes that he is “only dimly aware of all this”. He is prompted to select an apple to eat, each bite of

⁴² Evan Thompson and Mog Stapleton, "Making Sense of Sense-Making: Reflections on Enactive and Extended Mind Theories," *Topoi* 28, no. 1 (2009): 28-29.

⁴³ Sadaf Soloukey et al., "Diagnosing Embodiment Should Become Part of Our Repertoire," *Disability and Rehabilitation* (2020): 235.

⁴⁴ Leder, *The Absent Body*, 36, 65.

⁴⁵ Richard M. Zaner, *The Context of Self: A Phenomenological Inquiry Using Medicine as a Clue* (Athens: Ohio University Press, 1981), 47-55.

⁴⁶ Leder, *The Absent Body*, 39-49.

⁴⁷ *Ibid.*, 38-39.

which is initially noted for its sweetness. After being swallowed and sliding past a certain point at the back of his throat, though, each bit is “simply gone”. Immediately after eating the apple, he feels full and energised. This feeling subsides over the next hour, leaving his “middle in a vague neutrality”. The next hours pass with his “awareness of the digestive process... virtually nonexistent” before visiting a facility and voiding the last of his meal.

There is, I think, a lack of charity in this comparison. Of course, it is not possible to exhaustively describe any phenomenon, but even Leder’s relatively brief description of digestion points to a multifaceted visceral phenomenology. To sustain his claim of interoceptive bluntness, it is necessary to paper over the subtle inflections of digestive sensations. These can be perceived interoceptively as well as through other modalities, such as the audible and haptic growl of a stomach. These sensations are attributed all sorts of different and nuanced meanings to which body-subjects are, or can be, attuned with extraordinary sensitivity. The pang of hunger which drives a craving for a certain food is different to one which connotes an aversion. Leder is led by some presumably visceral imperative to choose “a particularly appetizing apple”. After a meal, the feeling of having overeaten is different to having eaten something objectionable. The gastric discomfort of nerves before a performance is qualitatively different to that announcing immediate vomiting. Leder describes his recognition and suppression of the urge to visit the toilet hours into this process. This negotiation within the body-subject is surely an example of an intricate visceral phenomena which could be further interrogated.

Digestion is one example, but interoception captures a huge diversity of organs and sensations. Some internal organs produce little obvious, or at least direct, sensation but others generate their own very peculiar phenomena. It is, in fact, the heart and heartbeat perception which has typically been taken as a scientific proxy for interoceptive sensitivity. I would contend that even these careful scientific measurements ignore rich distinctions in heartbeat sensations such as strength and depth, the pound or faintness of a beat, which are nonetheless clearly felt by their bearers. What Leder asserts to be a limited interoceptive vocabulary may simply point to what has been identified by health psychologist Erik Cunen and colleagues as failure of communicating about interoception.⁴⁸ Leder’s claim may point to a deficiency in our vernacular articulation of interoceptive phenomena rather than a deficiency in the phenomena themselves. Interoceptive sensations evince multiple and nuanced motor responses, but these discriminations rarely need to be verbalised except in contexts

⁴⁸ E. Ceunen, J. W. Vlaeyen, and I. Van Diest, "On the Origin of Interoception," *Frontiers in Psychology* 7 (2016): 3-4.

such as the clinic in which there is a diagnostic imperative to translate them into a typology of symptoms.

Taking expressive resources in phenomenology and patient narratives as valid can repair the neglect of the viscera in the account of the body-subject. Even more sensitive accounts of the viscera remain difficult to reconcile with the imaginative representation of which all parts of the phenomenal body are supposed to be capable. Since Merleau-Ponty is both implicitly and explicitly clear that the internal body is part of the basic existential structure of the body-subject, that “biological existence gears into human existence”, it is jarring that the viscera should lack this seemingly essential synaesthetic property.⁴⁹ But Merleau-Ponty’s reference to visual representation is itself unusual and jarring. The unity which animates his phenomenology of the body-subject is founded on a meaningful distinction between representation borne of reflection and non-representation borne prereflectively. I develop this distinction in the discussion of intentionality below. In Chapter 3, I show Merleau-Ponty’s affinity for metaphor and the ways in which the body-subject is apt to accommodate metaphor. I make use of expressive resources which refer to the heart no less than those parts which can be more straightforwardly visualised.

1.3 Motor intentionality

1.3.1 Basic intentionality

The phenomenology of the body-subject is marked by a distinctively motor account of intentionality. Merleau-Ponty draws substantially on the work of Gestalt psychologist Adhémar Gelb and neurophysiologist Kurt Goldstein. Merleau-Ponty gives an extended phenomenological analysis of their case of a patient named Johann Schneider, a returned World War I serviceman who suffered a brain injury after being struck by mine shrapnel. What comes into relief in this analysis is a notion of motor intentionality.⁵⁰ Most basically, this interpretation suggests experience or consciousness based in movement or the body.⁵¹ Gabrielle Benette Jackson rightly points that the nature of motor intentionality is contested.⁵² At stake is whether motor intentionality consists in one, the other, or both of abstract and concrete movement. These are the motoric counterparts to the earlier distinction between positional and situational space. Abstract movement is disconnected from any

⁴⁹ Merleau-Ponty, *Phenomenology of Perception*, 162.

⁵⁰ *Ibid.*, 105 ff.

⁵¹ “Motor intentionality” is a central concept for Merleau-Ponty, but the term itself is only used infrequently. He also sometimes uses the term “operative intentionality”. It has been translated as “motoric” and “motile” and can be related to “motive”.

⁵² Gabrielle Benette Jackson, “Maurice Merleau-Ponty’s Concept of Motor Intentionality: Unifying Two Kinds of Bodily Agency,” *European Journal of Philosophy* 26, no. 2 (2018): 771-72.

particular motor project, possibility, or task. It is undertaken by the reflective manipulation of the body through positional space. Concrete movement corresponds to a particular project or possibility mapped in situational space.

The patient Schneider can move and think but is unable to bring these two things together since he pathologically lacks motor intentionality. When asked to point to a part of his body he succeeds only if he is permitted to grasp it. When asked to give a military salute, he must perform the general comportment or situation of a soldier. The salute is accomplished amid a broader pretence of the respectful and deferential soldier. In a purely experimental setting, he can describe the position of his arm only by putting his entire body in motion in a series of exploratory pendular movements which reveal his arm in relation to his body. If he is reminded of the experimental nature of the exercise, he must begin again.⁵³ Through these Pirandellian activities he creates a situational space for concrete movement from which positional space and abstract movement can be derived. For Schneider, abstract movements themselves have no motor significance. He is capable of moving his body, and he is capable of understanding an abstract task, but he is not capable of marrying the two in a meaningful motor project.⁵⁴

Motor intentionality is the most basic and originary form of intentionality for the body-subject. Pathological cases do not necessarily show that situational space comes before positional space, although this does appear to be a feature of the pathological cases of Schneider and phantom limbs. Ordinarily in the non-pathological case, motor intentionality carries them along together since “every movement is indissolubly movement and consciousness of movement”.⁵⁵ Concrete movement is not so enthralling, nor abstract movement so lacking in motor significance. Merleau-Ponty’s analysis of Schneider leads him to reaffirm Husserl’s claim that “consciousness is originally not an ‘I think that,’ but rather an ‘I can’”. The world is not a series of representations welded together but is experienced in the projects lived by a body-subject. The revision Merleau-Ponty makes is “to understand motricity unequivocally as original intentionality” and the projects of the body-subject as motor projects.⁵⁶ Motor significance can and frequently does accompany representations in non-pathological cases but this kind of intentionality cannot be constructed from representations and the abstract alone. Motor intentionality follows the motor possibilities perceived by the body-subject with its configurations, capabilities, and comportments.

⁵³ Merleau-Ponty, *Phenomenology of Perception*, 106-09.

⁵⁴ *Ibid.*, 113.

⁵⁵ *Ibid.*

⁵⁶ *Ibid.*, 139.

1.3.2 Response and representation

The motor projects perceived by the body-subject polarise the world according to their various motor possibilities. Merleau-Ponty describes these motor projects as “causing a thousand signs to appear there, as if by magic, that guide action”.⁵⁷ These guide-“lines of force” are imperatives to act, wherein

to move one’s body is to aim at the things through it, or to allow one’s body to respond to their solicitation, which is exerted upon the body without any representation.⁵⁸

Solicitations also imply a call for movement to enhance perceptual clarity and affirm the body-subject’s place in the world through a “maximum of clarity in perception and action”.⁵⁹ Hubert Dreyfus interprets Samuel Todes as claiming that perception gears the body-subject to stabilise the world by grasping and determining it more clearly.⁶⁰ Its action is guided while underway by a sense of responsiveness to the solicitation, not by any representation of the action’s success conditions. At the completion or arrest of the action a body-subject might retrospectively reflect on and represent the action’s goal. Teleological trying is a *post hoc* projection, not a phenomenological fact. Only by quieting a solicitation do we fix its place in our milieu and allow it to be rendered as a determinate conceptual representation.

Perception is shaped not only by which objects are incorporated into the body-subject but also the motor aptitudes, skills and capabilities at its disposal. Of this kind of non-object incorporation Merleau-Ponty asserts, with little more explanation, that “a movement is learned when the body has understood it”.⁶¹ Dreyfus attributes the actual mechanism of gaining this understanding to what Merleau-Ponty calls the “intentional arc”. Merleau-Ponty describes it as a thing:

that projects around us our past, our future, our human milieu, our physical situation, our ideological situation, and our moral situation, or rather, that ensures that we are situated within all of these relationships.⁶²

⁵⁷ Ibid., 115.

⁵⁸ Ibid., 140.

⁵⁹ Ibid., 261.

⁶⁰ Hubert L. Dreyfus, “Todes’s Account of Nonconceptual Perceptual Knowledge and Its Relation to Thought,” in *Skillful Coping: Essays on the Phenomenology of Everyday Perception and Action*, ed. Mark A. Wrathall (Oxford: Oxford University Press, 2014), 93-96.

⁶¹ Merleau-Ponty, *Phenomenology of Perception*, 140.

⁶² Ibid., 137.

The intentional arc is network of conductive threads which run from the body-subject out into the world. Each thread is drawn magnetically to the unseen motor possibilities in the environment. The arc is also implicated in the way an organism “builds up aptitudes, that is, the general power of responding to situations... which have nothing in common but the meaning”.⁶³ That is, the charge of each thread can travel both ways and the network comprises an ongoing dialectic of cause and effect of situation.

A model of skilful coping correlates expertise with situational awareness and representation with failure or improficiency. Dreyfus argues that the situations sustained by the arc are inherently non-representational. He leverages this into a comprehensive notion of skilful coping and a model of skill acquisition. Under this model of skill acquisition “as one becomes an expert, the world’s solicitations to act take the place of representations as a way of storing and accessing what one has learned.”⁶⁴ Initially a body-subject will tend to rely on reflective, propositional knowledge. As the skill is reinforced and sedimented in the body-subject, understanding and response becomes primarily based on prereflective, situational awareness. Appropriate responses for particular situational variants spring to mind without conscious awareness and, “what transparently *must* be done is done.”⁶⁵ The expert is completely absorbed in their situation and has no recourse to reflection except in failure or interruption. Attendance to representation is associated with failure or a breakdown or break in awareness. In Chapter 6, I consider the effects of rendering prereflective knowledge into explicit representations to which body-subjects are required to attend. In particular I consider that such representations might disrupt ordinary “holographic” understandings of a situation.

1.3.3 Transparent fidelity

The spatialities of the body-subject presuppose a stable notion of horizon. An incorporated object is one brought behind the horizon of the phenomenal body. What is in the world lies between bodily horizon and the farthest extent of our perception: the “horizon of all horizons”.⁶⁶ Horizons therefore define the very conditions of situation. The body-subject can occupy only a single perspective producing a single set of horizons at any given moment. Yet Merleau-Ponty maintains these horizons are “always open”. Perception implies movement and movement implies innumerable perspectives and horizons available to the body-subject or to others.⁶⁷ Inherent in perception is an awareness that one’s current perspective on the world is limited and that the understanding and

⁶³ *The Structure of Behaviour*, trans. Alden L. Fisher (London: Methuen, 1965), 130.

⁶⁴ Dreyfus, “Merleau-Ponty and Recent Cognitive Science,” 234.

⁶⁵ “From Socrates to Expert Systems: The Limits of Calculative Rationality (1985),” 34-36.

⁶⁶ Merleau-Ponty, *Phenomenology of Perception*, 345.

⁶⁷ *Ibid.*, 345-47.

knowledge of the world which it provides is only partial. Perception reveals the structural uncertainty of a world never fully determined or assured. Fully determining the world would entail fixing it from an impossible perspective – a view from nowhere – incompatible with the being in the world of real body-subjects. At the same time, in order to perceive meaning in the world body-subjects must take the preliminary sketch of their horizons to satisfy and solidify the world: always open, but sufficient fixed.

Existence requires horizons which are simultaneously both open and treated as closed. The body-subject is the way of sustaining this ambiguity. It lives as though the infinite perspectives on the world which suggest themselves to it have been fully drawn together, knowing nonetheless that they never could be.⁶⁸ Neither subject nor object, nor entirely certain of the status of anything within its view, Merleau-Ponty emphasises that the body-subject expresses a “genius for ambiguity that might well serve to define man.”⁶⁹ It seems to me that another way of putting this is that the body-subject lives by the transparent fidelity of its horizons. In an essay on religion and politics easily transposed to his broader phenomenology, Merleau-Ponty explains why world-building can never be epistemically rigorous and must be taken on faith:

From the moment we do something, we turn toward the world, stop self-questioning, and go beyond ourselves in our action. Faith – in the sense of an unreserved commitment which is never completely justified – enters the picture as soon as we leave the realm of pure geometrical ideas and have to deal with the existing world. Each of our perceptions is an act of faith in that it affirms more than we strictly know, since objects are inexhaustible and our information limited⁷⁰

This link between perception and faith demonstrates not only the body-subject's patience with ambiguity but also its need for it. Ordinarily the body-subject exists its horizons with the confidence that comes prior to the puzzles of reflection. The body-subject, lacking either transparency or faith in its horizons, reserves its commitment to action pending assurances. It requires answers to the questions posed by prereflective perception. These answers – abstract, propositional, reflective, representational – are the justifications operative in positional space. There, action is an expression not of co-naissance with the world but of interrogation of and opposition to it.

⁶⁸ Ibid., 195.

⁶⁹ Ibid.

⁷⁰ "Faith and Good Faith," in *Sense and Non-Sense* (Evanston: Northwestern University Press, 1964), 179.

At least two cases might prompt the body-subject to interrogate their horizons. First, liminal objects. Some objects ordinarily set in positional space are capable of being brought into the body-subject. Objects incorporated this way are necessarily marginal to the horizon of the phenomenal body. These might return to positional space as a consequence of change in either the object, such as breakage or failure, or the body-subject, such as a loss of skill or comfort with or a deliberate ejection of the object from its situation. Merleau-Ponty gives the examples of a plumed hat or an automobile as objects which temporarily dilate the situation of the body-subject before being returned to positional space more or less unproblematically.⁷¹ Liminal objects are those which hover at the horizon. They are received into situation in moments of clarity before dropping back into position in moments of clumsiness, confusion or overt concentration. Such cases might include objects like cars prior to the body-subject becoming adept with them. They might also include objects too difficult or demanding for even the adept body-subject to reliably incorporate owing to their complexity or obdurance.

Liminal cases might also include those objects which call attention to themselves as objects during their incorporation. An object's echo focus may be tolerated as a mere side-effect of incorporation. Other phenomena may not be so easily endured. Objects may comprise multiple elements, some of which can or even must be brought into situation and other of which cannot. Defining parts of the object may cause the whole object being brought into positional relief. Since the object is partially incorporated, the entire phenomenal body might accompany it into position. In chapters 3 and 6, I discuss the idea of illness as loss and bodily doubt which describes scenarios in which the body can no longer be taken for granted. A lack of trust of horizon will cause the body-subject to begin their preliminary sketch of the horizon again. Liminal objects may continue to flicker in and out of perception. The motor intentions and possibilities enabled by liminal objects will similarly shimmer with each attempt to reset and refresh horizon in reflective consciousness, which Merleau-Ponty describes as "taken as the place of clarity, is in fact the very place of equivocation."⁷²

The second case which might trouble the body-subject's faith in horizon is the persistent presentation of representations. Representations are ways of disclosing states or things. They flatten and fix knowledge into opaque and definite forms. Unlike intentional phenomena, representations do not imply multiple perspectives. Representations may not disclose the thing to which they refer exhaustively but they do, by definition, exhaust themselves *qua* representations. They cannot, however, satisfy the needs of a real and existing body-subject. Bioethicist Joel Michael Reynolds, for

⁷¹ *Phenomenology of Perception*, 144.

⁷² *Ibid.*, 347.

instance, describes the way genetic and other medical technologies exhibit epistemic capture and value partitioning. Epistemic capture occurs when fundamentally ambiguous genetic information is represented as definite knowledge. Value partitioning closes down interpretive avenues that could better deal with ambiguity. Representations are elevated above non-representational knowledge and unwarranted judgements are encouraged on those bases.⁷³ In this way, representations to which a body-subject is required to attend can disrupt the body-subject's prereflective motor intentions and capture it within the domain of reflective, objective knowledge and positional space. The body-subject can be led into a spiral in which ever more verificatory representations must be accumulated and trapped within the limitations of reflective thought where motor intentions cannot appear.

Medical devices have the potential to manifest both liminality and persistent representation. Medical devices are often visible, complex, noticeably inorganic objects for which careful use and management is required. The stakes of proper use are often high. These properties alone make medical devices presumptively liminal objects. Briefly taking the case of artificial hearts, these devices are large, heavy systems with components which are both internal and not readily apparent and components outside the body which are obvious to both the bearer and others. The external components of artificial hearts display a constant stream of representations of both body-related information like cardiac output and device-related information like battery status, some of which bearers are expected to monitor. Some of these measurements are announced by alarms which patients and carers cannot ignore since the stakes for the safe use and maintenance of artificial hearts could hardly be higher. Failure or disconnection of an artificial heart will almost certainly result in the death of their bearers. In the chapters that follow, I undertake a more detailed examination of artificial hearts in light of these and other issues.

1.4 Temporality

1.4.1 Horizons: protention and retention

The body-subject is enclosed in a field of presence bounded by horizons of retention and protention. Merleau-Ponty agrees with Husserl's temporal perspective and priority of the present. Temporal objects or events may seem to us to present themselves in succession but they do so with a duration that defies measurement. Their succession is not like a series of punctual discontinuous nows in which each is abruptly replaced by the next. Objects endure and each of their temporal phases retains a certain continuity which allows them to be coherent. The perception of things occurs in

⁷³ Joel Michael Reynolds, "'What If There's Something Wrong with Her?' - How Biomedical Technologies Contribute to Epistemic Injustice in Healthcare," *The Southern Journal of Philosophy* 58, no. 1 (2020): 175.

their temporal extension. Husserl gives the example of the coherence of hearing a melody across time as a phenomenon with genuine duration. Temporal objects are more than just creations of our thought or imagination in which continuity is stitched together by reflection.⁷⁴ Temporal objects are experienced in a temporal perspective analogous to spatial perspective.⁷⁵ The body-subject's perspective on time is its consciousness of the present or what Husserl calls the primal impression. Like other perspectives its structure discloses dual horizontal limits.

Horizons of retention and protention are intuitive features of the present. They are not themselves anterior or posterior to the primal impression, but rather rays of meaning related to the now.⁷⁶ Retention provides us with an intention of the phase just past. Protention anticipates the phase about to occur. The flux of time is such that impressions are constantly replaced by new nows which carry with them new retentions and protentions. Retentions themselves harbour retentions so that "each retention is in itself a continuous modification which, so to speak, bears in itself the heritage of the past in the form of a series of shadings". The chain of retention continues until events conclude or it gradually sinks into imperceptibility.⁷⁷ Body-subjects experience this flux passively and prereflectively. It is also possible for body-subjects to actively recall and expect temporal objects. Recollection involves returning a retained impression to consciousness, thematising or reflecting on that moment as though it were our current impression. The body-subject thus re-presents a retention. Similarly, expectation involves a deliberate thematisation of the future, rather than an anticipation of the future given in the present impression.⁷⁸

1.4.2 Rhythm, incarnated

Merleau-Ponty frames the living ambiguity of the body-subject as a matter of temporality. Alia Al-Saji points to a later working note by Merleau-Ponty which criticises Husserl for having set retention in a field of presence considered as immanent consciousness, without thickness.⁷⁹ Merleau-Ponty's concern is Husserl's claim that "time is the name for a completely self-contained problem".⁸⁰ Husserl's solution is to posit a separate, absolute stream of time which does not rely on a living

⁷⁴ Dan Zahavi, *Husserl's Phenomenology* (Stanford: Stanford University Press, 2003), 82.

⁷⁵ Stuart F. Spicker, "Inner Time and Lived-through Time: Husserl and Merleau-Ponty," *Journal of the British Society for Phenomenology* 4, no. 3 (1973): 237.

⁷⁶ Zahavi, *Husserl's Phenomenology*, 84-85.

⁷⁷ Edmund Husserl, *The Phenomenology of Internal Time-Consciousness*, trans. James S. Churchill (Bloomington: Indiana University Press, 1964), 51.

⁷⁸ Zahavi, *Husserl's Phenomenology*, 83.

⁷⁹ Alia Al-Saji, "The Temporality of Life: Merleau-Ponty, Bergson, and the Immemorial Past," *The Southern Journal of Philosophy* 45, no. 2 (2007): 177-90.

⁸⁰ Husserl, *Ideas: General Introduction to Pure Phenomenology*, §81, 165.

subject to constitute it.⁸¹ Merleau-Ponty's existential convictions make this solution unacceptable. An absolute stream of time or immanent consciousness would, like a temporal view from nowhere, determine the world in a single instant. A fully determined and unchanging time would be "no longer time at all".⁸² A more existentially palatable solution would, as Maria Theresa Catena puts it, avoid crushing being in the world onto the present and instead lend thickness to temporal horizons.⁸³ Ultimately, however, Merleau-Ponty offers no solution to time. Like all human problems: time is lived in ambiguity.⁸⁴ Temporality depends on the thickness and openness of its horizons.

The thickness of temporality is expressed in the body. The body-subject's implicit refusal to engage with the dilemma of reflection keeps the horizons of temporality apart and prevents them from closing. That refusal is manifest in the body-subject's existence. Merleau-Ponty makes clear that it is the body which "takes possession of time and makes a past and a future exist for a present".⁸⁵ Reciprocally it is the "thickness of the pre-objective present, where we find our corporeality" which enables time to be constituted as time rather than a fully determined thing.⁸⁶ Neither of these statements mean that time is constituted by the body-subject alone. As in the spatialities above, existential temporality is co-constituted in the body-subject perception. As Mark S. Muldoon has observed this marks out the phenomenal body as "the datum where time authentic to our existence will arise."⁸⁷ He goes on to claim that "the primordial time of the phenomenal body is simply the present ecstatically understood."⁸⁸ Similarly, Al-Saji argues temporality results from a prereflective negotiation between the affective and kinaesthetic style of the body-subject and the world in which they find themselves.⁸⁹ As Al-Saji eloquently puts it: temporality is rhythm, incarnated.

1.4.3 Prepersonal temporality

The temporal horizons in which the body-subject has transparent fidelity are those of a temporality which is pre-personal and a present which is no longer its own. I have already argued that transparent fidelity involves living within horizons which are only partially and ambiguously

⁸¹ Zahavi, *Husserl's Phenomenology*, 86-88.

⁸² Merleau-Ponty, *Phenomenology of Perception*, 437.

⁸³ Maria Teresa Catena, "The Time of the Body in Maurice Merleau-Ponty," in *The Concept of Time in Early Twentieth-Century Philosophy: A Philosophical Thematic Atlas*, ed. Flavia Santoianni (Cham: 2016), 5.

⁸⁴ Maurice Merleau-Ponty, "Metaphysics and the Novel," in *Sense and Non-Sense* (Evanston: Northwestern University Press, 1964), 40.

⁸⁵ *Phenomenology of Perception*, 249.

⁸⁶ *Ibid.*, 457.

⁸⁷ Mark S. Muldoon, *Tricks of Time: Bergson, Merleau-Ponty and Ricoeur in Search of Time, Self, and Meaning* (Pittsburgh: Duquesne University Press, 2006), 136.

⁸⁸ *Ibid.*, 151.

⁸⁹ Alia Al-Saji, "'A Past Which Has Never Been Present': Bergsonian Dimensions in Merleau-Ponty's Theory of the Prepersonal," *Research in Phenomenology* 38, no. 1 (2008): 52.

determined. The body-subject is relieved of the need to reassess their horizons from moment to moment by relying on previous partial determination which are intentionally retained in its present. These determinations are forms of knowledge which are “sedimented” in the body-subject. The body-subject can rely on its habits – on its habit body – to take-up a process of determination of its horizons which is already part-way completed. The retained present on which it relies is one that is anonymous or pre-personal: not, or no longer, the one it is now living. As Merleau-Ponty claims, sedimentation and habit allow us to “count on our acquired concepts and judgments... without having to repeat their synthesis at each moment”.⁹⁰ According to Al-Saji habit bypasses the time needed for synchronisation between body-subject and world.⁹¹ It assumes and enacts the transparent fidelity of our temporal horizons.

As in space, it is possible for prepersonal temporality to come apart from the present world. The body-subject may take up prepersonal temporality from prior to a trauma, insisting on a “previous present which cannot commit to becoming past.”⁹² This obdurate present is disconnected from the world and perception is stalled in a moment of certain intentional possibilities. Rather than come to terms with a new rhythm, the body-subject represses their personal time and “remains open to the same impossible future.”⁹³ Phantom limb cases are one example of this, but repression can feature in any failure of a body-subject to adapt to new situations. In the next chapter, I consider the comparable phenomenon of normalisation under which the failure to adapt could be regarded as a pathological norm. Also as in space, the horizons of lived temporality constitute borders that ordinary temporal relations do not cross. The extremities of the body-subject’s temporal perspective are its birth and death, a particular kind of prepersonal or, perhaps more accurately, anonymous horizon in which I have transparent faith but can never determine.⁹⁴

Birth and death are straightforwardly anonymous because they are structural markers of temporality and they cannot be lived in perception or consciousness. The body-subject perceives as always “already born” and “still living”.⁹⁵ But attributing temporal anonymity to birth and death contrasts sharply with other accounts of phenomenology contemporary with Merleau-Ponty, most obviously that of Martin Heidegger. For Heidegger, death is the only genuinely individuating event in the unfolding of a person’s existence. It is the ownmost possibility available to *Dasein* insofar as it cannot

⁹⁰ Merleau-Ponty, *Phenomenology of Perception*, 131.

⁹¹ Al-Saji, ““A Past Which Has Never Been Present”: Bergsonian Dimensions in Merleau-Ponty’s Theory of the Prepersonal,” 66.

⁹² Merleau-Ponty, *Phenomenology of Perception*, 85-87.

⁹³ *Ibid.*, 88.

⁹⁴ *Ibid.*, 223.

⁹⁵ *Ibid.*

be lived or imitated by any other. Merleau-Ponty equivocates on the anonymity of the organs and organism which are inaugurated by birth. In a discussion of organic repression, he claims that

... my life is made up of rhythms that do not have their *reason* in what I have chosen to be, but rather have their *condition* in the banal milieu that surrounds me. A margin of *almost* impersonal existence thus appears around our personal existence, which, so to speak, is taken for granted, and to which I entrust the care of keeping me alive.

And later in the same passage, a further show of ambivalence:

... we say that my organism – as a pre-personal adhesion to the general form of the world, as an anonymous and general existence – plays the role of an innate complex beneath the level of my personal life. My organism is not like some inert thing, it itself sketches out the movement of existence.⁹⁶

Organic repression consists in the body-subject never questioning its biological conditions which are sedimented in it and which cannot by mere volition be overcome. The subsequent anonymity of the organic is “inseparably both freedom and servitude” in which biological processes are left to the “stable organs”, giving the body-subject “the mental and practical space that will free [it]”.⁹⁷ This double-edged notion recalls the implicatedness of Zaner’s body uncanny. The body-subject receives and has always received its rhythms from the organs. Merleau-Ponty seems to endorse organic repression as expressing the temporal structure of being in the world.⁹⁸ To my mind, this begs the question. It assumes the inevitability of repression and the irrelevance of personal rhythms. But it is only an act of organic repression that prevents personal rhythms from matching the personal present. That is to say, the body-subject’s repression of its personal rhythms in favour of prior or anonymous temporality simply ignores personal temporality. It does not and cannot stop or suspend personal temporality, which continues as long as the body-subject lives. As with other forms of repression it is conceivable that the temporality given in the prepersonal might become so desynchronised with the personal as to be pathological. In Chapter 7, I argue that just such desynchronisation can occur in contexts both of cardiac electrophysiological diseases and artificial heart therapies.

The heart leads personal organic rhythms. Merleau-Ponty compares the heart with the general principle of anonymous temporality, claiming that “I am not the author of time, any more than am I

⁹⁶ Ibid., 86.

⁹⁷ Ibid., 87, 89.

⁹⁸ Ibid., 87.

the author of my own heartbeats... no matter what I do, once I am born, time flows through me.”⁹⁹ He similarly argues the heart is in the organism in the same way the body is in the world, and that “... even reflexes have a sense, and the style of each individual is still visible in them just as the beating of the heart is felt even at the periphery of the body.”^{100,101} Another construction of this analysis might be that the body-subject’s temporal horizon is felt in the rhythm of the heart. The beating of the heart is a present which “secretly feeds” the body. It is the felt phenomenon by which the body-subject recovers and lives its specific past.¹⁰² In Chapter 7, I draw on Zambrano’s essay “The Metaphor of the Heart” to bring out the ways in which the transparency of the heart can coexist with temporalising phenomena which are particular to the personal circumstances of the body-subject.

1.5 Conclusion

The body-subject is a way to overcome the difficulties and paradoxes of dualism. By emerging already within the world and opening a perspective upon the world, the body-subject is simultaneously open and determinate, subjective and objective. While it is not clear that Merleau-Ponty succeeds in overcoming dualism, the body-subject does resolutely resist its reduction to one or other of these categories. The body-subject not only tolerates but requires ambiguity. It prereflectively lives with a sense of transparent fidelity in the horizons of its being in the world.

In this chapter, I have drawn out three of the core features of the body-subject as described by Merleau-Ponty: the phenomenal body with its capacity for incorporation, motor intentionality which projects possibilities around the body, and an embodied temporality which is at-once both personal and anonymous. I revisit these each of these features in their own chapter later in this dissertation. Using the insights of the body-subject and others taken from phenomenologists working in this tradition, in these later chapters I consider how artificial hearts might condition these features.

In the next chapter, I try to draw out what remains unclear about health and pathology in the body-subject. I consider two influential approaches to normality in medicine and bioethics, the biostatistical theory of health and vital normativity. Phenomenology is often placed in opposition to the historical epistemology which informs vital normativity. In what follows, I make the case that the phenomenology of the body-subject complements the notion of vital normativity. These complementarities track features of the body-subject I have highlighted here: the dialecticality of being in the world; the polarisation of motor intentionality; and the novelty of incarnation and

⁹⁹ Ibid., 451.

¹⁰⁰ Ibid., 209.

¹⁰¹ Ibid., 87.

¹⁰² Ibid.

personal temporality. This comparison seeks primarily to bring out the ways in which vital normativity can be aligned to what is already key to the body-subject. I seek secondarily to show that the disparate scholarship on the Merleau-Ponty and philosopher of medicine Georges Canguilhem, who were contemporaries but not confederates, can be brought into productive conversation. My aim is to better equip the body-subject to engage the issues in health, physiology, disease and illness about which any study of medical devices like artificial hearts must confront.

CHAPTER 2: NORMALISING THE BODY-SUBJECT

Without concepts of health and normality, phenomenology is unable to understand the meaning of the therapeutic situation. One of Merleau-Ponty's key empirical sources was the physiologist F. J. J. Buytendijk.¹ Buytendijk's most enduring contribution is his attempt to sketch an anthropological physiology, but this approach does little to advance a concept of health in the model of the body-subject. Anthropological physiology seeks to describe the way in which the individual human subject is writ already into the specifically human body. Its argument is that the body's autonomic, regulatory and vital processes such as circulation and breathing express distinct personal meanings and intentionalities.² Following Heidegger, Buytendijk offers the formulation that "Through the body the person presents himself in the body."³ So profligate is anthropological physiology in attributing meaning to biological processes that even diseased or pathological processes are potentially marked as privileged expressions of the subject, and its body as meaning without measure. Wim Dekkers notes that Buytendijk himself was significantly influenced by Merleau-Ponty.⁴ Anthropological physiology may be singularly suited to the body-subject but ends up adding little to it. It licences the subsumption of biology to experience rather than equipping phenomenology to evaluate biology within experience.

This dissertation must first try to understand what patients and clinicians seek from healthcare in order to understand phenomenology in light of artificial hearts. In the previous chapter, I outlined three of the most fundamental features of the body-subject: the phenomenal body; motor intentionality; and temporality. This model omits understandings of health, pathology and normality. In this chapter, I seek to fill this interpretive lacuna with a notion of normality. I consider two accounts of normality. First, the putatively value-free biostatistical theory of health. Biostatistical theory grounds its definitions of health in quantitative and statistical data gathered in relation to whole population. This approach is exemplary of views which generally frame medicine and healthcare systems. However, I argue that this theory does not account for body-subjects in their individual situations and existences. As a result, they are poorly responsive to the needs of body-subjects in their specificity and roles as patients. I then introduce the thought of neurophysiologist Kurt Goldstein. Goldstein was a significant influence on Merleau-Ponty and is representative of an

¹ Merleau-Ponty refers to nine texts by Buytendijk in *The Structure of Behaviour*.

² F. J. J. Buytendijk, *Prolegomena to an Anthropological Physiology*, trans. Anneke J. Orr (Pittsburgh: Duquesne University Press, 1974), 281, 91-92.

³ Wim J. M. Dekkers, "F.J.J. Buytendijk's Concept of an Anthropological Physiology," *Theoretical Medicine* 16, no. 1 (1995): 24.

⁴ *Ibid.*, 21-22.

alternative approach to health grounded in the individual. Goldstein is an essential propaedeutic to a normality appropriate to the body-subject.

Such a notion of normality is more comprehensively developed by the philosopher of medicine and science Georges Canguilhem. I argue that his value-laden vital normativity is more appropriate and helpful to the model of the body-subject. I offer an overview of vital normativity, including his interpretations of the concepts of vital norms, pathology, error, and normality. The notion of normalisation is employed in Chapter 6 as central to therapy but sometimes neglected in artificial heart therapy. Canguilhem's analysis of error demonstrates why static and final notions of health, such as those valorised in ideals of objective health, should be avoided. Vital normativity is grounded in the philosophical approach of historical epistemology which is frequently asserted to be opposed to and irreconcilable with phenomenology. I argue that key features of vital normativity correspond to key features of the body-subject. Agreement in these ways demonstrate their compatibility and permit normality and normalisation to be received into and made coherent in relation to the body-subject.

2.1 Biostatistical theory of health

Philosopher of biology Christopher Boorse purports to present a theory of health which is objective and naturalistic. Such a theory would be the opposite of the anthropological physiology saturated with meaning and value. Boorse claims that medicine has historically been based on the axiom that health is the absence of disease, with disease recursively defined as whatever is inconsistent with health.⁵ He notes that "It is safe to begin any discussion of health by saying that health is normality..." in the sense of being more or less arbitrary prescriptions of the way things ought to be.⁶ By the same token, diseases can be called abnormal, referring to some characteristic which departs excessively from a population's statistical average. This blunt statistical basis for normality does not totally succeed in shedding normativity nor robustly defining health and disease.⁷ Many variations from the average do not appear problematic or unhealthy, and many seeming diseases, such as tooth decay, are universal or at least statistically average. There is also an implicit premise that averages are derived from healthy exemplars of a population. Boorse's own theory seeks to avoid importing such normative assumptions, but Elselijn Kingma argues that it fails in this.⁸

⁵ Boorse, "Health as a Theoretical Concept," 542.

⁶ "On the Distinction between Disease and Illness," *Philosophy & Public Affairs* 5, no. 1 (1975): 50.

⁷ "Health as a Theoretical Concept," 546-47.

⁸ Kingma, "Health and Disease: Social Constructivism as a Combination of Naturalism and Normativism," 40.

Averages alone are neither necessary nor sufficient for health, but Boorse does regard them as central to a more developed biostatistical theory of health. Under biostatistical theory an organism is “theoretically healthy... insofar as its mode of functioning conforms to the natural design of that kind of organism.”⁹ He defines his theory in strictly biological terms. Perhaps most importantly, he claims that biologists and physiologists have no need to ask evaluative questions so long as they are describing “casual contributions to empirically given goals” and not considering the organism as a whole or the goals it has. Biostatistical theory asserts that these empirically given goals are those picked out by biologists as key for the species or category to which the organism belongs.¹⁰

Biostatistical theory is thus sometimes known as species-typical functioning. The goals Boorse identifies as highest or apical are those of individual survival and reproduction.¹¹ The valuing of biology for its contribution to these axiomatic goals also entails that individual organisms’ opinions or evaluations of their biology are superfluous to the meaning of health. It is on the basis of independence from these evaluations that Boorse claims to offer a value-free concept of health.¹²

Biostatistical theory seeks to be value-free, but its objective notions can acquire their own presumptive value. Since health is independent of the goals pursued by a particular organism, an individual may prefer to avoid health. For example, contraception may advance an individual’s goals while departing from this evolutionary notion of health. Boorse embraces the decoupling of health and preferences, encouraging the question, “what exactly is wrong with being unhealthy.”¹³ This makes biostatistical theory useful for liberal, plural societies with large, advanced healthcare systems. Such systems are integrated through common, scientific understandings and aim at individual choice and patient autonomy. For these same reasons, medicine is anchored by and oriented to objective theories of health. As a starting point for medical conversations and practice, received notions of objective health and illness acquire a presumptive, normative value. I have already referred to biostatistical theory to explain the implicit premises of medical device design. The presumption that therapy should aim at the restoration of objective health also helps explain some of the responses to heart failure I will consider in Chapter 6 on motor intentionality.

⁹ Boorse, “On the Distinction between Disease and Illness,” 57.

¹⁰ *Ibid.*, 58.

¹¹ *Ibid.*, 57.

¹² *Ibid.*, 58.

¹³ *Ibid.*, 68.

2.2 Rescuing the individual

Naturalistic theories test each part of an organism against expectations derived from experimental data, finding health in the sum of an organism's parts. In the patient case model, health or normality belongs to the individual, which is greater than the sum of its parts. In their history of the early development of theories of corporeal integration, Stefanos Geroulanos and Todd Meyers survey the rise of patient case studies in medicine.¹⁴ They argue patient case studies had acquired an epistemic legitimacy by the end of the nineteenth century. By the first decades of the twentieth century, the patient case was widely employed as a model of physiological knowledge. Its use in medicine proliferated during the Great War as wounded soldiers returned home, often bearing uncommon injuries and responding in idiosyncratic ways. Cases described the particulars of the patient's history, behaviour and experience in great detail. The development of such cases usually required sustained and responsive engagement with patients, documenting their handling of both everyday and experimental settings and giving consideration to their personalised clinical care. The growth in the use of patient cases was partly fuelled by scepticism towards the impartial and reductive understandings of the proper functioning of the body aimed at by traditional, atomistic biology.

Geroulanos and Meyers deploy Jean-Luc Nancy's analogy between juridical case law and patient cases to illustrate this point.^{15,16} Juridical law is codified in abstract by statute but is enacted by application to discrete facts in cases. The precedents generated in common law, case law, apply elsewhere only to the extent that the facts between cases align in all their contextual content. Their lessons must be extracted by argument and judgment, not merely transposed from edict. Similarly, whereas atomistic medical science seeks to establish general physiological laws or principles, patient cases show how such laws may or may not apply in the particular. The uniqueness of patient cases limits their usefulness in other, even similar, examples of the same physiology or pathology. The contradiction of patient cases at once exemplary and exceptional gives them an ambiguous status as knowledge resources. Their virtues as research and pedagogical tools have been contested. Jessie Stanier, for example, cautions against using cases to affirm existing biases.¹⁷ Yet, despite or perhaps

¹⁴ Stefanos Geroulanos and Todd Meyers, *The Human Body in the Age of Catastrophe: Brittleness, Integration, Science, and the Great War* (Chicago: University of Chicago Press, 2018), 78-108.

¹⁵ Jean-Luc Nancy, *Corpus*, trans. Richard Rand, *Perspectives in Continental Philosophy* (New York: Fordham University Press, 2008), 53.

¹⁶ Geroulanos and Meyers, *The Human Body in the Age of Catastrophe: Brittleness, Integration, Science, and the Great War*, 85.

¹⁷ Stanier, "An Introduction to Engaged Phenomenology," 231.

because of this epistemic ambiguity, patient cases have been at the vanguard of new approaches to philosophy, psychology, physiology and normality.

2.2.1 Goldstein and order

Descriptive patient cases pave the way for a phenomenological approach to physiology. Among the most prominent early proponents of the patient case were collaborating Gestalt psychologist Adhémar Gelb and neurophysiologist Kurt Goldstein.¹⁸ Goldstein consciously adopted an approach to their work in biology which Anne Harrington has described as phenomenological, bracketing received notions of pathology and the isolability of symptoms.¹⁹ Goldstein himself observed such a correspondence with phenomenology, albeit retrospectively, and noted with satisfaction that his work was taken up by philosophers such as Merleau-Ponty.²⁰ In fact, Goldstein's methodology included three principles: bracketing preconceptions about symptoms; comprehensively describing phenomena, rather than merely recording the valence of specific tests; and considering phenomena with reference to the whole organism and its situation study.²¹ This final precept is his chief methodological commitment and shifted his practice from a reductive anatomy of parts to the study of the organism as an integrated whole. Rather than seek to establish the invariable laws of psychophysical integration common to a species or type, this method aimed at an empirical essentialism concerned with the essence of just this person in just their situation.²² It was not just phenomenological in means and ends, but also existential and posttranscendental.

The essence of the individual is revealed, or approximated, in the achievements of the organism in relation to its environment. Goldstein argues that an organism strives to reach and maintain its essence amid changes in its environment and its situation. It seeks a feeling of adjustment to the world which he refers to as order, manifest in "all involved organismic factors" including attitudes, feelings, "the mental and the somatic down to the physiochemical processes".²³ The organism's preferred behaviour is one which will best arrange or order their situation for their central performance or projects. Changes in preferred behaviours are designed to produce new situations

¹⁸ Geroulanos and Meyers, *The Human Body in the Age of Catastrophe: Brittleness, Integration, Science, and the Great War*, 100-02.

¹⁹ Anne Harrington, *Reenchanted Science: Holism in German Culture from Wilhelm II to Hitler* (Princeton: Princeton University Press, 1996), 146-47.

²⁰ Kurt Goldstein and Walther Riese, "Kurt Goldstein," in *A History of Psychology in Autobiography*, ed. Edwin C. Boring, Gardner Lindzey, and Walther Riese (New York: Appleton-Century-Crofts, 1967), 162-63.

²¹ Kurt Goldstein, *The Organism: A Holistic Approach to Biology Derived from Pathological Data in Man*, trans. Henry E. Garrett (New York: Zone Books, 1995), 37-40.

²² Marjorie Grene, *Approaches to a Philosophical Biology* (New York: Basic Books, 1968), 228.

²³ Goldstein, *The Organism: A Holistic Approach to Biology Derived from Pathological Data in Man*, 48-49.

which will allow the organism to express their essence. One instructive example he gives is of “tonus pull” by which a patient with a cerebellar lesion adopts a pronounced tilt which compensates for both subjective disturbances in equilibrium and objective deficits of performance, such as walking. This compensation is experienced not as pathological but as the preferred and healthiest behaviour:

Gradually, however, it becomes so much a matter of course that the patient is then hardly conscious of the abnormal posture. He only knows that thereby he feels better, for example.²⁴

Goldstein uses the term “normal” with the abandon of a practitioner who employs it in everyday use. However, one of his first explicit insights into biological normativity is to identify normal behaviour with preferred, ordered behaviour.²⁵ The abnormal posture of the patient exhibiting tonus pull would, therefore, be normal. Disordered behaviour, on the other hand, is inadequate for the performance sought by an organism and accompanied by profound disorientation. These effects lead Goldstein to regard the terms “disordered” and “catastrophic” as interchangeable. Catastrophe generates a physical and mental shock which radiates from the organism to its world.²⁶ It causes a sense of constraint, impairment and unresponsiveness owing to a “greater bondage to the demands of environment”. In such conditions even the performances of which an organism is usually straightforwardly capable become challenging. Their ability to imagine possibilities and voluntarily change their behaviour evaporates. Goldstein characterises this loss of the “capacity to deal with that what is not real – with the possible” as the loss of the abstract attitude.²⁷ He argues that organisms attempt to preserve the most important elements of their performances by both conscious and unconscious adjustments of biology and behaviour.

When disorder is felt or threatened, an organism will also adjust or shrink its milieu and its choices to maintain order. Goldstein gives a range of examples of brain injury patients exhibiting obsessive-compulsive tendencies in order to prepare an orderly environment. Among his most illustrative is the tendency for such patients to avoid emptiness. When asked to write on a blank piece of paper, patients tend to crowd their writing at the edge of the paper and studiously avoid the empty space at the centre. Goldstein explains this tendency not as an aversion to emptiness *per se*, since its lack of presence is by definition effectively imperceptible by the patient. Rather, their behaviour reflects a need for a concrete point of reference or for “something they can handle”.²⁸ In the patients’ interaction with the blank paper he observes two further insights into biological normality. First,

²⁴ Ibid., 334-36.

²⁵ Ibid., 48-49.

²⁶ Ibid., 49.

²⁷ Ibid., 44.

²⁸ Ibid., 55-56.

that an organism might achieve ordered behaviour by a shrinkage of its environment in proportion to its defect, such as the effective reduction of the page to its borders. Second, that an organism in or in fear of disorder will tend to “cleave to the concrete” rather than adopt an abstract attitude.

These strategies to avoid disorder aim to preserve the organism’s ability to express its essence. Goldstein sees in disorder primarily a threat to the freedom of the organism rather than its existence or survival. Out of this observation, Goldstein ascribes “functional value” to a performance on the basis of its ability to express the essence of the organism rather than its “survival importance”.²⁹ As Marjorie Grene puts it, “Only when its normal functioning is impaired, when it can no longer aim at its best expression, does the organism fall back on survival as all it can obtain.”³⁰ While adaptation entails self-preservation, it is not exhausted by it. Despite the apparent dichotomy between order and disorder, states of disorder are neither absolute nor irremediable. It is possible for survival to overtake expression as a priority for the organism, but this occurs only when even adaptive preferred behaviour becomes impossible. An organism will usually first try to maintain order and expression by attempting substitute performances, preserving and prioritising performances, and controlling and shrinking its milieu.

2.2.2 Equivocating normality

Goldstein’s work informed Merleau-Ponty but it is not enough to ground a robust concept of normality. Goldstein was unimpressed by the paradigms of atomistic and evolutionary physiology of his time. It is likely he would have been equally critical of the placement of the evolutionary goals of survival and reproduction at the core of the biostatistical theory of health. As I showed in the previous chapter, the case of Johann Schneider and the notions of abstract attitude and concrete movement are central to the phenomenology of the body-subject, especially to its motor intentionality. But perhaps reflecting Goldstein’s own equivocations, Merleau-Ponty does not express a confident notion of normality. Schneider, for example, is described as disordered and compared to normal workers and people owing to his loss of abstract attitude or what Merleau-Ponty calls motor intentionality. But Schneider exhibits disorder not in his ordinary situation but only when asked to perform experimental tasks in the manner of atomistic biology. Merleau-Ponty regards Schneider’s compensations as abnormal despite seeming preferential and normal to the

²⁹ Ibid., 47.

³⁰ Grene, *Approaches to a Philosophical Biology*, 233.

patient himself.³¹ The body-subject is still missing a robust account of normality. But as I will argue, it is compatible with the approach of vital normativity developed by Canguilhem.

2.3 Canguilhem and vital norms

Georges Canguilhem took up and advanced Goldstein's work as a foundation for bodily normality. Where the biostatistical model attempts to undermine the normative architecture of health, Canguilhem leans into it. Canguilhem trained as a medical doctor during World War II. While he found his medical expertise required by the French Resistance in that period, his principal motivation for studying medicine was to have some practical experience by which to better understand those topics which interested him philosophically.³² Those topics particularly included how knowledge and concepts have been and are produced and promulgated within the domains of science and medicine, or what is often called historical epistemology. It is his doctoral thesis in medicine, later published as *The Normal and the Pathological*, for which Canguilhem is probably best known. In it Canguilhem offers an argument for thinking about health, normality and pathology apart from measures in relation to a quantitative baseline. His argument takes the thought of physiologist Claude Bernard as its foil but other quantitative and objective approaches can stand in for it. Sander Werkhoven draws a comparison specifically between Bernard and Boorse's biostatistical theory.³³

In Canguilhem's view, organisms establish vital norms by adopting and adapting those ways of life appropriate to their purposes. Instead of the normal being fixed to a certain state, "what distinguishes the physiological from the pathological is not a physicochemical objective reality but a biological value."³⁴ Temperature, for example, is not just a measure or configuration of energy. Temperature is understood and expressed through the biological values of comfort, chill, or fever. 'Normal' describes an organism's way of relating to their environment for which no constant is intrinsically suited. Ways of living, or vital norms, are validated by their biological value, since

³¹ Georg Goldenberg, "Goldstein and Gelb's Case Schn.: A Classic Case in Neuropsychology?," in *Classic Cases in Neuropsychology, Volume II*, ed. Chris Code, et al. (Hove: Psychology Press, 2003), 283.

³² Colin Gordon, "Canguilhem: Life, Health and Death," *Economy and Society* 27, no. 2-3 (1998): 186.

³³ Sander Werkhoven, "Life and Objective Norms: Canguilhem in the Context of Contemporary Meta-Ethics," in *The Care of Life: Transdisciplinary Perspectives in Bioethics and Biopolitics*, ed. Miguel de Beistegui, Giuseppe Bianco, and Marjorie Gracieuse (London: Rowman & Littlefield International, 2015), 80n3.

³⁴ Georges Canguilhem, *The Normal and the Pathological*, trans. Carolyn R. Fawcett and Robert S. Cohen (New York: Zone Books, 1989), 220.

It is life itself and not medical judgment which makes the biological normal a concept of value and not a concept of statistical reality.³⁵

Normality reflects the needs, capacities, environment, and projects of an organism. Organisms arrange themselves into communities which adopt similar vital norms to cope with shared conditions. In an inversion of the approach received from the objective view, species-typicality coincides with normality because frequency follows normality, not because normality derives from frequency. The very notion of species refers to a way of life adopted by many individuals: “all of whom are different to some degree, whose unity expresses the momentary normalization of their relations with the environment”.³⁶ When an organism’s conditions change, its way of life may also need to change. Similarly, changes to an organism’s projects and aims may be reflected in changes in its way of life. Idiosyncratic projects may require idiosyncratic ways of life. Measured against the most common or average, this new way of life may be anomalous. However, so long as it remains adequate for the organism to pursue its projects within its environment “An anomaly or a mutation is not in itself pathological. These two express other possible norms of life.”³⁷ That is, ways of life which diverge from a certain vital norm but which remain adequate for that organism are also normal.

2.3.1 Normativity

In this context of normative pluralism, Canguilhem maps the terms normal and the pathological to superior and inferior norms. Organisms from a given species can legitimately adhere to different norms. It is trivially true that an inadequate norm would be no vital norm at all. What is inadequate for maintaining an organism with certain goals under certain conditions is not a way of life. But given the foregoing analysis it is less clear how vital norms could be hierarchised or translated to health and disease. As much as pathology or disease may represent a loss *vis a vis* a prior norm, an organism faced with a particular situation may take up a pathological norm whenever that norm is adequate. Even a narrow, pathological norm is normal within its circumscribed domain. It, and disease, can be “a positive, innovative experience in the living being... a new dimension of life”.³⁸ Canguilhem describes pathological norms in terms of “stability, fecundity, variability of life”.

³⁵ Ibid., 131.

³⁶ Ibid., 143.

³⁷ Ibid., 144.

³⁸ Ibid., 186.

Deficiency across these attributes will cause a norm to be “pushed aside by life.”³⁹ Pathological norms are those at risk of destruction by changes in conditions or replacement by superior norms.

Pathological norms are inferior because they cannot respond to challenges. A pathological norm is strictly limited in the conditions for which it is adequate, and like the Goldstein’s organism undergoing a catastrophic reaction its world shrinks to just such conditions. If conditions change beyond these limits inadequacy will render it no longer a vital norm and no longer a way of life: no longer life at all. As Werkhoven puts it, “being fixed to normality is pathological, while the ability to be abnormal is precisely what characterizes health.”⁴⁰ This notion of pathology turns on normativity itself. Normality comes from normativity.⁴¹ That is, normativity establishes norms. A pathological norm is one which is normal but not normative. Its opposite, health, goes beyond mere normality. For Canguilhem “What characterizes health is the possibility of transcending the norm”.⁴² Health starts as an assertion of normativity and settles into a way of life poised for challenge. It is a preparedness to give up old ways of life to respond to new circumstances. It is feeling “capable of following new norms of life.”⁴³

2.3.2 Error

Canguilhem later offers an analysis of error which warns against a final and univocal ideal of health, such as compliance with absolute, quantified measures and markers. Revisiting his *magnum opus* twenty years after its publication Canguilhem attempts to clarify the concept of pathological error. Pathological error is a disturbance to conditions caused not by an external agent but by an overreaction the origin of which is “in the physiological function itself”. Canguilhem offers anaphylaxis and allergy as examples of errors which might be interpreted as “bad readings” of biochemistry. Such interpretations presuppose the possibility of good readings of biochemistry. Canguilhem warns that pathological errors may prompt “gene police” to “dream of absolute remedies” worse than illness. Ultimately, to produce readings of life which are canonical and free of error some may be tempted to conclude that “The real solution to heresy is extirpation”.⁴⁴ Canguilhem writes in the shadow of the eugenic projects of National Socialism against which he

³⁹ Ibid., 144.

⁴⁰ Werkhoven, “Life and Objective Norms: Canguilhem in the Context of Contemporary Meta-Ethics,” 82.

⁴¹ Canguilhem, *The Normal and the Pathological*, 126-27.

⁴² Ibid., 196-97.

⁴³ Ibid., 200.

⁴⁴ Ibid., 280-81.

stood as a military medic. His analysis of pathological error is an admonition against a different project of finality, totalisation, and biological utopianism.

More than just a tolerance for challenge and change, health is a propensity and predisposition for such infractions. Error expresses the central argument of vital normativity. Life is an ongoing dialogue between organism and world. Momentary stability is crystallised in a concrete norm which makes the organism feel normal. But this normality can only be conceived in a world where the negotiation between life and milieu is not once and for all a settled matter. Normality exists in relation to disease. Normality can be tested against actual disease or poised for pathology. It is, in any event, aware and capable of ways of being which are not itself. Of health Canguilhem says “the power and temptation to fall sick are an essential characteristic of human physiology.”⁴⁵ Of normality:

In order for the normal man to believe himself so, and call himself so, he needs not the foretaste of disease but its projected shadow... His health is an equilibrium which he redeems on inceptive ruptures. The menace of disease is one of the components of health.⁴⁶

Error is the essential complement and counterweight to normality. Neither health nor normality can be outside the context of difference, departure and disease. No organism could create or express an immutable norm. Error and contingency are indispensable elements of “a way of tackling existence as one feels that one is not only possessor or bearer but also, if necessary, creator of value, establisher of vital norms.”⁴⁷ In the context of a phenomenology concerned with therapy and the aims of the various stakeholders of the therapeutic situation, error is a reminder that life need not attain to health in order to be adequate or to be meaningful. As I will discuss in Chapter 6, therapy driven by notions of restoration or cure risk substituting the particular situation of the patient for a detached ideal of health. A way of life which is adequate for its bearer to progress their projects, and even more one over which that bearer has ownership and belonging, is capable of being normal.

2.4 Vital norms and the body-subject

The poststructuralist Michel Foucault regards French philosophy after Husserl as an history of two dichotomous schools. On the one hand, there is a philosophy of meaning, subject and the experienced thing which is practiced by the likes of Jean-Paul Sartre and Merleau-Ponty. Foucault sees in these phenomenologies a naïve, pre-Kantian conflation of empiricism and transcendence

⁴⁵ Ibid., 200.

⁴⁶ Ibid., 286-87.

⁴⁷ Ibid., 201.

which improperly identifies knowledge with knower. On the other hand, there are those thinkers of the theory of sciences. This latter school includes Canguilhem, whom Foucault regards as making a particular contribution to philosophy of error, concept and living being.⁴⁸ The anthropologist Paul Rabinow also draws a distinction between Canguilhem's vital rationalism and Merleau-Ponty's attempt to understanding life with a single set of concepts.⁴⁹ Rabinow also acknowledges there is in Foucault's depiction of this French philosophical schism no shortage of rhetorical posturing. Personal and professional rivalries, rather than pure philosophical incompatibility, may motivate Foucault's uncharitable framing of phenomenology.⁵⁰ For his own part, Canguilhem did offer Sartre's existentialism as one of the symptoms of French philosophy's forgetting of life as an object of study.⁵¹ But it is not clear that criticism of Sartre's distinctively radical phenomenology of consciousness should be transposed onto Merleau-Ponty's posttranscendental phenomenology.

Canguilhem and Merleau-Ponty start and end their thought in sympathy. For both, the heritage of French philosophy includes Gaston Bachelard, Henri Bergson and others, not least the *ur-philosophe* that is Descartes. Canguilhem offers tentative approval of the role Merleau-Ponty attributes to thought in the Cartesian union of body and soul. Canguilhem regards his own position as one which regards health as a bodily truth, insofar as to live is also to know. Not only this but Canguilhem refers to Merleau-Ponty in his justification for making health a philosophical question.⁵² Both are indebted to Goldstein. Harrington notes that Goldstein's study of Schneider was Merleau-Ponty's theoretical well-spring;⁵³ Grene refers to Canguilhem as Goldstein's disciple.⁵⁴ Beyond their influences it is anyway not clear that even the more sincere divergences of phenomenology and vitalism necessarily signal fundamentally different readings of the actual conduct of living. David Peña-Guzmán argues that Canguilhem's study of normality bears a striking resemblance to Merleau-Ponty.⁵⁵ In the next section, I argue this to be the case in at least three ways: the dialecticality of the

⁴⁸ Michel Foucault, "Introduction," in *The Normal and the Pathological* (New York: Zone Books, 1989), 8.

⁴⁹ Paul Rabinow, "Georges Canguilhem: A Vital Rationalist," in *Essays on the Anthropology of Reason* (Princeton: Princeton University Press, 1996), 84.

⁵⁰ *Ibid.*, 88.

⁵¹ Charles T. Wolfe and Andy Wong, "The Return of Vitalism: Canguilhem, Bergson and the Project of a Biophilosophy," in *The Care of Life: Transdisciplinary Perspectives in Bioethics and Biopolitics*, ed. Miguel de Beistegui, Giuseppe Bianco, and Marjorie Gracieuse (London: Rowman & Littlefield International, 2015), 64.

⁵² Georges Canguilhem, "Health: Popular Concept and Philosophical Question," in *Writings on Medicine*, ed. Stefanos Geroulanos and Todd Meyers (New York: Fordham University Press, 2012), 50-52.

⁵³ Harrington, *Reenchanted Science: Holism in German Culture from Wilhelm II to Hitler*, 147.

⁵⁴ Grene, *Approaches to a Philosophical Biology*, 240.

⁵⁵ David Marcelo Peña-Guzmán, "Not Phenomenology's 'Other': Historical Epistemology's Critique and Expansion of Phenomenology," in *The Subject(S) of Phenomenology: Rereading Husserl*, ed. Iulian Apostolescu (Cham: Springer, 2019), 375.

relationship between organism and environment; the polarisation of the world by the organism; and understanding organismic variations as distinct forms of life.

2.4.1 Life is: dialectical

As I have already shown, Merleau-Ponty's phenomenology is motivated by bringing together subject and world. The term body-subject refers to an ambiguous way of being-in-the-world occurring at a place of embodiment. It is ambiguous because its horizons are always open, orienting an infinite number of intentions yet lived with sufficient certainty to anchor our projections into the world. Its ambiguity is also representative of the co-naissance of body-subject and world. The body-subject is contained in, yet generative of, the world.⁵⁶ It is a mistake to read into this mutuality a simple ontological monism. Merleau-Ponty's attribution to Descartes of a *mélange*, a mixture, of mind and body parallels the notion of mixture in his own thought. Such a mixture remains capable of "an absolute distinction between mind and body which is denied by their union."⁵⁷ Leonard Lawlor notes that Merleau-Ponty expresses this mixturism in different ways – as Gestalt, as linguistic construction, and as the relation of scientific knowledge to something larger – to show that meaning emerges from the way different parts come together to form a whole.⁵⁸ For Merleau-Ponty, mixturism implies an ongoing dialectic. It at once shapes and is shaped by a world which is situation and milieu.

Similarly, normalisation is an ongoing process of production, selection, and revision. Charles Wolfe and Andy Wong make the point that life in Canguilhem's vitalism should be construed as causing a certain attitude on the part of one who inquires into life.⁵⁹ As a heuristic, vitalism requires the living to know life in a particular way. Life produces and knows its own vital norms but remains seized of other available to and even pressed upon it. Error is what escapes normalisation. It is the exception which proves the rule insofar as it requires an organism to realise its own way of living. Julien Pieron argues that "we need to see life as a normative/normalized activity... as two aspects or moments of a complex dynamic..."⁶⁰ Canguilhem goes on to problematise two additional systems of multiple and conflicting norms: epistemological and social. While these may not be equivalent to the phenomenological projects they do indicate an affinity with Merleau-Ponty's description of human

⁵⁶ Merleau-Ponty, *Phenomenology of Perception*, 204.

⁵⁷ *The World of Perception*, trans. Oliver Davis (Abingdon: Routledge, 2008), 65.

⁵⁸ Leonard Lawlor, *The Implications of Immanence: Toward a New Concept of Life* (New York: Fordham University Press, 2006), 72-75.

⁵⁹ Wolfe and Wong, "The Return of Vitalism: Canguilhem, Bergson and the Project of a Biophilosophy," 66.

⁶⁰ Julien Pieron, "Critical and Political Stakes of a Philosophy of Norms," *ibid.*, 100.

existence as an act of taking up “a factual situation that we make our own and that we ceaselessly transform through a sort of escape that is never an unconditioned freedom.”⁶¹

For both Canguilhem and Merleau-Ponty the organism conducts its life dialectically. Canguilhem praises the lucidity of Goldstein’s philosophical view of the relation between organism and milieu, the influence of which on his own views is evident. Canguilhem translates the original term for this relation, *Auseinandersetzung* as *débat*. Rather than a dialectic as a conflict, which would already signal a catastrophe, this dialectic is one “to which the living brings its own proper norms of appreciating situations, both dominating the milieu and accommodating itself to it.”⁶² It is unclear – but this is precisely the point – whether Canguilhem is representing Goldstein’s view or offering his own when he says “To live is to radiate; it is to organize the milieu from and around a center of reference, which cannot itself be referred to without losing its original meaning.”⁶³ For his part, Merleau-Ponty offers the intentional arc as the power of responding to situations “which have nothing in common but the meaning.”⁶⁴ Both of these notions are drawn from Goldstein, for whom the being of an organism consists in its meaning. In drawing on and elaborating Goldstein both Canguilhem and Merleau-Ponty come to regard living, either as life or lived-experience, as dialectical.

2.4.2 Life is: polarising

There is a remarkable similarity between Merleau-Ponty and Canguilhem in the way in which organismic meaning is expressed in the organisation of its milieu. Merleau-Ponty describes a motor intentionality which has a relation to a non-representational solicitation at its core. He refers to this in a number of ways: as solicitations, lines of force, and ultimately as the polarisation of the world through the projects of the body-subject.⁶⁵ At times, Merleau-Ponty refers to the body’s polarisation by the field of existence, by the natural world, rather than by the body-subject. But this merely restates the indeterminacy of the dialectic of co-naissance. One takes possession of space on the basis of a pact between one’s body “as the power of certain gestures and as the demand for certain privileged planes” and the world “as the invitation to these very gestures and as the theater of these very actions”.⁶⁶ Polarisation and the orientation towards poles of action in the world is a product of

⁶¹ Merleau-Ponty, *Phenomenology of Perception*, 174.

⁶² Georges Canguilhem, *Knowledge of Life*, ed. Paola Marrati and Todd Meyers, trans. Stefanos Geroulanos and Daniela Ginsburg (New York: Fordham University Press, 2008), 113.

⁶³ Merleau-Ponty, *Phenomenology of Perception*, 113-14.

⁶⁴ *The Structure of Behaviour*, 130.

⁶⁵ *Phenomenology of Perception*, 115.

⁶⁶ *Ibid.*, 261.

dialectical perception, and particularly of the perception of the body-subject. Whatever else they are, the fields of perception and the fields of existence imply a field of polarisation which is our being in the world.

Normativity polarises the milieu according to biological values. As I have just shown, Canguilhem's vital normativity proceeds as a dialectic sometimes normative and sometimes normalising.

Normality expresses an individual's certain way of adjusting to a milieu. Vital norms do not dominate or defeat conditions. Neither are they passive accommodations or receptions on account of conditions. Normativity is enacted in the evaluation of certain features of the milieu as good or bad for that organism. These evaluations manifest as convenient or inconvenient, helpful or unhelpful, desirable or undesirable. Organismic responses indicate that "life is not indifferent to the conditions in which it is possible; that life is polarity and thereby even an unconscious position of value".⁶⁷

Polarisation propels, repels, and produces the normal and the pathological.⁶⁸ As Pieron puts it, the norm is not a single pole but a field of polarisation, and the normal will, "constitute the rhythm or the mode by which life stabilizes itself following this polarization, or this submission to norms."⁶⁹

For both Merleau-Ponty and Canguilhem, life is necessarily polarising, orienting and reorienting the organism and its milieu in accordance with its way of living.

2.4.3 Life is: novel

Merleau-Ponty makes extensive use of Gelb and Goldstein's case of Johann Schneider as a resource for uncovering features of the body-subject. Many scholars take Merleau-Ponty to be using this pathological case as a guide to the physiological, as though the absence of certain qualities in the pathological highlights their presence in the physiological. Merleau-Ponty explicitly addresses and rejects this, insisting "The normal cannot be deduced from the pathological, and deficiencies cannot be deduced from their substitutions, through a mere change of sign."⁷⁰ This is a direct invocation of Goldstein's second methodological postulate rejecting the "plus or minus method". Goldstein argues that simply recording the success or failure at a given test is inadequate for correctly describing the phenomena in question.⁷¹ Comparisons fail to capture a person's entire orientation to a task, their possible hidden detours to its completion, or their sincere disinterest in experimental ends. To do justice to new orientations, Merleau-Ponty regards Schneider as expressing an entirely new and complete way of being in the world. At the same time, this way of being in the world is identified as

⁶⁷ Canguilhem, *The Normal and the Pathological*, 126.

⁶⁸ Ibid., 222.

⁶⁹ Pieron, "Critical and Political Stakes of a Philosophy of Norms," 97.

⁷⁰ Merleau-Ponty, *Phenomenology of Perception*, 110.

⁷¹ Goldstein, *The Organism: A Holistic Approach to Biology Derived from Pathological Data in Man*, 38-39.

pathological.⁷² It is difficult to see how the features of the normal body-subject can be discovered by analysing another complete being in the world.

With this in mind, Gabrielle Benette Jackson argues that Merleau-Ponty engages in a process of triangulation. By understanding pathological behaviour as alluding to fundamental functions, Merleau-Ponty hopes to reveal some facts about normal being in the world. Jackson makes a glancing reference to Canguilhem and Goldstein as thinkers who similarly understand the compensations and substitutions of the patient as pathological.⁷³ It seems to me this is only partially the case. Canguilhem may assess Schneider as unhealthy or limited in his normativity, but he would understand Schneider precisely as normal and not as pathological. Canguilhem's whole theory of vital norms is aimed at explaining how an organism can find a way of living and make something of its life through adaptation to imposed conditions. Even a restricted and inflexible norm "insofar as it is compatible with life, ends up being basically normal."⁷⁴ Canguilhem makes this point time and again explicitly in relation to the types of conditions which Merleau-Ponty regards as, or does not deny being, pathological. For Canguilhem, pathology is associated with suffering.

Suffering is a focus of vital normativity but receives little attention in the model of the body-subject. Canguilhem replaces Goldstein's identification of illness with disorder with his own claim that "There is no disorder, there is the substitution for an expected or loved order of another order which either makes no difference or from which one suffers."⁷⁵ It is subjective suffering, not medical judgement, that makes a person a medical *patient*. It is a person's own pathic call to the doctor which qualifies life as pathological.⁷⁶ To call Schneider's case pathological he himself would have to identify his suffering. Katherine J. Morris suggests that Merleau-Ponty's ideas of normality and abnormality are underpinned by something like vital norms.⁷⁷ Peña-Guzmán argues that since both Merleau-Ponty and Canguilhem offer illness cases as existentially prior to normal cases, both thinkers are making use of a kind of pathic normativity.⁷⁸ It is true that for Canguilhem "the abnormal, while logically second, is existentially first" and that for Merleau-Ponty "existence itself, is

⁷² Merleau-Ponty, *Phenomenology of Perception*, 110.

⁷³ Jackson, "Maurice Merleau-Ponty's Concept of Motor Intentionality: Unifying Two Kinds of Bodily Agency," 766.

⁷⁴ Canguilhem, *The Normal and the Pathological*, 200.

⁷⁵ *Ibid.*, 194.

⁷⁶ *Ibid.*, 226.

⁷⁷ Katherine J. Morris, "Merleau-Ponty and Medical Anthropology," *Journal of the Anthropological Society of Oxford Online* VII, no. 3 (2015): 346.

⁷⁸ David Marcelo Peña-Guzmán, "Pathic Normativity: Merleau-Ponty and Canguilhem's Theory of Norms," *Chiasmi International* 15 (2013): 374.

prior to every philosophy, but it only knows itself in limit situations”.^{79,80} It is not clear to me that Merleau-Ponty intends any such pathic analysis. This is precisely what the body-subject lacks.

Underneath this diverging terminology and pathic concerns is a joint interest in novelty. For Canguilhem, new vital norms are revealed in many ways: from diseases as “new ways of life”; to pathologies which have the lived character of “being really *another way of life*”; and of sickness which “means that a man really lives another life”.^{81,82,83} Sick life can only be compared to itself. Hence for Canguilhem “we are sick in relation not only to others but also to ourselves.”⁸⁴ Merleau-Ponty compares illness to childhood insofar as it expresses a complete form of existence. He also notes that one can identify in oneself sick- or disabled-consciousness only through “a statistical or objective view” which compares oneself with others. In a discussion of freedom, Merleau-Ponty comes close to endorsing a view of life which approximates Canguilhem’s philosophy of error: “that in returning to the core of his consciousness, everyone feels himself to be beyond his particular characteristics and so resigns himself to them.”⁸⁵ What is common in both is defining life by simultaneous acceptance of and escape from new ways of being in the world. Life is original and it is novel.

2.5 Conclusion

The choice of these domains of agreement between Merleau-Ponty and Canguilhem is not arbitrary. These three domains correspond more or less to the three features of the body-subject I have already tried to explicate. The phenomenal body and its motor intentionality operate in the dialectic and polarisation of the situational horizon. The temporal and rhythmic character of the body-subject rely on life in its incarnation, emergence and productive novelty. I have hoped to show that vital normativity and the body-subject are not contradictory concepts but in fact agree in just these ways. Reading Canguilhem’s model of vital norms onto the body-subject fills in the blanks in Merleau-Ponty’s implied but never clearly articulated biological normality. It also provides a counterweight to the temptation to inflate claims about the human body to the level of invariance or universality. The real profit of admitting vital normativity into the resources available to the body-subject is to facilitate a phenomenology which is responsive more to patients’ needs than detached ideals of health and disease.

⁷⁹ Canguilhem, *The Normal and the Pathological*, 243.

⁸⁰ Merleau-Ponty, *Phenomenology of Perception*, 426.

⁸¹ Canguilhem, *The Normal and the Pathological*, 100.

⁸² *Ibid.*, 89.

⁸³ *Ibid.*, 88.

⁸⁴ *Ibid.*, 138.

⁸⁵ Merleau-Ponty, *Phenomenology of Perception*, 458-59.

Vital normativity helps to bring out what is already at work in the body-subject, and how to interpret health, disease, normality, and normalisation in discussions involving the body-subject.

Normalisation is important to a later chapter on motor intentionality. Artificial hearts can sometimes represent a therapeutic means of attempting to restore or achieve an ideal of health that is not appropriate to an individual patient's situation. Such attempts can prevent the more helpful normalisation, acceptance and adaption of a patient and their projects to their new, albeit pathological, vital norms. In the next chapter, I go beyond the biological and consider how possibilities for experience might be conditioned by variations of history not limited to physiology, such as gender, disability and illness as distinct from disease. I elaborate three key types of variation from the ostensibly general body-subject: feminine comportment, disabled embodiment and embodied metaphor, and the body in illness. Unlike the interpretative lens of vital normativity, variance is not about realising what is already latent within the body-subject but instead appending new phenomenological resources to its scaffolding.

CHAPTER 3: VARYING THE BODY-SUBJECT

In the previous chapter I attempted to reconcile Merleau-Ponty's body-subject with the vital normativity of his contemporary Georges Canguilhem. Despite reports that these two thinkers adopt divergent methods yielding divergent results, I argued that they agree in important respects. The fundamental features of the body-subject I described in Chapter 1 can be read to imply the biological and somatic normalisations which are laid out explicitly by Canguilhem. Normalising the body-subject is about reading what is already in the body-subject in this light. In contrast, the purpose of the present chapter is to both re-read and extend the body-subject in certain ways. That is, not only to interpret but to vary the model body-subject formulated within the specific historical milieu inhabited by Merleau-Ponty. As I indicated in the introduction, it is characteristic of his phenomenology that it is existential, posttranscendental, and historicised. These features make the body-subject amenable to variation. But the production of these varied phenomenologies was not part of his phenomenological project. Instead, a long train of scholarship has applied phenomenological insights to help elucidate the experiences of those marginalised in dominant phenomenologies and unearth rich conceptual resources for elaborating the human experience.

In this chapter, I outline three complements to the body-subject developed by Merleau-Ponty. First, I consider Merleau-Ponty's apparent presumption that there is a universal or general type of body, which happens to closely track his own. I show that political theorist Iris Marion Young's description of feminine comportment amends the body-subject to reflect the motor intentionality of women, or at least women under certain conditions. Second, I engage with the concept of embodied metaphor as employed in Jackie Leach Scully's disability bioethics to show that metaphor can be useful for expanding the body-subject. I particularly illustrate the sympathies between Merleau-Ponty's phenomenology and the approach taken by the underappreciated phenomenologist María Zambrano. Third, I draw on two important phenomenologists of health and illness, S. Kay Toombs and Havi Carel, to discover what occurs when the body-subject is conditioned by illness. These three variations in constituency and approach clearly do not exhaust the critical reflections required to make the body-subject properly inclusive, nor are they the final theoretical insights which will be used in this project. They do, however, represent three significant and key areas of variation which must be acknowledged before embarking on a study of artificial hearts.

3.1 Feminine comportment

Even while drawing out the consequences of bodily variations, Merleau-Ponty appears to presume a socially and somatically generic body. No sooner was *Phenomenology of Perception* published than it garnered criticism for its reduction of existence to a monolithic norm of primordial being, a problem

which is common to much of the classical phenomenological literature. Not only does Merleau-Ponty's analysis of existence describe only one particular type of existence, but it supposes both implicitly and explicitly that others share this form of existence. In a seeming contradiction, alterity seems to have no place in his intersubjectivity. For the phenomenology of the body-subject to be in any way fruitful for identifying the phenomenology of certain groups, such as those with artificial hearts, it must be either capable of recognising difference or be amenable to renovation or extension. In this section, I consider the generic presumptions of the body-subject and explore the illuminating amendment to it offered by Iris Marion Young. I initially take Judith Butler's close reading of Merleau-Ponty's writing on the body-subject as a sexed being as emblematic of the issues many scholars have raised with Merleau-Ponty's identification of general body with a set of abstract prejudices.

Merleau-Ponty reveals a certain phallocentricity in his analysis of the patient Johann Schneider. After cataloguing a history of this patient's apparent sexual dysfunctions, Merleau-Ponty concludes a diagnosis of sexual incapacity. Butler rightly points out the oddity of pathologising many of Schneider's behaviours. Most, in fact, are perfectly reasonable: the failure to become aroused in experimental, though artificially sexualised, circumstances; a loss of desire after his partner has already climaxed; and the view that it is "predominantly character which makes a woman attractive."¹ More deeply, however, she notes that Merleau-Ponty's ascription to the female body of an essence not lived and existed by any real individual but fixed and constituted by a perceiver contradicts the existentialism he elsewhere so robustly maintains. Butler argues that Merleau-Ponty leans on metaphors of perceiving as seeing to explain the projection of erotic intentions on the decontextualised female body by the non-pathological subject. But this normal, general subject is a "strangely disembodied voyeur whose sexuality is strangely non-corporeal," and the woman onto whom he projects his desire is "never seeing, always seen". Bodies which perceive, body-subjects in general are, *per exclusionem*, male bodies.²

Since the body-subject turns on corporeality, a gendered delimitation on the body points to an internal contradiction. Merleau-Ponty attempts to buttress his account against such criticism with his discussion of intersubjectivity. In a discussion on the application of Merleau-Ponty's phenomenology to multiple-difference or intersectional feminism, Sonia Kruks argues that his way

¹ Butler responds to the formulation given above, but a newer translation reads: "... it is the personality that makes a woman attractive". Ibid., 158.

² Judith Butler, "Sexual Ideology and Phenomenological Description: A Feminist Critique of Merleau-Ponty's Phenomenology of Perception," in *The Thinking Muse*, ed. Jeffner Allen and Iris Marion Young (Bloomington: Indiana University Press, 1989), 92-95.

of overcoming the dominance of a singular body-subject is for it to engage in a dialectic wherein solitude and communication are “two ‘moments’ of one phenomenon”. Imperfect knowledge of the other is a product of the incomplete horizontal synthesis I earlier described. She argues that though such imperfect knowledge is no guarantee of communication where interests diverge, a shared world can be affirmed on the basis of affective predispositions, particularly on shared understanding of pain.³ Whether or not solidarity can be grounded in pain, the more fundamental claim is that if there is a way to engage with and recognise others, it is through bodily empathy. Such bodily empathy likely requires a more inclusive notion than the general body Merleau-Ponty asserts.

The phenomenology of feminine comportment is one example of the reconstruction of a more inclusive phenomenology which acknowledges gender. Iris Marion Young’s essay *Throwing Like A Girl* aims at providing this account.⁴ Young responds to a suggestion by Erwin Straus similar to Merleau-Ponty’s that a distinctively feminine manner must reduce to a feminine essence. Simone de Beauvoir had already rejected the idea of a natural female essence in favour of women’s existence both in and as situation. But Young argues Beauvoir fails to offer an account of women’s bodily motility. It is this gap which Young seeks to fill using the same phenomenological resources employed by Beauvoir and Merleau-Ponty; namely, an analysis of the body as lived within a set of structures and conditions which delimit the typical situation of women. Although she accepts Merleau-Ponty’s description of motor intentionality as basically valid, Young identifies a distinctive feminine motility which relates to her observation that women tend to focus on moving only the part of the body required to perform an act, rather than throwing their whole body into an act.

According to Young, feminine comportment manifests three key differences from Merleau-Ponty’s body-subject. These three differences – ambiguous transcendence, inhibited intentionality, and discontinuous unity – coalesce to mark feminine motility with less fluidity, greater effort and a disruptive and inhibiting deliberation in performing some tasks. Feminine spatiality is similarly distinct. The body tends not to simply be the zeropoint of spatiality, but to posit concentric horizons: first an existential enclosure to which movement tends to be restricted, and a boundary which distinguishes between here and yonder. Constituting space this way, independent and inhibitive of intentions, the feminine body is then “*positioned* by a system of coordinates which does

³ Sonia Kruks, "Merleau-Ponty and the Problem of Difference in Feminism," in *Feminist Interpretations of Maurice Merleau-Ponty*, ed. Dorothea Olkowski and Gail Weiss (University Park: Pennsylvania State University Press, 2006), 40-43.

⁴ Iris Marion Young, "Throwing Like a Girl: A Phenomenology of Feminine Body Comportment Motility and Spatiality," *Human Studies* 3, no. 1 (1980).

not have its origin in her own intentional capacities.”⁵ The feminine body-subject thus also exhibits features of not of the body-subject but of objects, a kind of orientation to the world which Merleau-Ponty contemplates only in the context of pathology or exception. Young’s description of this inhibited but altogether unexceptional intentionality highlights the presumptions in Merleau-Ponty’s general account.

Feminine comportment describes features of phenomenology which might be observed in other body-subjects. It is a proof of concept for phenomenological alternatives to the general body-subject. Young extends the classical phenomenologist Simone de Beauvoir’s account of women’s existence in patriarchal societies and develops her model of comportment based on women in the historical conditions of late twentieth century advanced, urban societies. While other circumstances will not necessarily give rise to precisely this type of comportment, it is nonetheless possible that they may. Such a phenomenology could be enacted by other body-subjects. In a later chapter on motor intentionality, I describe how structures similar to those described in feminine comportment might also be displayed by artificial heart patients as a consequence of their compulsory attendance to their devices. Artificial hearts are perceived and cared for in positional space, and this attendance may interrupt and inhibit the intentionality of their bearers. Feminine comportment is not only a demonstration of the limitations and presumptions of the general body-subject and the possibility of alternatives, but also a template for the kinds of phenomenological variations which might manifest by other body-subjects, including artificial heart patients.

3.2 Embodied metaphor

3.2.1 Mediating the medical and social

The general body-subject can also be varied by disability. Disability refers to a large and heterogeneous group of conditions which disable or limit a person’s pursuit or enjoyment of some goods. I limit my discussion of disability to disabled embodiment, and specifically to the anatomical, morphological or sensory variations which can result in impairment or difficulties in accessing goods standardly available to non-disabled people. Despite narrowing this discussion to the specifically somatic and not considering intellectual, neurological or emotional variance, this definition remains expansive. Its breadth reflects a theoretical disagreement at the heart of the concept of disability. On the medical model, it is a question of an individual’s somatic situation whether they possess certain functional possibilities which we regard as typical or basic. Being born with or acquiring an

⁵ Ibid., 151.

impairment which alters or restricts a person's possibilities is what is referred to by disability. Alternatively, on the social model, disability is a function of a society which, in general, caters for and expects a certain default form of embodiment. Disability or limit derives from social and cultural concern to accommodate some types and extents of somatic variation, but to exclude other variations or their exponents.

Both medical and social models speak to important aspects of the experience of disability. The choices made by a society clearly shape the options available to, and therefore the activities and affiliations formed by, people with impairment. But as much as identity is crafted by social forces, our bodies also shape our experience in all the fundamental ways implied by the body-subject. While acknowledging the criticisms which motivate the social model, bioethicist and philosopher of disability Jackie Leach Scully notes that untethering disability from biology may counterproductively splinter attempts at advocacy on behalf of disabled people. For some people living with impairment, personal struggles persist even in the absence of social barriers.⁶ Scully has instead advanced the project of disability bioethics, informed by feminist approaches to philosophy and sociology, which leave

open the conceptual space to examine how phenotypically variant bodies are culturally identified... without forgetting that there *really are* possibilities and impossibilities that cannot be dismissed as the effects of discourse.⁷

Scully's main interest is in the different moral understandings and perspectives which might be generated by living with disability. Other fundamental questions about the possibility of variant, disabled non-moral perspectives are equally compelling.

3.2.2 Knowing through difference

Scully pairs criticism of the lack of phenomenological attention to bodily variation with a positive account of embodied cognition. She has the goal to explore the possibility that "bodies with qualitatively unusual interactions with the material world generate subtly different structures of meaning".⁸ Her work ranges across the field of individual and collective identity formation and use. Perhaps its most striking illustration of the intersection of actual, somatic and created, discursive meaning-making is in her linguistic analysis of embodied cognition. Embodied cognition refers to a

⁶ Jackie Leach Scully, "Admitting All Variations? Postmodernism and Genetic Normality," in *Ethics of the Body: Postconventional Challenges*, ed. Roxanne Mykitiuk and Margrit Shildrick (Cambridge: MIT Press, 2005).

⁷ *Disability Bioethics: Moral Bodies, Moral Difference* (Lanham: Rowman & Littlefield Publishers, 2008), 170.

⁸ *Ibid.*, 101.

family of theories in philosophy of mind which hold that thinking, understanding and behaviour depends not only on the brain, but also on interactions with the rest of the body and the environment. This family is also sometimes referred to as 4E cognition in recognition of its major variants: embodied, embedded, enactive, and extended. These approaches have in common the rejection of cognition as the simple manipulation of representations. Adherents to these theories owe and acknowledge debts, increasingly, to pragmatism in the analytic tradition as well as phenomenology in the continental, and these basic themes are already familiar from the core features of the body-subject, including situational spatiality and motor intentionality.

Among the most vivid and compelling demonstrations of embodiment shaping cognition is the theory of embodied metaphor, which Scully gives a central role in thinking through the variant body. Embodied metaphor is the idea that patterns in lived experience can schematically structure our understanding. Perhaps the most pertinent example is the polysemicity of the word *stand*. Cognitive linguist Raymond W. Gibbs Jr and collaborators have noted how the postural experience of standing motivates metaphorical uses of *stand*, such as its use in the sense of persisting or continuing, such as “the law stands” or “to stand for something”.⁹ They suggest five candidate image-schemata for these metaphorical uses, such as VERTICALITY and BALANCE. Scully notes the normative overtones of this metaphor. An influential essay by phenomenologist and neurologist Erwin Straus presented standing, expressed as upright posture, as foundational for human lived spatiality and modes of communication.¹⁰ This assertion has rightly received criticism for its exclusionary presuppositions: from S. Kay Toombs and others, such as sociologist Thomas Abrams, in terms of disability;^{11,12} from Iris Marion Young in terms of feminine embodiment and Adriana Caverero in terms of feminine subjectivity more generally.^{13,14}

Verticality is a ubiquitous foil in Merleau-Ponty’s phenomenology. As I have already discussed, an interest in situatedness is common to phenomenologists. A certain privileging of first-person experience goes along with this situatedness. Merleau-Ponty understands these two ostensibly shared elements of phenomenology in a particular way. First, situation is expressed in the body-

⁹ Raymond W. Gibbs, Jr et al., “Taking a Stand on the Meanings of *Stand*: Bodily Experience as Motivation for Polysemy,” *Journal of Semantics* 11, no. 4 (1994): 249.

¹⁰ Erwin W. Straus, “The Upright Posture,” *The Psychiatric Quarterly* 26, no. 1 (1952).

¹¹ S. Kay Toombs, *The Meaning of Illness: A Phenomenological Account of the Different Perspectives of Physician and Patient* (Dordrecht: Kluwer Academic Publishers, 1992), 65-66, 66n98.

¹² Thomas Abrams, “Is Everyone Upright? Erwin Straus’ “the Upright Posture” and Disabled Phenomenology,” *Human Affairs* 24, no. 4 (2014): 569-71.

¹³ Young, “Throwing Like a Girl: A Phenomenology of Feminine Body Comportment Motility and Spatiality,” 137-38.

¹⁴ Adriana Caverero, *Inclinations: A Critique of Rectitude*, trans. Amanda Minervini and Adam Sitze (Stanford: Stanford University Press, 2016), 10.

subject, in embodiment and co-naissance with the world. Second, his privileging of lived experience is accompanied by a distaste for high-altitude thinking: the idea that it could ever be possible, even cumulatively or by scientific increments, to survey and know the whole world. In this, it is possible to identify parallels with the feminist philosopher of science Donna Haraway, who is explicit about the epistemological privileges of partial perspectives. For her, only embodied, situated perspectives can be answerable or responsible for knowledge and avoid being taken in by the “god trick of seeing everything from nowhere.”¹⁵ Haraway and Merleau-Ponty share an antipathy toward enlightenment transcendence. Heliotropic rationalism, which casts ever more light on the world, risks blinding its adherents to how it is they, in fact, see.¹⁶

Phenomenological verticality is already image-schematic in the linguistic, metaphorical sense. Reflecting on Descartes’ *Optics*, Merleau-Ponty argues that vision is not merely the decipherment of signs caused by light, thus not merely a representation or figure. Neither is vision divorced from the world and created purely by us or by our sight, since our sight is only background. What is required of vision is a figure-background structure, a figuring against and connected to things unfigured. The enigma of vision is, “their connection; the enigma is between them. I see things, each one in its place, precisely because they eclipse one another.”¹⁷ This contingent obscurity is a function of my motion and perspective, my counting in the visible world. Most importantly, it is a function of horizontality and delimitation. It is also a function of depth and specifically, as philosopher Leonard Lawlor points out, depth which is permitted by the verticality of the upright body.¹⁸ It is not, however, just that posture facilitates depth vision by overlooking a scene, since Merleau-Ponty is clear about the synaesthetic unity of the body-subject: vision is palpation with the eyes.¹⁹ Depth, vision, and verticality are imbued with metaphorical meaning.

3.2.3 Expressive subjectivity

Knowledge is connected to embodiment structures, and it is as likely to be disclosed by metaphor as it is by rationalism. It is these two approaches that María Zambrano seeks to balance with her method of expressive subjectivity and poetic reason. A student of José Ortega y Gasset and a member of the putative Madrid School, Zambrano continued Ortega’s attempts to reconcile transcendental

¹⁵ Donna Haraway, “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective,” *Feminist Studies* 14, no. 3 (1988): 581-84.

¹⁶ “The Promises of Monsters: A Regenerative Politics for Inappropriate/D Others,” in *Cultural Studies*, ed. Lawrence Grossberg, Cary Nelson, and Paula A. Treichler (Abingdon: Routledge, 1992), 300.

¹⁷ Maurice Merleau-Ponty, “Eye and Mind,” in *The Merleau-Ponty Reader*, ed. Ted Toadvine and Leonard Lawlor (Evanston: Northwestern University Press, 2007), 369.

¹⁸ Lawlor, *The Implications of Immanence: Toward a New Concept of Life*, 85-86.

¹⁹ Merleau-Ponty, *The Visible and the Invisible*, 133.

subjectivity with embodiment. Zambrano stayed in Spain until the end of the Civil War before leaving into exile until dictator Francisco Franco's death and the last years of her own life. On her return, she was the first philosopher or woman to receive the Miguel de Cervantes Prize for Spanish-language literature, and her prolonged absence and association with historic Spanish republicanism earned her recognition as the mother of Spanish democracy. A lack of stable, institutional support and her *ad hoc* contributions to Spanish-language periodicals perhaps contributed to her work being far less recognised and appreciated across Europe, and particularly in the anglophone world, than that of her teacher and contemporaries.

Zambrano combines metaphor and reason in a notion of expressive subjectivity. Scholarship on Zambrano has mostly been in Spanish, and only a handful of her works have so far been translated into English. While many of her texts are clearly philosophical and involve deep engagement with figures in the history of philosophy, they are equally aimed at broader audiences and written in literary style. This idiomatic mode of expression represents her central contribution to philosophy: poetic reason. One of Zambrano's few English-language scholars, Karolina Enquist Källgren, notes that poetic reason is, "notoriously difficult to read, grammatically and lexically innovative" and reliant on metaphorical, symbolic and allusive diction and structures.²⁰ Chantal Maillard understands this impenetrability as an attempt to reconcile experience, expression and creation with the impossibility of speaking reality in complete correspondence with things. Maillard therefore argues that Zambrano uses metaphor to offer a new articulation of reality.²¹ Enquist Källgren notes that Zambrano has been interpreted by Caverero and Roberto Esposito to allow thinking which is temporary and particular, but which makes generalisable claims. For her own part, she argues that poetic reason entails transcendence as well as embodied moments, or what she calls expressive subjectivity.²²

Expressive subjectivity is grounded in an attitude of poetic reason. Zambrano argues that a balance between philosophical inquiry and poetic encounter is necessary to get to the truth. In her *Filosofía y poesía* and early essays, she claims

Passion by itself scares off the truth, which is sensitive and agile in avoiding its claws. Reason alone cannot capture its prey. But passion and reason together, reason charging forward with

²⁰ Karolina Enquist Källgren, *María Zambrano's Ontology of Exile: Expressive Subjectivity* (Cham: Palgrave Macmillan, 2019), 13-14.

²¹ Chantal Maillard cited in *ibid.*, 15.

²² *Ibid.*, 4-5.

passionate impetus and braking at the right point, can collect the naked truth without damaging it.²³

The point, however, is not to employ poetry and philosophy, passion and reason, alternately, trapping the truth pincer-like between them. Rather, poetic reason has its own capacity to approach truth gently and effect its revelation. In this way, the lived, creative and emotive resonances of metaphor are not meant as a departure from reality, but a bridge toward it. Poetic reason seeks to develop an empirical metaphysics. As Zambrano writes to Agustín Andreu:

metaphors and symbols and myths have this: they epitomize *in one the metaphysical and physical experience. Metaphysics is empirical, philosophy 'a priori'. And one has to conjugate them together.*²⁴

Merleau-Ponty has his own misgivings about the adequacy of reason and literality to convey meaning.²⁵ He admires painting's ability to express itself indirectly and outside thought. He claims that the titles of Paul Klee's paintings allow them to function more purely as paintings by relieving them of the prosaic requirement to resemble an object.²⁶ Merleau-Ponty's essay on Paul Cézanne documents the artist's attempts not just to represent the object but "to find it again behind its atmosphere", "to [recapture] and [convert] into visible objects... the vibration of appearances which is the cradle of things."^{27,28} Finding meaning in the context, not just the figure, extends to the relationality of language, in which "meaning appears only at the intersection of and as it were in the interval between words."²⁹ Jerry H. Gill claims that the idea that the invisible must be approximated through the visible shows that human knowledge is always mediated, such as invisible meaning shown through visible words.³⁰ He argues that Merleau-Ponty employs a deliberately metaphoric mode of expression, and in particular employing the tangible structures of corporeality shared by human individuals as a "language beneath language" to reveal the intangible meanings of our lived experience.

Merleau-Ponty never claimed to be doing poetry, though Jessica Wiskus notes that his writing is deliberately poetic. She concludes that the operative language which Merleau-Ponty takes to be the

²³ María Zambrano, "Toward a Knowledge of the Soul," [Hacia un saber sobre el alma.] *History of European Ideas* 44, no. 7 (2018): 937.

²⁴ Zambrano cited in Enquist Källgren, *María Zambrano's Ontology of Exile: Expressive Subjectivity*, 137.

²⁵ Jerry H. Gill, "Merleau-Ponty, Metaphor, and Philosophy," *Philosophy Today* 34, no. 1 (1990): 55.

²⁶ Merleau-Ponty, "Eye and Mind," 372.

²⁷ "Cézanne's Doubt," 12.

²⁸ *Ibid.*, 17-18.

²⁹ "Indirect Language and the Voices of Silence," in *Signs* (Evanston: Northwestern University Press, 1964), 42.

³⁰ Gill, "Merleau-Ponty, Metaphor, and Philosophy," 56-58.

theme of philosophy is “the language of poetry, the abode of metaphor.”³¹ At the same time, Merleau-Ponty expresses caution about philosophical aspirations to absolute knowledge. Here his worries are expressed in similar terms to Zambrano. An overemphasis on conceptual rigour risks nihilating life. The philosopher must think the world through living phenomena “which no formal *a priori* assures him mastery of in advance. [Edmund] Husserl had understood: our philosophical problem is to open up the concept without destroying it.”³² The solution to this problem comes late in Merleau-Ponty’s posthumously published work, evoking words and images in which what counts is “the lateral relations, the kinship that are implicated in their transfers and their exchanges”: that is, “the occult trading of the metaphor”.³³ This consideration of what language is appropriate to philosophy precedes his discussion of flesh, *chiasm*. In this, the body is an order of visible and invisible that makes itself a world and makes things flesh.

The body-subject is shot-through with metaphor. Some scholars consider the turn to flesh the decisive move of Merleau-Ponty’s philosophy. As I see it, flesh crystallises an essential ambiguity already familiar in Merleau-Ponty’s early thought. What I have tried to show in this section is that metaphor can reveal not only the cultural and discursive possibilities and impossibilities of body-subjects, but also their somatic ones. In this respect, feminist approaches in disability are particularly revealing. Psycholinguistics and neuroscience lend a different kind of credence to the claim that metaphor is founded by and related to empirical experience, as attempts to cognise the patterns of lived experience. And though their philosophical methods do not overlap entirely, Merleau-Ponty and Zambrano share a conviction about the value of metaphor. The body-subject, therefore, might admit the lyrical and poetic uses of metaphor. Zambrano’s extended inquiries into the metaphorical meaning of embodied experience, for which her “The Metaphor of the Heart” is exemplary, can be brought into communication with the body-subject. Embodied metaphor, in its empirical, psycholinguistic and expressive dimensions, can help us to attend more closely to lived experience and understand the body-subject and its world.

3.3 Body in illness

In the previous chapter, I introduced vital normativity as a way of parsing biological notions of health and disease through the body-subject. Though these ideas are correlated to conditions for living they do not provide an accounting of lived experience. Moving beyond physiological or

³¹ Jessica Wiskus, *The Rhythm of Thought: Art, Literature, and Music after Merleau-Ponty* (Chicago: University of Chicago Press, 2013), 8-12.

³² Merleau-Ponty, “Everywhere and Nowhere,” 138.

³³ *The Visible and the Invisible*, 125.

biological processes to the lived experience of health or illness requires a different approach. Most classical phenomenology provides such an accounting only for a state of unquestioned health. Merleau-Ponty's is such an account: what he extracts from patient cases is there to be contrasted with healthy experience. In terms of disease, phenomenological principles have been applied as a way of enabling clinicians to better attend and understand the experiences and priorities of patients in various clinical settings, especially medicine and nursing. Aligning with a new emphasis on patient autonomy in the late 20th century, these analyses found mainstream acceptance in the guise of patient narratives and narrative care. Such clinical phenomenology helps to affirm the interests of individual patients in therapeutic settings but does not, necessarily, serve as the distillation of the structures of lived pathology sought by theoretical phenomenology.

Phenomenologists of health and illness have sought to describe the common features of illness experience. In this section I will consider three pertinent features of illness in the body-subject, whom in this context I call the patient. First, the notion of illness as a pentad of losses. Loss is a useful backdrop for discussions of artificial hearts, the indications for which are serious cardiac illnesses. Second, illness as transformation, especially in terms of spatial and temporal changes. Third, illness as the displacement of bodily transparency and certainty by appearance and doubt. I also adopt the same scope that Carel gives to illness. The first and principal distinction is between disease and illness: illness is lived experience of disease, at the intersection of the objective and phenomenal bodies. Third, the types of illness with which I am concerned are, "serious, chronic, and life-changing," not trivial or fleeting.³⁴ Lastly, a number of important and influential phenomenological studies have focused on discrete mental, psychiatric, and affective illnesses. Without wishing to paper over the porous boundary between psychological phenomena and their physicochemical correlates, my focus is illness primarily associated with somatic rather than psychological conditions.³⁵

3.3.1 Illness as loss

Toombs gives the typical characteristics of illness in the form of a series of losses. These are the losses of wholeness, certainty, control, freedom to act, and the familiar world.³⁶ Loss of wholeness is experienced when the body is unable to translate typical volitions into actions, say because of symptoms of debilitating pain or weakness. More significantly, loss of wholeness forces the patient's awareness of the body in its physical objectivity. The unity of body and self is replaced instead by

³⁴ Havi Carel, *Phenomenology of Illness* (Oxford: Oxford University Press, 2016), 2.

³⁵ *Ibid.*, 18-19.

³⁶ *Ibid.*, 41-46.

alienation from one's body and a new, oppositional relationship is established wherein the body is counterweight to, rather than vehicle for, being in the world. Bodily damage usually spreads to subjective intentionality, which is to say that the suite of available volitions is brought into line with objective possibilities. Where intentionality fails to synchronise with this new domain of objective possibility, as in cases of phantom limbs, a distinct illness or lamentation ensues.³⁷ While symptoms can be alleviated and the suite of action and intention restored, loss of wholeness persists as a self-conscious obeisance to the threat of somatic limitation. According to Toombs, "one recognizes that one can no longer take the body's future compliance completely for granted."³⁸

If loss of wholeness principally describes a precarity of intention, the next two forms of loss, of certainty and control, send the contagion of precarity back to body and world. Both losses involve the surrender of the assumption of personal indestructability, and the interruption, by the vagaries of the world, of a "more or less carefully formulated life plan."³⁹ Toombs' loss of certainty can in this respect be brought into conversation with the sociological concept of biographical disruption.⁴⁰ As well as confounding expectations of personal life, the predictability of the world is questioned. It is perceived as uncontrollable, aleatory, newly colonised by capricious irruption. Toombs cites influential bioethicist Edmund D. Pellegrino that illness moves us, "toward the absorption of man by circumstance," invoking a juxtaposition with Ortega y Gasset's claim that "the reabsorption of circumstance is the concrete destiny of man."^{41,42} Toombs makes the particular observation that these losses are exacerbated by the exaggerated expectation often held that medical technology will effect a complete restoration of health. As Canguilhem points out and I have emphasised, therapy never reestablishes norms which existed prior to disease but rather creates new and uncertain "physiological innovations."⁴³

Deference to medical technology not only creates a false and unsustainable expectation of certainty, but also transfers agency from the patient to the technology or its various operators and designers. In the encounter with medical technologies, the patient comes to regard themselves as an object, reflected through the gaze of machines, "with barely understood functions but whose dictates must

³⁷ Merleau-Ponty, *Phenomenology of Perception*, 83.

³⁸ Toombs, *The Meaning of Illness: A Phenomenological Account of the Different Perspectives of Physician and Patient*, 91.

³⁹ *Ibid.*, 93.

⁴⁰ Michael Bury, "Chronic Illness as Biographical Disruption," *Sociology of Health & Illness* 4, no. 2 (1982): 169.

⁴¹ Edmund D. Pellegrino, "Being Ill and Being Healed: Some Reflections on the Grounding of Medical Morality," in *The Humanity of the Ill: Phenomenological Perspectives*, ed. Victor Kestenbaum (Knoxville: University of Tennessee Press, 1982), 159.

⁴² José Ortega y Gasset, *Meditations on Quixote*, trans. Evelyn Rugg and Diego Marín (New York: Norton, 1961), 45.

⁴³ Canguilhem, *The Normal and the Pathological*, 196.

be obeyed.”⁴⁴ Loss of control is, of course, not confined to the transfer of agency to technical devices. Much has been said, by Toombs and others, about the complex decision-making processes enacted by patients and physicians, the asymmetry of power and knowledge between these actors and the roles and responsibilities of each. Carel takes up and develops these themes, borrowing from Miranda Fricker’s taxonomy of epistemic injustice.⁴⁵ Therapy implies an aim to bring healthcare professionals into empathetic conversation with patients. The delegation of diagnostic or therapeutic duties to medical devices may imperil holistic relations with patients. In the absence of such relations, medical technology tends to manifest loss of control.

Losses of certainty and control join to enact the fourth type of loss described by Toombs, the loss of freedom to act. Uncertain prognoses and knowledge asymmetries between healthcare professional, or medical technology, and patient result in a paralysing inability to separate clinical and non-clinical reasoning. Toombs argues that illness, suffering and distress can impair the ability of patients to view clinical choices with equanimity, resulting in an inaccurate appreciation of the ramifications of clinical options for their own situation. Perhaps in repair of this error, patients may assume or project onto their physician, “often incorrectly and certainly unreasonably,” an understanding of their particular value system and circumstances. For their part, physicians sometimes feel that values-based enquiries are, “inappropriate, irrelevant or intrusive” or that clinical reasoning is sufficient for decision-making.⁴⁶ Clinical ethics continues to host a contest on precisely the role of the physician in such deliberations.⁴⁷ In any event, despite the serious and personal nature of treatment decisions, patients sometimes abdicate, expressly or implicitly, the informed choice and freedom to act assumed in healthcare decision-making.

The preceding losses culminate in what Toombs calls loss of the familiar world. Illness prevents the patient from engaging in everyday activities, by removing capacities to participate, crowding out capacity with suffering or distress, or introducing new imperatives to avoid further injury and convalesce. Whereas the patient’s routine is upended, others continue to pursue their ordinary activities with little or no disruption. Except in the case of immediate dependents or carers, a patient’s illness is, as Toombs points out, only peripheral to others’ experience. The world continues in familiar ways but the patient can no longer access it; it is lost to them. Beyond separation from

⁴⁴ Toombs, *The Meaning of Illness: A Phenomenological Account of the Different Perspectives of Physician and Patient*, 94.

⁴⁵ Carel, *Phenomenology of Illness*, 180-204.

⁴⁶ Toombs, *The Meaning of Illness: A Phenomenological Account of the Different Perspectives of Physician and Patient*, 95-96.

⁴⁷ For example, Robert M. Veatch, “Abandoning Informed Consent,” *Hastings Center Report* 25, no. 2 (1995). and Julian Savulescu, “Liberal Rationalism and Medical Decision-Making,” *Bioethics* 11, no. 2 (1997).

familiar society, the significance of which will depend on the illness and routine in question, the privacy and incommensurability of suffering guarantees a different sort of isolation and exclusion. There is no sharing or including others in one's pain; the patient must bear it entire, so that, "Existential aloneness is necessarily a part of serious illness."⁴⁸ The effect of this cinquefoil of losses is to significantly destabilise the patient's place in the world; to deconstruct their being in the world in preparation for new comportments.

3.3.2 Illness as spatiotemporal transformation

3.3.2.1 Spatial transformation

In contrast to the loss of the familiar world by the various constraints of illness, the transformed body reflects the new way of engaging with the world brought about by illness. Toombs provides a rich description of changes in her engagement with her world in the course of living with multiple sclerosis, which at times affected her ability to see, to sense the positions of her limbs, and to walk, stand or move. Employing a situational spatiality she notes that from my body outwards, "the world around me arranges itself in terms of near and far goals." Whereas normally movement opens up or makes space available, disruptions in movement, or disruptions to faith in movement, "anchors one in the Here, engendering a heightened sense of distance between oneself and surrounding things."⁴⁹ For Carel, who suffers from a chronic respiratory illness, the breathlessness brought about by her condition renders almost all physical activity arduous. Subsequently all activities and aims are modulated by these physical and phenomenological limitations. Vectors of relation to the world stretch out. Distances once perceived to be near become far: "Everything seems further away and heavier than it was."⁵⁰

The total effect of this reproximation is to limit the possibilities of the world. Some possibilities disappear as motor intention fails to afford their appearance. Other possibilities disappear by remaining outside the draw distance of the body-subject, beyond the horizon of possible action. As Carel puts it, "My world, and the world of those who are close to me, has shrunk. For me, the trap is permanent."⁵¹ Permanence does not mean fixed or static, since a patient can alter their intentional reach by recovery, psychological adaptation, and planning or compensatory measures. Toombs and

⁴⁸ Toombs, *The Meaning of Illness: A Phenomenological Account of the Different Perspectives of Physician and Patient*, 96-97.

⁴⁹ "Reflections on Bodily Change: The Lived Experience of Disability," in *Handbook of Phenomenology and Medicine*, ed. S. Kay Toombs (Dordrecht: Kluwer Academic Publishers, 2001), 249.

⁵⁰ Carel, *Phenomenology of Illness*, 113.

⁵¹ *Ibid.*, 71.

Carel both note the preparation required to ensure that conditions for action are appropriate to the restrictions of illness: for instance, whether a destination has nearby parking, flat terrain or downstairs seating. Toombs notes that "With habitual use the wheelchair becomes an extension of one's bodily range."⁵² Carel affirms the liberating power of fitness and a plentiful supply of portable oxygen. Equally, she notes the restrictive character of deconditioning or compromised oxygen arrangements.⁵³ Disability and illness are felt continuously as a global reorientation and resituating. Illness dilates and relocates things in situational space by changing worldly geography and topography.

Toombs and Carel both stress the particularity of this new way of perceiving. Unnoticed by those able to unproblematically negotiate them, marginal details are imbued with decisive significance. What once seemed to be a flat shopping mall becomes undulating in a wheelchair.⁵⁴ What was once a minor hill seems mountainous.⁵⁵ Newly perceived obstacles can bluntly foreclose possibilities or, more productively, give rise to new ways of accomplishing being in the world. Toombs distinguishes those who suffer the erosion or impediment of certain abilities and known ways of doing things from those who never had or acquired those abilities in the first place. Perhaps counterintuitively, she observes that the ongoing task of relearning to interact with the world may be more challenging than being congenitally without a capacity.⁵⁶ Scully, too, notes that the progressive nature of certain disabilities or illness can prevent the assimilation of the condition into one's personal identity, further complicated by the dependence of disability identity on contexts of stigma and exclusion, or inclusion, support and community.⁵⁷ In positive contexts, limitations might even be able to be rearticulated as new and valuable ways of knowing the world, or what bioethicist Rosemarie Garland-Thomson calls an epistemic resource.⁵⁸

3.3.2.2 Temporal transformation

The erasure of and need to reconstruct ways of being in the world is a matter not only of adjusting to material changes but to intentional ones as well. The cycle of bodily adjustment and relearning prevents a patient from advancing existing aims or creating new ones, from escaping the loop and moving forward. I have so far primarily framed geographic changes in their spatially intentional

⁵² Toombs, "Reflections on Bodily Change: The Lived Experience of Disability," 256.

⁵³ Carel, *Phenomenology of Illness*, 110-11.

⁵⁴ Toombs, "Reflections on Bodily Change: The Lived Experience of Disability," 249.

⁵⁵ Carel, *Phenomenology of Illness*, 113.

⁵⁶ *Ibid.*, 251.

⁵⁷ Scully, *Disability Bioethics: Moral Bodies, Moral Difference*.

⁵⁸ Rosemarie Garland-Thomson, "The Case for Conserving Disability," *Journal of Bioethical Inquiry* 9, no. 3 (2012): 345-47.

dimensions but this, among many implications of illness, demonstrates that transformation extends to the temporally intentional as well. Recall that for Merleau-Ponty the “body takes possession of time and makes a past and a future exist for a present”.⁵⁹ In its thickness it creates a place for history, for the present, and the future, each sufficient to host the network of intentions appropriate to them. For Toombs as for Merleau-Ponty, lived space and lived time are “experienced as a gearing towards the future.” But illness, as bodily dysfunction, disrupts that future in at least three ways.⁶⁰ First, illness can cause the present to be temporally predominant. Second, illness can confuse the future or render it inaccessible altogether. Third, illness can cause the future to overshadow or intrude on the present.

Illness unbalances the usual flow of temporal rhythm, in which history informs present action and projects into the future. In illness, suffering commands a consuming and preoccupying attention. As Carel puts it, progress towards her future must be more gradual. She requires frequent pauses to catch her breath physically, but more importantly, phenomenally: “Every step and every breath fill my consciousness, control my mind, leave no space for anything else.”⁶¹ As the need to focus on immediate efforts becomes greater the present expands, leaving little room for the future to unfurl. To the extent that the present commands a disproportionate amount of our temporal resources, the future is reduced. Since past, present and future do continue to structure temporality, this reduction is not categorical. Nonetheless, experience is foreshortened, less rich and full of possibilities at the extremities, such as in the interpretation of history or the crafting of medium- and long-term goals. If living and experiencing is fundamentally ecstatic and propulsive and one becomes relatively grounded or weighed down in the present then, as Toombs puts it “Illness truncates experiencing.”⁶²

In more extreme circumstances this can transform into the second type of disruption, effectively abolishing or blocking off the future. For instance, the first generations of patients with a novel intervention for congenital single ventricle heart disease called the Fontan circulation find it difficult to plan for the long-term owing more to uncertainty generated by the novelty of their survival than to physical limitations or symptoms of their condition.⁶³ As the Fontan procedure turns from surgical novelty to routine treatment, as it is now beginning to do, understanding of the life course for Fontan patients will replace uncertainty. Medicine continues to advance survivorship across

⁵⁹ Merleau-Ponty, *Phenomenology of Perception*, 249.

⁶⁰ Toombs, “Reflections on Bodily Change: The Lived Experience of Disability,” 258.

⁶¹ Carel, *Phenomenology of Illness*, 72.

⁶² Toombs, *The Meaning of Illness: A Phenomenological Account of the Different Perspectives of Physician and Patient*, 97.

⁶³ Karin du Plessis et al., ““How Long Will I Continue to Be Normal?” Adults with a Fontan Circulation’s Greatest Concerns,” *International Journal of Cardiology* 260 (2018): 55, 58.

many congenital illnesses, resulting in many new first-generation illness survivors. Inaccessibility of the future may not be a perpetual feature of congenital illness but it is likely to be a feature of many for some time yet.⁶⁴ In these circumstances, the disruption to temporality is categorical or structural in respect of the horizons of presence, not merely foreshortening.

The third disruption identified by Toombs involves the encroachment of the future into the present. When the uncertainty or severity of a prognosis assumes an overriding significance, forecast conditions may come to dominate present possibilities. Toombs cites one study in which patients newly diagnosed with degenerative multiple sclerosis begin to live as though their prognosis of severe incapacitation has already and immediately come to pass. As she puts it, “the actual present is forfeited and transposed into an imagined future.”⁶⁵ The early phenomenologist and psychiatrist Eugène Minkowski constructed a rather idiosyncratic model for lived time which conceives time on three levels from proximal to distal. An element of Minkowski’s temporality which captures this effect is his distinction made between two aspects of one such level: activity and expectation. The duration of activity is a kind of forward vector, propelling one into the future. Expectation, on the other hand, causes one to wait for the future to approach rather than moving towards it; it, “englobes the whole living being, suspends his activity, and fixes him, anguished, in expectation. It contains a factor of brutal arrest and renders the individual breathless.”⁶⁶ Expectation, and illness, can surrender the present to the future.

These disruptions have their most significant effects at timeframes of weeks, months and years, but illness also modifies time on a shorter scale. Days and weeks can be restructured in line with the requirements of illness. Medication regimens, maintenance or charging requirements for medical devices, and periodic diagnostic appointments and engagements all have their temporal demands. Carel notes that owing to supplies in her ambulatory oxygen tanks, excursions away from the spare oxygen tanks stored in her home are limited to three hours.⁶⁷ Medical anthropologist Tanisha Jowsey has identified four categories of temporal structure in chronic illness. These include calendar or clock time, and three others sometimes grouped together as lived time: biographical time, past-present-future time; and inner time, which includes physiological rhythms. Jowsey observes that these lived times can become tethered to other temporal structures. HIV patients, for example, must

⁶⁴ I have published elsewhere on the phenomenology of congenital illness: McConville, "Toward a Phenomenology of Congenital Illness: A Case of Single-Ventricle Heart Disease."

⁶⁵ Toombs, "Reflections on Bodily Change: The Lived Experience of Disability," 258-59.

⁶⁶ Eugène Minkowski, *Lived Time: Phenomenological and Psychopathological Studies*, trans. Nancy Metzel, Northwestern University Studies in Phenomenology & Existential Philosophy (Evanston: Northwestern University Press, 1970), 87.

⁶⁷ Carel, *Phenomenology of Illness*, 73.

take antiretrovirals at specific intervals and must therefore eat or fast coincidentally with those intervals. Diabetics schedule mealtimes to fit insulin regimens.⁶⁸ The temporality of illness and its management therefore has the capacity to reshape temporality of the body-subject over the short-term. As Merleau-Ponty might put it, illness can vary the weight of the day, or even the life-course.⁶⁹

3.3.3 Illness as bodily doubt

In classical phenomenology the body recedes into the background to become the transparent “vehicle of being in” the world.⁷⁰ In his work on the experiential absence of the human body, phenomenologist and physician Drew Leder argues “As that which operates via self-effacement, the lived body can never be a fully explicit thing.”⁷¹ The effacement of the body from objective being does not efface the possibility of action. Rather, action is first and foremost an accomplishment in phenomenal space, only followed by objective achievement secondarily. These spaces can come apart for a number of reasons, such as when one clings to a bodily temporality antecedent to some trauma, such as in cases of phantom limbs, or when one is still in the process of learning or acquiring a motor skill. In general, however, bodily action is performed on the basis of a certain transparent confidence that the motor possibilities that solicit our action do so with a certain presumption of success ahead of their completion. These invitations are offered without an outcome being calculated or even considered in advance. As Leder points out, “Functionally, we rely upon a set of abilities we cannot fully thematize.”⁷²

The final feature of Carel’s phenomenology of illness, bodily doubt, equivocates on motor possibilities. Bodily doubt inserts into intentionality a countervailing hesitation. Simultaneous to the positive intentionality that Merleau-Ponty expresses as “I can” is an equally concrete negative “I cannot.”⁷³ Rather than an unconditional invitation to treat, to participate in an action with a presumption of success, solicitations instead transform into prohibitions. With basic motor intentionality confused, possibilities must be judged with conscious planning and estimations of bodily capacity. Carel describes three aspects of bodily doubt in the familiar terms of a triad of losses. Loss of continuity and loss of transparency largely capture what I have already mentioned: that the prereflective flow of action is disrupted by the need to attend to individual aspects of the act, to plan for both the action and contingencies in case of failure, and to check and recheck progress towards

⁶⁸ Tanisha Jowsey, “Time and Chronic Illness: A Narrative Review,” *Quality of Life Research* 25, no. 5 (2016): 1098.

⁶⁹ Merleau-Ponty, *Phenomenology of Perception*, 439.

⁷⁰ *Ibid.*, 83.

⁷¹ Leder, *The Absent Body*, 17.

⁷² *Ibid.*

⁷³ Carel, *Phenomenology of Illness*, 95.

one's goal as assurance against bodily doubt. In doing so, one attends not only to their performance, but also to the processes by which they engage in this performance. To revisit Leder's characterisation, a loss of transparency causes one to thematise their abilities and the bodily components which enable them.

Richard Zaner complicates the typical idealisation of the transparency of the body in his analysis of the internal, or visceral, organs of the body. Making use of the Freudian notion of the uncanny as the strangely familiar, Zaner describes four features of the body uncanny.^{74,75} First, the inescapable boundedness and limitation of the body and the possibilities which accrue to it. Second, implicatedness in the body: as much as my body belongs to me, at least in some sense, I also belong to it, and its vicissitudes are my own. Third, the body exhibits a hidden presence wherein the viscera are independent of my intentions. Awareness of visceral processes comes at a distance, through proxy sensations, and with latency. Hunger, for example, is the result of a digestive process the generation and satisfaction of which is linked to intentional action indirectly. Finally, the body can feel alien, in that one is responsible for and exposed by something whose nature is distinct from my own. The body uncanny describes the state of health as much as illness and so insists on a more dynamic and nuanced conception of the body than mere transparency.

According to Carel, bodily doubt punctures even this relatively deflated, non-ideal transparency, culminating in a third loss: of faith in one's body.⁷⁶ Carel describes this loss as the evaporation of the tacit set of beliefs which underpin the everyday. She draws an analogy between bodily doubt and Hume's critique of induction, in that the loss of faith that occurs in bodily doubt, a result of the challenge and failure of and critical reflection on bodily performance, reveals how epistemically ungrounded our confidence in performance usually is. It is not necessary to analogise away from the body since we find something similar in Merleau-Ponty. For him, a set of beliefs he labels the intentional arc is what "ensures that we are situated" in our world and open to perception. This arc "goes limp" in illness.⁷⁷ He expands on why the kind of world-building accomplished by this arc can never be epistemically rigorous and must be taken on faith:

From the moment we do something, we turn toward the world, stop self-questioning, and go beyond ourselves in our action. Faith – in the sense of an unreserved commitment which is never completely justified – enters the picture as soon as we leave the realm of pure

⁷⁴ Sigmund Freud, "The Uncanny," in *The Uncanny* (London: Penguin, 2003), 132.

⁷⁵ Zaner, *The Context of Self: A Phenomenological Inquiry Using Medicine as a Clue*, 50-55.

⁷⁶ Carel, *Phenomenology of Illness*, 100-03.

⁷⁷ Merleau-Ponty, *Phenomenology of Perception*, 137.

geometrical ideas and have to deal with the existing world. Each of our perceptions is an act of faith in that it affirms more than we strictly know, since objects are inexhaustible and our information limited.⁷⁸

Bodily doubt causes us to reserve our commitment to action. The assurance that it asks of us – abstract, propositional, reflective, opaque – are the justifications operative in objective space, where action is an expression not of co-naissance with the world but of alienation from, interrogation of and opposition to it. In making these demands, bodily doubt refuses the promise of the body, refuses to take capacity to act on faith, and suspends motor possibility pending guarantee.

Without the transparent fidelity of the body-subject the world petrifies into an inhospitable and even hostile place. The uncertainty and questionability of the world which is brought about by bodily doubt generates what Toombs calls existential fatigue. Loss of faith in the body results in the diminution of the corporal part of the body-subject. What remains is an overreliance on subjectivity, since in illness “To organize and carry out projects requires not only physical ability but, as importantly, an exercise of will.”⁷⁹ Worldly involvement is not only especially effortful, it is sclerotic, since the horizontal synthesis of the world once kept porous by the ambiguous body begins to ossify. These horizons are calculated and charted in solid *ligne claire*, making perception certain and stable but rigid and inflexible. Quality of life in the world created by the unbalanced body-subject, or body-subject, is degraded both in its dynamism and spontaneity characteristic to living, its normativity, and the sense known from clinical encounters, of lived wellbeing.

3.4 Conclusion

The three sections of this chapter develop the framework of the body-subject in ways which are particularly relevant to analyses within medicine and healthcare. Early feminist criticisms showed that as initially presented by Merleau-Ponty, the body-subject presupposes a general, unsurprisingly male, history. The development of a phenomenology of feminine comportment provides a proof of concept that the body-subject can be adapted to describe the possibility of experience under alternative conditions. It also provides a potent example of such an alternative phenomenology, on which I draw in Chapter 7, on motor intentionality. I have sought to be clear about how embodied metaphor is at work in the general body-subject, just as it enables the reconstruction of the body-subject along different embodiments, including disability. I have sought to show the correspondence between the methods of the body-subject and Zambrano’s poetic reason, which in turn yields an

⁷⁸ “Faith and Good Faith,” 179.

⁷⁹ Toombs, “Reflections on Bodily Change: The Lived Experience of Disability,” 253.

expressive subject. The use of expressive resources including Zambrano's essay "The Metaphor of the Heart" will be important to later chapters on incorporation and temporality.

Finally, the body in illness is a variation of the body-subject which must be considered in a study of health, illness, and therapy. Valuable research has improved our understanding of the phenomenology of illness as such, but these insights largely remain to be applied to specific illnesses or therapies. I take the body in illness to inform my attempt to apply phenomenology to artificial hearts across later chapters and particularly chapters on motor intentionality and temporality. These three supplements to the body-subject leave aside a significant body of critical and engaged phenomenology which could further deepen the responsiveness of the body-subject to a range of human experiences. However, these variations are additions to the body-subject which are globally relevant to thinking about artificial hearts. In the next chapter, I introduce the case of hearts and artificial hearts. This material history will be necessary to give content to the phenomenological framework which has been developed in this and earlier chapters and ultimately to describe experience as conditioned by artificial heart devices.

CHAPTER 4: HEARTS AND ARTIFICIAL HEARTS

The meanings of the heart are manifold. The heart makes a central contribution to the maintenance of the physiological body, and it is to this contribution that the artificial heart attends. But its resonances extend from the purely physiological to the metaphorical, the cognitive, the social, the literary, and the philosophical. Some of these philosophical perspectives are treated within the phenomenological tradition through scholarship on the heart. Much of this, however, treats the heart as a mere emblem of emotion or cipher for Western religion. These matters are interesting and incidental to some of what I seek to explore here, but my focus is also on the material and anatomical. The modern period marked the beginning of the disenchantment of the heart, a process which although perhaps not entirely complete has been sped up by increasingly sophisticated understandings of cardiovascular physiology and the widespread adoption of brain death criteria. The brain has succeeded the heart as the seat of the self, or at least parts of it. The heart is increasingly manipulable and replaceable. And yet, the heart retains a special place for both physiology and what it means to be human.

Only a short time before his death Maurice Merleau-Ponty became preoccupied with questions of ontology. Reinforcing the continuity of human being across the lifecourse and the ongoing primacy of perception, he emphasised the prefiguration of mature perception by infantile interoception. Considering how the child relates to the world at the very earliest stages of life, Merleau-Ponty asserted that

the body is already a respiratory body. Not only the mouth, but the whole respiratory apparatus gives the child a kind of experience of space.¹

His last published essay is principally concerned with how art and painting might express Being as it really is, in its enigmatic relations rather than as a clarified representation. Within this piece on aesthetic ontology, he claims

What is called 'inspiration' should be taken literally: there is really and truly inspiration and expiration of Being, respiration within Being.²

From these two brief references to respiration David Michael Kleinberg-Levin claims that from infancy "we are already breathing, participating in the world in a relationship of the most intimate

¹ Maurice Merleau-Ponty, "The Child's Relations with Others," in *The Primacy of Perception*, ed. James M. Edie (Evanston: Northwestern University Press, 1964), 122.

² "Eye and Mind," in *The Primacy of Perception*, ed. James M. Edie (Evanston: Northwestern University Press, 1964), 167.

taking and giving.”³ Separately, Petri Berndtson argues that “all the other ways of being-in-the-world come *after* our embodied respiratory openness.”⁴ These observations form a basis, respectively, for a hermeneutics of breathing and an ontology of respiration. A detailed elaboration of breathing was not, I think, Merleau-Ponty’s own aim but these projects nonetheless rest on the foundation of reasonable interpretations of his general agenda. As indisputably important and primordial as respiration might be, it is not absolutely originary. After all, a mother nourishes and oxygenates her foetus through their uterine connection and the foetus begins its practice-breathing at about 10 weeks. The foetal heartbeat can begin earlier. Foetal circulation circumvents the foetal lungs. On the one hand, the breathing of the born infant may be an initial, or at least co-initial, relation to the world; on the other hand, circulation is both a prior physiological process of the infant and an earlier intersubjective relation to their mother.

A project on circulation can, at least as much as respiration, be motivated by Merleau-Ponty’s own words, the implication of his project and, as I argue in later chapters, accounts such as Zambrano’s which are compatible with his work. In this chapter, I provide the foundations for this, and more specifically for a study of artificial circulation. Mine is less ambitious than either a hermeneutics or an ontology. What I propose is a basis for a circulatory phenomenology, guided by the method employed by Merleau-Ponty which Gabrielle Benette Jackson calls triangulation, in which an abnormal case is described and compared to a normal case in order to elucidate their essential features.⁵ This comparison is neither straightforward nor exact since judgements of the fundamentality or contingency of any phenomenological feature are always coloured by their interpreter. My ultimate interest is not only in circulatory phenomenology but in the particular phenomenology of the artificial heart. In this chapter, I provide the material background to the organic heart and its artificial replacements. This includes an overview of the function of the heart and the key indications for an artificial heart.

The development of the artificial heart has been motivated significantly by questions of engineering rather than lived experience. The artificial heart is apt for the device paradigm I discussed in the Introduction, and I use this interpretative lens to identify the commodity of circulation to which the heart is effectively reduced. I provide a summary of the fitful development of artificial hearts as well as sketching how they operate which will inform and be interrogated phenomenologically in the following chapters. Having surveyed the state of the art, I consider some views on whether it is

³ David Michael Kleinberg-Levin, “Logos and Psyche: A Hermeneutics of Breathing,” in *Atmospheres of Breathing*, ed. Lenart Škof and Petri Berndtson (Albany: State University of New York Press, 2018), 10.

⁴ Petri Berndtson, “The Possibility of a New Respiratory Ontology,” *ibid.*, 36.

⁵ Jackson, “Maurice Merleau-Ponty’s Concept of Motor Intentionality: Unifying Two Kinds of Bodily Agency,” 765-67.

possible to think of organs as tools and, vice-versa, to think of tools or devices as standing in for organs. I consider three arguments for a disanalogy between organs and tools, only one of which I find convincing. Unlike tools, organs contribute to a person's overall phenomenological situation. I undertake a comparative phenomenology of western and Chinese thought to bring out the salience of the pulse. I find that in western traditions and their modern, disenchanted successors, pulsatility generates the most prominent marker of cardiac phenomenology. Pulsatility offers perhaps the most direct illustration of how the heart prefigures the body-subject and why it ought command phenomenological attention.

4.1 Organic heart

4.1.1 Basic physiology

Since the embryogenesis and mature anatomy of the heart is complex, a very basic physiology will suffice for the purposes of this discussion. The human heart has always attracted great interest and has given rise to a great deal of proto- and pseudo-medical knowledge, some of which is consonant with contemporary understandings and much of which is not. In various traditions the heart has been thought responsible for intelligence, emotion, soul, courage and other virtues and vices, and the circulation of various animating substances: *qi*, *pneuma*, air, and blood. William Harvey's description of the circulation of blood between the heart and the body marked the beginning of modern medical interpretations of circulation.⁶ The circulatory system is now understood to be the means by which blood is conveyed around the body, carrying essential resources to sustain and maintain the body such as nutrients, oxygen and immune cells. It includes a network of arteries, veins, capillaries and other vessels, but the hub and engine of this network is the heart. At the centre of the circulatory system, the heart is the pump by which blood is propelled and to which it returns.⁷

The heart is a muscular organ about the size of a fist located behind the breastbone and enclosed in a sac of tissue called the pericardium. It has four chambers: two atria side-by-side, and two ventricles below them. The atria receive and collect blood, emptying periodically into the ventricles below via atrioventricular valves. The ventricles contract in response to regular electrical impulses generated mostly within the right atrium. Ventricular contractions discharge blood through the arteries away

⁶ William Harvey, *William Harvey's De Motu Cordis: A New Translation and Latin Edition*, trans. Emerson Thomas McMullen (Bethesda: Academica Press, 2005).

⁷ It should be noted that the term "pump" does not by itself imply anything about cadence of transfer. One medical dictionary gives it as: "pump (pŭmp). 1. An apparatus for forcing a gas or liquid from or to any part. 2. Any mechanism for using metabolic energy to accomplish active transport of a substance." Thomas Lathrop Stedman, *Stedman's Medical Dictionary*, (Philadelphia: Lippincott Williams & Wilkins, 2006). 1604.

from the heart. These atrioventricular pairs comprise the left and right heart. The left atrium receives blood rich with oxygen from the lungs and empties into the left ventricle via the mitral valve. The left ventricle then pumps into the major artery, the aorta, via the aortic valve. The left heart is responsible for systemic circulation. The right atrium receives blood depleted of oxygen from the body and empties into the right ventricle via the tricuspid valve. The right ventricle then pumps into the pulmonary arteries via the pulmonary valve, which carry blood to the lungs to be replenished of oxygen. The right heart is responsible for pulmonary circulation. Blood returns from the body to the right atrium through a network of veins.

4.1.2 Failure, dysfunction, and function

Cardiovascular diseases are the leading cause of death globally.⁸ Cardiac injury is frequently serious or fatal, and for much of the history of medicine death was defined by the cessation of circulation or respiration. One major pathology, heart failure, is a condition in which one or both ventricles do not adequately fill with blood or are unable to pump a sufficient fraction of their contents to the rest of the body.⁹ This can cause fluid to be backed up in the veins, and heart failure is sometimes known as congestive heart failure. In cases of left heart failure, fluid can build up in the lungs, causing shortness of breath and respiratory issues. Right heart failure is often accompanied by fluid build-up and swelling in the abdomen, legs and impairing vital organs. Heart failure can also cause the dilation of the ventricle, resulting in an enlarged but weakened heart. Heart failure is measured in four stages and while there are treatments, there is no cure.

Cardiac dysfunction implies the core physiological function of the heart: to pump blood. Throughout the body, the heart alone has this physiological capacity. It also motivates medical and surgical intervention to restore the heart in order that it might discharge this function or, as a radical alternative, restore that function by other means. In such circumstances – of late-stage ventricular failure – artificial hearts may be indicated to augment or replace the heart's pumping function. One difficulty of complex systems, like bodies, is isolating and reducing the functions of an individual organ to a single or small cluster of functions. The presumptive view of biological function in bioethics takes its point of departure from Christopher Boorse's biostatistical or species-typical functioning theory, which I discussed in Chapter 2. According to this theory, an organ's function is derived from its contribution to goals supposed to be evolutionarily apical: survival and

⁸ World Health Organization, "The Top 10 Causes of Death."

⁹ Atherton et al., "National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand: Guidelines for the Prevention, Detection, and Management of Heart Failure in Australia 2018," 1137-38.

reproduction.¹⁰ This received wisdom is built into physiological descriptions of the heart and its place in the circulatory system. As a result, philosophers Justin Garson and Gualtiero Piccinini label the heart's pumping function paradigmatic.¹¹ This paradigm is borne out, pragmatically and distressingly, in situations of heart failure.

A challenge to the paradigm of species-typical cardiac functioning is how to characterise atypical organs which originally lack the typical function, such as congenitally single-ventricle hearts. Garson argues that such since these hearts categorically descend from functionally typical hearts, we should consider them malfunctioning hearts, rather than tokens of a distinct class lacking a function.¹² This response is fair to the extent that functional changes are contained within a single category or class, but single-ventricle hearts provide a complicating example in which species-typical functions of the heart can be redistributed more broadly across the organism. Such conditions were routinely fatal until the development of a procedure to allow blood to be passively oxygenated by returning to the heart via the lungs. These patients are now kept alive by a concert of surgical replumbing, the Fontan procedure, and the combined momentum of an initial systemic pump from the remaining ventricle, the action of peripheral musculature, and negative pressure of the inspiratory bellows.¹³ One interpretation of the Fontan heart might be that it restores a malfunctioning heart to a minimum functional performance. But one might also wonder if a prior cardiac function has been superseded and a new one uncovered.

Population- or species-level ascription of function regards non-circulatory products of the heart as functionally negligible. It excludes those things which incidentally or accidentally contribute to other aspects of life, despite the unlimited values of life and culture which might fall outside the purview of evolutionary biology. It deliberately excludes those properties of the heart which are idiosyncratic to individuals or particular to cohorts of populations outside the strata selected by the evolutionary biologist.¹⁴ Understanding the ways in which organs contribute to living and lived experience both by new forms of survival and reproduction and beyond these evolutionary criteria requires an approach that can respond to the particular vitality of individuals. As I argued in Chapter 2, the vital normativity of Georges Canguilhem is capable of this broader view. Vital normativity can recognise how an organism might find an equilibrium between themselves and their worlds, even in

¹⁰ Boorse, "On the Distinction between Disease and Illness," 57.

¹¹ Justin Garson and Gualtiero Piccinini, "Functions Must Be Performed at Appropriate Rates in Appropriate Situations," *British Journal for the Philosophy of Science* 65, no. 1 (2014): 7.

¹² Garson, *A Critical Overview of Biological Functions*. 49.

¹³ Jack Rychik et al., "Evaluation and Management of the Child and Adult with Fontan Circulation: A Scientific Statement from the American Heart Association," *Circulation* 140, no. 6 (2019): e30.

¹⁴ Garson, *A Critical Overview of Biological Functions*. 69-70.

cases of physiological innovation. It can also compare the whole of what might be gained and lost in progress and regress of not just the organ, but the organism, by pathetic as well evolutionary analysis.¹⁵

This holistic analysis is capable of accounting for not only physiological innovations but also discontinuities in vital normativity. By definition, the failure of vital or central biological systems is a threat to other systems and to life. But systems can fall out of harmony or normalisation with each other not only by the insufficiency of a system but also by a disjunctive excess of a system. Consider a heart transplant performed in the first wave of procedures in 1968 by surgical pioneer Norman Shumway, in which a heart with six times the cardiac output of the diseased heart it was replacing “confused” the recipient’s lungs and effected fatal respiratory failure.¹⁶ The biostatistical theory accounts for the possibility of a part performing surplus to requirements by framing function in terms of readiness and efficiency.¹⁷ But it is not clear that the donor heart in this case was malfunctioning. Rather, the functioning of a part, or even of a system, may not be an adequate test for its compatibility with an organism. It may be necessary to consider the organism more holistically even when dealing in purely physiological terms.

4.1.3 Paradigm function to device paradigm

The heart-lung machine and other medical developments transformed the relationship between cardiac health and threats to life. Heart-lung machines enabled cardiopulmonary bypass, in which the heart can be stopped and drained while a machine outside the body oxygenates and returns blood to the body.¹⁸ Their increasing use from the 1960s permitted complex surgery, including heart repair, without causing death or serious injury. New frontiers for cardiac surgery culminated with the first heart transplantation by surgeon Christiaan Barnard in 1967, though poor results – the patient lived, but for less than three weeks – temporarily dampened enthusiasm and heart transplant procedures were paused for almost two decades.¹⁹ In the meantime, the possibility of heart and other organ transplants, the destabilisation of the definition of death, and the increasing problem of permanently comatose “hopeless” cases in hospitals led to the development in 1968 of a new set of criteria for death: brain death.²⁰ Historian Sean Quinlan observes that since the 1960s, the headshot

¹⁵ Canguilhem, *The Normal and the Pathological*, 196, 38.

¹⁶ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 71.

¹⁷ Boorse, “Health as a Theoretical Concept,” 561-62.

¹⁸ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 16-17.

¹⁹ *Ibid.*, 65-74.

²⁰ “A Definition of Irreversible Coma: Report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death,” 85-86.

has become representative of death in American culture.²¹ The brain has increasingly replaced the heart as the vital organ, physiologically and culturally.

These changes coincided with growing expectations and achievements in technology and engineering generally. By 1965, concern about heart disease resulted in a US government sponsored programme to develop artificial hearts. As medical historian Shelley McKellar notes in her definitive history of the artificial heart in North America, this programme adopted a funding model from space and military development which separated projects into components and supported researchers operating in parallel and competition. The result was the early scientific and political framing of cardiac devices as principally a matter of efficacy and engineering, rather than of effectiveness at addressing pathetic criteria or a patient's overall subjective wellbeing.²² Early cardiac interventions therefore spent little time on expansive notions like vital normality, and instead conformed to what Albert Borgmann calls the device paradigm. As I have already introduced, the device paradigm describes the way in which devices are manufactured to deliver distinct commodities, concentrated and distilled from the phenomenal context of the thing on which they are based.²³ Whatever function is selected by physiology or pathology becomes the sole focus of devices designed to stand in for or supplement organs.

4.2 Artificial hearts

The artificial pacemaker is probably the most common and well-known cardiac device. Bioethicists Katrina Hutchison and Rob Sparrow observe that artificial pacemakers and artificial organs share a number of key features: they are implanted electronic devices that support a vital organ, are or can be a destination therapy, and are intended for long term use.²⁴ The parallels between pacemakers and artificial hearts are, naturally, even greater. Both being cardiac devices, artificial pacemakers have been subject to the same cultural and some of the same technical imperatives and impediments as artificial hearts. They relate to the same physiological system, the circulatory system, and therefore seek to preserve the same high-level function. The artificial pacemaker, however, seeks to address a particular problem with an otherwise intact heart. One probably apocryphal exchange between cardiologist Albert Hyman and influential physiologist Walter Bradford Cannon has Hyman

²¹ Sean M. Quinlan, "Shots to the Mind: Violence, the Brain and Biomedicine in Popular Novels and Film in Post-1960s America," *European Journal of American Culture* 32, no. 3 (2013): 219-22.

²² McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 31-46.

²³ Borgmann, *Technology and the Character of Contemporary Life*, 42.

²⁴ Hutchison and Sparrow, "What Pacemakers Can Teach Us About the Ethics of Maintaining Artificial Organs," 16.

pondering of an arrested heart, "That heart looked exactly like all the other hearts which were working. What happened, and why can it not be started again?"²⁵

Artificial pacemakers have an important, but secondary, function compared with the primary function of artificial hearts. Artificial pacemakers seek to compensate for specifically electrophysiological problems: problems of the organic cardiac pacemaker and not accompanied by widespread cardiac co-pathologies. I have already noted that, at least on standard cardiological and surgical interpretations, what is paradigmatic of the heart's function is its pumping. The role of the artificial pacemakers is limited to a kind of failsafe for the organic pacemaker: a certain electrical impulse which heralds but does not constitute its total function. It follows that the functional contribution of the artificial pacemaker and its particular commodity is also only partial. Recalling the device paradigm, the correlate of this limited commodity is that much of the original context of the heart remains: its denaturation is limited to just the extent of its commodification. On the other hand, artificial hearts replace what is both substantial and central in the organ. Artificial pacemakers facilitate the pumping of the organic heart. Artificial hearts instead relieve the organic heart of this responsibility. The commodity of the artificial heart fully eclipses the function of the heart. By doing so, it lays the heart bare of context.

4.2.1 History

A preoccupation with the engineering challenges of artificial hearts has marked their development with clinical ambivalence. Artificial pacemakers were principally built by matching engineering plausibility with clinical utility. Steady progress in both fields led to the incremental and relatively linear evolution and adoption of pacemakers. McKellar makes the potent observation that the markers of success in artificial hearts has rarely been clear. Instead, artificial heart research and use has been fitful, perpetually promissory, and troubled by a disjunction between physiological and pathic criteria.²⁶ So punctuate has the development of the artificial heart been that the first major successful replacement of an organic heart with an artificial one made no contribution whatever to its later development and is not included in McKellar's otherwise comprehensive history. In 1937, the Russian cardiac surgeon Vladimir Demikhov reported the survival of a dog for five and a half hours following the excision of its organic heart and its substitution with an extracorporeal apparatus.²⁷

²⁵ Kirk Jeffrey, *Machines in Our Hearts: The Cardiac Pacemaker, the Implantable Defibrillator, and American Health Care* (Baltimore: Johns Hopkins University Press, 2001), 28.

²⁶ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 21.

²⁷ Harris B. Shumacker, "A Surgeon to Remember: Notes About Vladimir Demikhov," *The Annals of Thoracic Surgery* 58, no. 4 (1994): 1196.

Demikhov's research was never published outside local conferences in Russia, and his subsequent work focused on transplantation was also doomed to obscurity abroad by the Cold War.

The first comparable achievement in the US did not occur until 1957 when physician-researcher Willem Kolff, who had previously invented an artificial kidney, worked with medical researcher Tetsuzo Akutsu at the Cleveland Clinic to successfully keep a dog alive with an implanted artificial heart for 90 minutes.²⁸ Surgeon-researcher Domingo Liotta working at the University of Cordoba, Argentina, created an artificial heart that could sustain a dog for up to 13 hours.²⁹ In 1961, Liotta was persuaded to join fellow surgeon-researcher C. William Hall at the artificial heart research programme headed by Michael DeBakey based at Baylor College, Texas. Prior to this team's formation DeBakey already had an established reputation as an innovative cardiac surgeon: indeed, as the "unquestioned leading vascular surgeon in the world".³⁰ Beside his research programme, DeBakey attracted talent to his surgical practice at Houston Methodist Hospital, including ambitious surgical prodigy Denton Cooley. Cooley left in 1960 to start his own surgical practice which grew into the Texas Heart Institute, though he retained a professorship at Baylor College.³¹ DeBakey and Cooley were both charismatic figures. DeBakey leveraged his profile to secure the support of congress for US government funding for artificial hearts divided across the sector in 1965.

Despite DeBakey's enthusiasm for and optimism about artificial heart research by the end of the decade he remained of the belief that the device produced by his team at Baylor was not ready for a human trial. Team member Liotta, however, was more confident about his work and covertly took on an additional and conflicting role with an artificial heart programme led by Cooley. Cooley asked his team to prepare for the clinical use of an artificial heart. Liotta fabricated and sterilised three artificial hearts at Baylor and, on 4 April 1969, Cooley implanted the Liotta-Cooley Total Artificial Heart (TAH) – practically identical to the Baylor device – in a patient unable to be weaned from bypass named Haskell Karp. The device was intended to support Karp until a donor heart could be found and transplanted, known as a bridge-to-transplantation. Karp received a transplantation after 64 hours with the artificial heart, but he died a further 32 hours later.³² This dramatic episode led to public and professional controversy on questions of medical ethics and the place of artificial hearts,

²⁸ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 33.

²⁹ *Ibid.*, 37.

³⁰ DeBakey also studied for a year with vascular surgeon René Leriche. Leriche was a major influence on the thought of philosopher-physician Georges Canguilhem. O. H. Frazier, "Michael E. DeBakey, 1908 to 2008," *The Journal of Thoracic and Cardiovascular Surgery* 136, no. 4 (2008): 809.

³¹ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 64.

³² *Ibid.*, 76-82.

as well as demonstrating the difficulty in judging whether bridging with the artificial heart helped or hindered.

The fate of the artificial heart tracked the efficacy of organic transplantation. Cooley's attempt to marry the two newest and seemingly most promising developments in cardiac surgery, artificial hearts and organ transplantation, reflected a widespread professional intuition. Although Barnard and a slew of skilled successors demonstrated heart transplants were technically achievable, autoimmune complications could not be overcome, and heart transplants all but ceased through the 1970s. Organ transplantation triggers the rejection of the implanted organ, as the patient's immune system recognises it as foreign material to be fought. The selective immunosuppressant cyclosporine began to be used in cases of organ transplantation from 1978. It was approved and became the drug of choice for transplant rejection in 1983.³³ Rates of heart transplantation in the US increased from less than 100 for the year 1980 to 844 in the year 1985.³⁴ Improved immune control also opened new doors for bridge-to-transplantation artificial hearts.

Research continued. Akutsu joined the Texas Heart Institute in 1974 and continued to work on artificial hearts. In July 1981, Cooley attempted to bridge a desperate patient with the Akutsu III artificial heart, which had not undergone the routine animal testing expected for an experimental device. An obstruction caused by the artificial heart made the search for a donor heart more urgent, and an oversized heart was accepted which meant that the patient's chest could not be properly closed. He suffered massive infection and organ failure and died after having survived in a semi-conscious state for around two days.³⁵ In roughly the same period, a team at the University of Utah were finalising the development of their own artificial heart intended not as a bridging device but end stage solution, known as a destination-therapy. The Utah laboratory had been run by Willem Kolff since his departure from Cleveland in 1967. Over more than three decades, Kolff mentored and coordinated a steady stream of remarkable physicians and researchers, including Australian engineer Clifford Kwan-Gett and American, Robert Jarvik. When Kwan-Gett left the Utah laboratory to continue his surgical studies in 1971, Jarvik continued work based on his artificial heart design.³⁶

In late 1981, the Jarvik-7 artificial heart was finalised for human use and received ethics permission for implantation. On 1 December 1982, a 61-year old patient named Barney Clark was identified as a candidate for the Jarvik-7. Clark's heart was removed and the device implanted. A number of

³³ Irwin W. Sherman, *Drugs That Changed the World: How Therapeutic Agents Shaped Our Lives* (London: Taylor & Francis Group, 2016), 163.

³⁴ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 90-91.

³⁵ *Ibid.*, 136-37.

³⁶ *Ibid.*, 128.

complications followed, both mechanical and medical, resulting in seizures, strokes, re-operations and component replacements. In the end, however, Clark lived for almost four months with the artificial heart before succumbing to infection and multi-organ failure. Weeks before his death, Clark expressed satisfaction with his experience, though in a recorded interview which had been heavily edited.³⁷ Clark's case was covered extensively in the popular media and led to intense bioethical debate, apparently totally unanticipated by the surgeon responsible.³⁸ The Jarvik-7 was used as a destination-therapy only four more times. In the final case, the device was more difficult to fit in the patient's chest than anticipated, resulting in a failure to reclose the torso and death from infection after only ten days.³⁹ It continued to be used for bridging. After a series of transfers and acquisitions, the Jarvik-7's successor continues to be licenced for this use under the name SynCardia Total Artificial Heart.⁴⁰

In 1988, the US government offered new funding to four artificial heart programmes contingent on meeting more demanding performance criteria than the Jarvik-7. Among other things, devices were to be untethered from bulky units and not require lines through the skin. Programmes attrited at each grant renewal and through corporate consolidation until, by 1996, the only remaining programme was a collaboration between the Texas Heart Institute and device company Abiomed. Although it was a more mobile and contained device than other artificial heart models, it was large and unsuitable for women or children. In 2001, their device, the AbioCor, was implanted in a series of 14 patients. The longest-lived survived for 512 days, but all patients were plagued by continued ill health and a number of adverse events caused by the device, including hemolysis (blood damage), bleeding, and thromboembolism (blood clotting), causing complications such as strokes. In 2009, Abiomed suspended development of a second-generation device in favour of other research.⁴¹

Other artificial hearts are currently under active development.⁴² Three are under development in Europe: in Germany, by ReinHeart; in Sweden, by Realheart; and in France, by Carmat. Of these, Carmat's Aeson TAH is the furthest advanced, though US clinical trial approval granted in 2021 has since been suspended.⁴³ The Aeson is a bioprosthetic device in which the surfaces in contact with blood are fashioned from treated polytetrafluorethylene (Teflon) and bovine tissue combination,

³⁷ Preston, "Who Benefits from the Artificial Heart?," 5.

³⁸ Pence, *Classic Cases in Medical Ethics*, 244.

³⁹ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 154.

⁴⁰ *Ibid.*, 251-54.

⁴¹ *Ibid.*, 241-51.

⁴² "46th ESAO Congress 3–7 September 2019 Hannover, Germany," *The International Journal of Artificial Organs* 42, no. 8 (2019): 457-59.

⁴³ "Carmat TAH Early Feasibility Study," U.S. National Library of Medicine, <https://clinicaltrials.gov/ct2/show/NCT04117295>.

similar to the materials sometimes used as heart replacement valves. Published results have so far been mixed, but there have not been serious bleeding or clotting events.⁴⁴ In the US, the Cleveland Clinic in Ohio is developing the SmartHeart, supported by funding from the National Institutes of Health (NIH). In Texas, the BiVACOR device is being developed by an eponymous startup, supported by the NIH, National Aeronautics and Space Administration (NASA) and the Queensland Government.⁴⁵ Both US developments break with the model established by their ancestors. Rather than attempt to mimic the pulsatility of the organic heart, these devices impel blood with a spinning rotor in a method known as continuous-flow.

4.2.2 Mechanism of action

Artificial hearts replace organic material and substitute intrinsic activity. The SynCardia and Carmat devices require the removal of both ventricles and all four valves, which are replaced with two separate artificial ventricles. The ReinHeart device requires the removal of the ventricles and valves and their replacement with a single chamber through which blood moves at different stages of circulation. The Realheart replaces all four chambers of the heart, atria and ventricles. These devices are pulsatile, pumping in the periodic way characteristic of the heartbeat but to new, machine rhythms. In contrast, the SmartHeart and BiVACOR require the removal of the ventricles, and also the left atrium in the case of the BiVACOR, and their replacement with a motorised casing. The SmartHeart unit is split with a centrifugal rotor pump at each end to replace the ventricles, supported within the blood flow. The BiVACOR includes a single rotor with impeller blades which spin between the left and right heart to regulate blood flow, suspended on a magnetically levitated bearing. In both cases, blood is moved by the constant spinning of the rotors at a given speed, rather than by periodically ejecting the contents of the artificial ventricle: hence, continuous-flow.

There are other differences between artificial heart models in addition to pumping modes and rhythms. All but the ReinHeart require drivelines to run from the device through the patient's abdomen to connect to a controller unit and power source. In the case of the SynCardia the driveline also connects to a loud pneumatic pump, the actuation of which effects the heart's contraction. Internal components of the other devices are electrically powered, resulting in far quieter operation. Instead of percutaneous lines, which increase the risk of infection, the ReinHeart makes use of transcutaneous energy transfer (TET) with a receiver coil below and a transmitter above the skin. All

⁴⁴ Christian Latrémouille et al., "A Bioprosthetic Total Artificial Heart for End-Stage Heart Failure: Results from a Pilot Study," *The Journal of Heart and Lung Transplantation* 37, no. 1 (2018): 34.

⁴⁵ William E. Cohn, Daniel L. Timms, and O. H. Frazier, "Total Artificial Hearts: Past, Present, and Future," *Nature Reviews Cardiology* 12, no. 10 (2015): 615-16.

artificial hearts require patients to wear a controller unit and batteries in a belt, holster or backpack. Controllers vary, but typically display heartrate or equivalent, fill volume, cardiac output and pressures. As well as displaying on the unit, controllers interface with monitors used by clinicians to review recorded data and set new haemodynamic parameters. Batteries must be charged regularly, and patients typically plug their wearable components into a wall outlet when stationary or sleeping.

Patients are selected not only on the basis of pathology but also physiology, especially an appropriate chest cavity size and body surface area (BSA). The artificial heart is placed orthotopically: that is, where the organic heart would ordinarily be. The SynCardia is now produced in two sizes. The larger 70cc model is for patients with a lower BSA limit of 1.7m². The Carmat is based on the larger SynCardia. Data suggest these would be usable in less than 20 percent of women for whom they are indicated.⁴⁶ The smaller 50cc model can be used by patients with the lower BSA of 1.16m². Surgical techniques for the implantation of the SynCardia have not significantly changed since the Jarvik-7's original use. A patient is prepared for open-heart cardiac surgery in the routine way, with chest and breastbone opened and aorta and veins connected to cardiopulmonary bypass. Special attention is now paid to preserving the pericardial space which otherwise tends to close around the device and make re-entry, explantation of the device and implantation of a donor heart more challenging. This is done by lining the pericardium with a saline implant.⁴⁷

4.2.3 Ventricular Assist Devices (VADs)

Research towards artificial hearts is intimately linked to research on ventricular assist devices (VADs). In their overview of artificial hearts, intensivists Olivier Van Caenegem and Luc-Marie Jacquet note the close interrelation of progress in these two domains of mechanical circulatory support (MCS).⁴⁸ VAD research comprised a parallel programme at the US artificial heart laboratories of the 1960s, and it was this division of labour at DeBakey's laboratory at Baylor College which may have frustrated Liotta and precipitated his collaboration on the controversial Liotta-Cooley Total Artificial Heart.⁴⁹ Total Artificial Hearts (TAHs) replace the entire organic heart, taking over both pulmonary and systemic pumping from both ventricles. VADs either replace or more typically attach to and assist a single ventricle, supporting a ventricle which has been permanently

⁴⁶ Paul Mohacsi and Pascal Leprince, "The Carmat Total Artificial Heart," *European Journal of Cardio-Thoracic Surgery* 46, no. 6 (2014): 934.

⁴⁷ Daniel G. Tang et al., "Implantation of the Syncardia Total Artificial Heart," *Journal of Visualized Experiments*, no. 89 (2014): 11.

⁴⁸ Olivier Van Caenegem and Luc M. Jacquet, "Artificial Heart Support," in *Regenerative Medicine Applications in Organ Transplantation*, ed. Giuseppe Orlando (San Diego: Elsevier, 2013), 426-28.

⁴⁹ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 75.

damaged or temporarily reducing its workload so it can recover. Since a VAD leaves the organic heart in place, they can have the therapeutic purpose of being a temporary bridge-to-recovery as well as bridge-to-transplantation and destination therapies.

Devices initially sought to assist the left ventricle since it is responsible for systemic circulation, the bulk of the heart's propulsive work. DeBakey and Liotta developed a Left VAD (LVAD) which, by 1966, had some success. This device was paracorporeal, with the actual pump completely outside the body of the patient. Two incisions permitted tubes to run through the ribs: one to the left atrium to take in blood, and another to expel blood into a systemic artery, such as the axillary artery under the arm. Its pneumatic mechanism could be synchronised to the native pulse, every second or third beat of the heart, or controlled manually.⁵⁰ VADs became the priority of the US government in the 1970s leading to the development of devices by a variety of laboratories. By the late 1970s, surgeon and engineer William Pierce had developed a commercially viable pneumatic Paracorporeal VAD (PVAD). New thoracic technology company, Thoratec, partnered with Pierce's team for the development and distribution of the PVAD in 1976, and iterations of the PVAD continue in use.⁵¹

By 1984, a team at Stanford was implanting an internal LVAD system. This device integrated an electrically activated mechanism contained inside the body with drivelines running through the skin to an external power supply and controller, mirroring the design of artificial hearts. At roughly the same time, engineer Victor Poirier turned from his work on power sources for space technologies at Thermo Electron to the technical challenges posed by VADs.⁵² A spinoff of his employer, Thermo Cardiosystems, released the implantable pneumatic HeartMate LVAD in 1986. A second, electric version became available in 1991. Thermo Cardiosystems and Thoratec merged in 2001.⁵³ These three VADs remained a niche technology throughout the 1990s. From 1998 to 2001, a clinical trial was conducted to compare a HeartMate device to optimal medical management in non-transplant eligible patients. The REMATCH trial concluded that the devices were superior.⁵⁴ This first generation of pulsatile VADs were now clinically proven but challenges remained, including haematological and infection complications. Above all, they remained cumbersome, expensive and invasive.

⁵⁰ Michael E. DeBakey, "Left Ventricular Bypass Pump for Cardiac Assistance: Clinical Experience," *The American Journal of Cardiology* 27, no. 1 (1971): 4-5.

⁵¹ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 189.

⁵² *Ibid.*, 195.

⁵³ Van Caenegem and Jacquet, "Artificial Heart Support," 427.

⁵⁴ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 216.

Alternatives to pulsatile devices began development from the early 1980s. In 1988, physician Richard Wampler developed a miniaturised pump that could be mounted on a catheter and inserted into the heart through the femoral artery. The Hemopump applied the principle of the Archimedes screw, spinning to generate momentum and alleviate up to 80 percent of the heart's workload.⁵⁵ The manufacturer of this device, Nimbus Corporation, was acquired by Thermo Cardiosystems in 1996. Development of a continuous-flow VAD, the HeartMate II, had commenced by 1997. The HeartMate II was one-seventh the size and a quarter the weight of the HeartMate.⁵⁶ Meanwhile, though Abiomed had abandoned development on a new artificial heart, they did produce a catheter-based pump on the model of the Hemopump called the Impella, still used as a bridge-to-recovery device.⁵⁷ Robert Jarvik had left Symbion in the late 1980s and founded his own company which, from the 1990s, was also working on a small, continuous-flow device called the Jarvik 2000. Though it is available as a bridge-to-transplantation in Japan and destination therapy in Europe, it remains in clinical trials in the United States.⁵⁸

4.3 Organs as tools

4.3.1 Extreme disappearance

The development of artificial hearts rests on a judgement that organs are apt for repair, modification and replacement by devices. As part of an analysis of organ transplantation, Frederik Svenaeus considers whether Martin Heidegger's characterisation of equipment and tools might apply to organs and other body parts. I take from Svenaeus that there are at least three important dissimilarities between tools and organs: disappearance; ready-to-handedness; and alienation. First, while tools tend to withdraw from our intentional perception to make way for the perception of things and projects, the organs are extreme in this respect, only making themselves known to us in illness or strenuous activity.⁵⁹ This observation is common, though I think exaggerated. It is perhaps most prominent in Drew Leder's suggestion that the recessive body, populated by the visceral organs, provides little in the way of sensation or percept. Leder claims visceral perception is blunt, spatially ambiguous and spatiotemporally discontinuous: that is, generalised and only indirectly

⁵⁵ Van Caenegem and Jacquet, "Artificial Heart Support," 428.

⁵⁶ Ibid.

⁵⁷ ABIOMED, "Impella," <http://www.abiomed.com/impella>.

⁵⁸ Jarvik Heart, "Availability," <https://www.jarvikheart.com/availability/>.

⁵⁹ Fredrik Svenaeus, "What Is an Organ? Heidegger and the Phenomenology of Organ Transplantation," *Theoretical Medicine and Bioethics* 31, no. 3 (2010): 194.

related to intentional action.⁶⁰ As I argued in Chapter 1, the claim of visceral bluntness is already a question of degree rather than nature. Its applicability, too, varies widely across the viscera.

Extreme disappearance does not seem, to me, to describe the heart. Svenaeus himself rejects a distinction Heidegger tries to make between existential and physiological anxiety because of the close correlation between conscious and visceral phenomena. The kinds of anxiety which “makes things narrow and stifles one’s breath” manifests simultaneously as existential and physiological.⁶¹ Such a correlation was being observed from the nineteenth century by psychologist and pragmatist William James, even citing studies suggesting emotion is dependent on visceral, not peripheral, sensation.⁶² At the least, there is a sensory modality arising from the viscera which reveals internal states of the body such as hunger, internal temperature and, arguably, emotional states. This sense is called interoception. A common proxy for measuring one’s interoceptive sensitivity is the ability to consciously detect and track one’s heartbeat.⁶³ Measurements of interoception are typically taken not during illness or exertion, but at rest. To be sure, interoceptive sensibility may vary and some people will, at least in some circumstances, have difficulty consciously perceiving their heartbeat. But far from extreme disappearance, perception in visceral organs seems not only possible but constant, its rate and regularity influenced by a range of factors.

4.3.2 Ready-to-handedness

Svenaeus’s second main dissimilarity between organs and tools is that tools can be used or taken up deliberately as part of a person’s activities. They are, in Heideggerian terms, ready-to-hand. Tools can be drawn into the central domains of a person’s being-in-the-world and, to use the language preferred by Merleau-Ponty, become incorporated in a person’s phenomenal body. Organs always and already belong to this corporeal domain. They cannot be taken up but already “serve as the silent non-chosen ground of the person’s being able to act”.⁶⁴ Precluding organs from the ready-to-hand seems to entail a kind of one-way relation in which organs condition activity but can themselves only be acted upon indirectly. This notion recalls Richard Zaner’s observation that we are implicated in the hidden workings of an uncanny body over which we have no direct control.⁶⁵ Again this claim is a matter of degree, since Svenaeus, Leder and Zaner would agree that a body-subject can

⁶⁰ Leder, *The Absent Body*, 39-49.

⁶¹ Svenaeus, "What Is an Organ? Heidegger and the Phenomenology of Organ Transplantation," 187.

⁶² William James, "The Physical Basis of Emotion," *Psychological Review* 1, no. 5 (1894): 527-29.

⁶³ Sarah N. Garfinkel et al., "Knowing Your Own Heart: Distinguishing Interoceptive Accuracy from Interoceptive Awareness," *Biological Psychology* 104 (2015): 65-66.

⁶⁴ Svenaeus, "What Is an Organ? Heidegger and the Phenomenology of Organ Transplantation," 190.

⁶⁵ Zaner, *The Context of Self: A Phenomenological Inquiry Using Medicine as a Clue*, 47-55.

affect their organs on timescales longer than the instant. Intentional influence on the organs may be spatiotemporally delayed and discontinuous, but a person can quiet hunger by eating or alter the body through exercise and training.

At least some instances of intentionality towards the organs seem to be, or to be tantamount to, ready-to-hand. Contemporary medicine is predicated on the notion that diagnostic and imaging technologies enable us to view, model and imagine our organs. Svenaeus recognises this but regards this kind of intentional engagement as technologically mediated and indirect, and therefore not as ready-to-hand.⁶⁶ Pharmaceutical and other interventions enable us to alter the activities of organs at any number of timescales, from the immediate extending all the way to the life course. This too might be regarded as an indirect form of engagement and so not equivalent to the ready-to-hand. There are examples of intentionality toward the organs which are not mediated through technology or obvious representation, such as through meditation, concentration, cognitive training or even spontaneous revelation. Leder recognises as much.⁶⁷ For him, the intentional relation can go in both directions. In illness the organs “dys-appear” with a “demand” for remediation. With voluntary attention, consciousness invites the organs to show themselves. In either mode, however, it does not seem that the organs truly escape the ready-to-hand.

4.3.3 Alienation and global change

Svenaeus’s third major disanalogy, relating to attachment and alienation, seems more plausible. Tools engaged in large and complex systems are typically straightforwardly fungible. When tools break down, assuming that the breakdown can be narrowed to an individual tool or subsystem, agents are able to discretely substitute them without altering the network of relations: between the tool and the system, or the agent and the system. The failure or breakdown of an organ, however, results in the agent’s alienation from both the organ and the system in which the organ is engaged – our bodies. This constitutes alienation from our very grounds of understanding. It is the type of global loss and uncertainty recognised by phenomenologists of illness such as S. Kay Toombs and Havi Carel, upon whose ideas I expanded in Chapter 3, and is expressed by Svenaeus as “no longer being at home with one’s own body”.⁶⁸ Such alienation, and by implication such meaning and attachment, does not obtain in tools. Unlike other putative distinctions, advances in medicine have

⁶⁶ Svenaeus, "What Is an Organ? Heidegger and the Phenomenology of Organ Transplantation," 185.

⁶⁷ Leder, *The Absent Body*, 91.

⁶⁸ Svenaeus, "What Is an Organ? Heidegger and the Phenomenology of Organ Transplantation," 195.

helped to treat and relieve the content of, but not yet to fundamentally question, this difference. The global significance of organs is a significant and substantial difference between tools and organs.

4.4 Pulsatility

Though circulatory pulsatility is ubiquitous among primates, it does not appear to be biologically necessary. As a result, pulsatility is regarded as superfluous to artificial hearts. As I outlined earlier, the most prominent artificial heart models make use of continuous-flow technology. The first generation of VADs imitated the periodic electrical activation of the native pulse. These devices were set on large bearings and had multiple moving parts, resulting in both size and durability issues.⁶⁹ The engineering imperative to overcome these issues led to the development of continuous-flow devices which are generally smaller and more versatile and have fewer moving parts, with less wear and tear resulting in lighter maintenance requirements. Continuous-flow devices ignore the electrical impulses of the organic pacemaker and circulate blood constantly at a given rate. Patients with continuous-flow circulation have a narrow range of pulse pressure, which often renders the pulse non-palpable.⁷⁰ Although there is substantial debate on the physiological and medical value of pulsatility, its absence does not seem to have a clear effect on organ or cognitive function or the other products of sufficient circulation.

According to cardiac surgeon and collaborator on the BiVACOR artificial heart, O. H. Frazier, the artificial heart of the future will be pulseless.⁷¹ A capability to simulate pulsatility is built into some continuous-flow devices by using software which can periodically alter the speed of the rotor. Artificial pulses were ostensibly developed to compensate for complications such as aortic insufficiency, pump thrombosis and gastrointestinal bleeding.⁷² Two of these issues, the leaking and backflow of blood into the aorta and pump clotting, are mostly circulatory or haemodynamic issues. Simulated pulsatility may assist with these by temporarily boosting blood flow and displacing stagnating blood. But the third is a haematological issue, likely to be associated the depletion of blood vessels of the coagulant protein known as Von Willdebrand's Factor in continuous-flow circulation.⁷³ This is the more frequent complication, and though physiologically and clinically

⁶⁹ Leslie Miller, "We Always Need a Pulse, or Do We?," *Journal of Cardiovascular Translational Research* 5, no. 3 (2012): 296.

⁷⁰ Francesco Castagna et al., "The Unique Blood Pressures and Pulsatility of LVAD Patients: Current Challenges and Future Opportunities," *Current Hypertension Reports* 19, no. 10 (2017): 3-4.

⁷¹ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 239.

⁷² Allen Cheng, Christine A. Williamitis, and Mark S. Slaughter, "Comparison of Continuous-Flow and Pulsatile-Flow Left Ventricular Assist Devices: Is There an Advantage to Pulsatility?," *Annals of Cardiothoracic Surgery* 3, no. 6 (2014): 578.

⁷³ Miller, "We Always Need a Pulse, or Do We?," 299-300.

significant, it does not necessarily relate to the heart's paradigmatic function. In terms of the heart's commodity, its pumping function, artificial heart designers appear to have largely dispensed with pulsatility.

4.4.1 Cultural constructions: western and Chinese medicine

Pulsatility is not a medically meaningful property, but rather a result of cultural conditions. The pulse was deprecated by medicine well prior to the design of continuous-flow systems. Pulsatility reveals little that cannot be discovered with as much precision by other means, such as by monitoring haemodynamic markers like blood pressure through ultrasound.⁷⁴ Writing on the divergence of ancient Greek and Chinese medicine, cultural historian Shigehisa Kuriyama argues that understandings of pulsatility are neither natural nor inevitable. The Hippocratic School mentions only a multiplicity of pathological pulses, as if there were no physiological pulse. A few generations after Hippocrates' death, Herophilus completed his study *On Pulses*. At the same time, Herophilus undertook the first human cadaveric dissections and set in train the subsequent framing of medicine and the pulse in anatomical terms. This framing persists in Greco-Roman physician-philosopher Galen's later study of the pulse. The subjective discernment of the pulse, for which Galen developed an extensive taxonomy, was to provide epistemic access to the motions of the arteries which underlay them. Greek pulse theory sought to separate what a pulse is from how it feels: fact from perception, natural from normative.⁷⁵

Galen's work on medicine, and circulation, retained authority on the pulse until the modern era. Discernment of the pulse remained of central importance to western medicine and diagnostics. Galen had constructed an array of ways to classify the pulse objectively, including speed, rhythm and tension, ratios marked in words and by music, as well metaphorical descriptions.⁷⁶ By the modern era the more objective terms had been subsumed under descriptions such as "large" or "strong", thought by modern practitioners to leave too much to the idiosyncratic judgements. In the early 18th century, English physician John Floyer attempted to blend Galenic qualification of the pulse with modern quantification, and his attempts to numerate the pulse with the so-called pulse-watch was the catalyst for clockmakers to add a hand denoting seconds to conventional watches for the first

⁷⁴ A. Montalto et al., "Pulse Oximeter Usefulness for Blood Pressure Monitoring in Patients Implanted with Latest-Generation Continuous-Flow Device Heartmate 3," *Transplantation Proceedings* 51, no. 1 (2019): 213.

⁷⁵ Shigehisa Kuriyama, *The Expressiveness of the Body and the Divergence of Greek and Chinese Medicine* (New York: Zone Books, 1999), 95.

⁷⁶ Vivian Nutton, *Ancient Medicine* (Abingdon: Routledge, 2012), 244.

time.⁷⁷ Later in the century, his compatriot William Heberden argued to the Royal College of Physicians that fine distinctions should be eliminated, leaving quantification alone: easily described and communicated, unaffected by the constitution of the patient and, more importantly, having a clear and unambiguous meaning.⁷⁸ The pulse had been naturalised and instrumentalised.

A contrast with the development of Chinese medicine is instructive. In traditional Chinese medicine, pulse taking has resisted naturalisation and remains central to understandings of the body. Ancient Chinese medicine provided four ways to know the body: divine gazing, sagely listening, crafty questioning, and skilful touching. Ancient works on only the last of these survive. Concerns of survivor bias are assuaged by classical evidence that Chinese physicians consistently focused on the art of touching, and specifically what is called *qiemo*, the palpation of the *mo*.⁷⁹ *Qiemo* appeared to its first western observers to consist in a physician's devotion of a significant part of the clinical interaction, from half an hour to up to three hours, to closely feeling a patient's wrists to inspect their pulse. From this, they would both diagnose affliction and recommend treatment. The skill of *qiemo* involved attending to the subtle variations in the feeling of the *mo* at each of three locations along each wrist and at different depths, by pressing gently or firmly. Each of these twelve distinct location/depth dyads could be described in fine and figurative sensational variations.⁸⁰

To western sensibilities, these descriptions seem unscientific. To take one example, the floating *mo* was given by different medical commentators as: "if one lifts the fingers there is abundance; if one presses down one finds insufficiency"; "like clouds floating in the sky",

like a subtle breeze blowing across the down of a bird's back. It is quiet and whispering, like falling elm pods, like wood floating in water, like scallion leaves rolled lightly between the fingers.⁸¹

But this is to not only impose European objects onto a different and distinct medical project, but also misunderstand the traditions and methods of Chinese thought. What is sought and expressed in *qiemo* is not the objective condition of an underlying anatomy. *Mo* was assumed to refer to and translated into European discourse as "blood vessels," but Kuriyama offers "streams of blood" as the more exact translation, more like rivers that flow than conduits that propel.⁸² Their putative

⁷⁷ Gary L. Townsend, "Sir John Floyer (1649-1734) and His Study of Pulse and Respiration," *Journal of the History of Medicine and Allied Sciences* 22, no. 3 (1967): 297-98.

⁷⁸ Kuriyama, *The Expressiveness of the Body and the Divergence of Greek and Chinese Medicine*, 69.

⁷⁹ *Ibid.*, 71.

⁸⁰ *Ibid.*, 93-94.

⁸¹ *Ibid.*, 96-98.

⁸² *Ibid.*, 50-51.

locations do not map any major blood vessels. Rather than an anatomic analogue, their closest relation is the inner feeling of pain.⁸³

These two approaches to pulsatility speak to two approaches to circulatory phenomenology. *Qimo* fully entails the phenomenology of both patient and physician, the first-person perspectives of the suffering patient and the skilful doctor and the second-person mutual regard of the clinical interaction. Reference to an objective third-person perspective is unnecessary. Its efficacy appears connected only loosely, if at all, to anatomical precision. *Qimo* retains a central role in current practices of traditional Chinese medicine. It continues to be rendered as pulse-taking and refers to beats. Variants of the pulse are still given in deeply figurative terms and it is expected to accord with environmental factors, such as the seasons.⁸⁴ But pulsatility is only one element of a much more expansive *qimo* phenomenon. A broader phenomenological understanding persists across the patient's self-perceived *mo* and in the relationship of *qimo*. In contrast, in the west products of pulsatility such as heart rate and rhythm constitute a substantial part of cardiac phenomenology, and one increasingly isolated, appropriated to medical quantification and marginalised to medical practice. This comparative phenomenology suggests that the deprecation of the pulse has a proportionally greater effect on circulatory phenomenology in western than Chinese cultural settings.

4.5 Conclusion

The phenomenological questions raised by the silencing of the pulse are begged by the paradigms on which the development of artificial hearts is implicitly based. Removal of the pulse accentuates the heart's disappearance, differentiating it from a tool. However, the devices which effect the quieting of the circulation make the heart more ready-to-hand than ever, speeding objectification. As I have already argued, these two qualities picked out by Svenaeus were already insufficient to decide whether we should think of organs as tools. The more important contrast is that organs seem to prefigure being and to manifest an intimate link with personhood. A change to an organ might alienate a person from their larger self. The deprecation of the pulse is based on the assumption already present in statistical approaches to biology that the heart can be distilled down to a paradigm function. On this assumption, context is divorced from and subordinated to function, legitimating its commodification under the device paradigm. The phenomenology of alienation can

⁸³ Ibid., 42.

⁸⁴ Wendy Wei Zhang, "Pulse-Taking," in *Handbook of Traditional Chinese Medicine*, ed. Stevenson Xutian, et al. (Singapore: World Scientific Publishing 2015), 200-03.

hardly be investigated from a framework which makes an end of the isolation of function. Testing the effects of the heart's transformation into a device requires a phenomenological approach.

In this chapter, I have sought to situate organic and artificial hearts in the context of their physiological contribution, their participation in the viscera, and their meaning in the phenomenology of the body-subject. I have also sought to provide a summary history of the development of artificial hearts. Success in device development requires the clear definition of functional goals for the device which have not always aligned with the aims of patients or their therapists. The cross-cultural phenomenology of pulsatility, or pulsatility as an aspect of circulatory phenomenology, I considered here is a propaedeutic to the analyses which follow over the next chapters. Each of these are undertaken in light of the material realities of artificial hearts as medical interventions described in this chapter. They are also informed by the reduction necessary to render organs as tools and define the heart as a device. The following chapters consider incorporation, motor intentionality, and temporality respectively. Through a sustained study within the conceptual framework made out in the foregoing chapters I hope to elucidate phenomenological issues which cannot be articulated within the device paradigm and thus evade the attention of artificial heart stakeholders, including prospective device bearers.

CHAPTER 5: INCORPORATION

Classical humanist traditions of medicine sought to treat the whole patient, informed both by an ethical commitment and the practical necessity resulting of an only approximate understanding of physiology and aetiology. After Descartes' early modern meditations split life into distinct dual concerns of mind and body, subject and object, medicine concentrated on and advanced through an ever-deepening understanding of body. Phenomenology has, in part, aimed at recasting and resolving this Cartesian division. Phenomenology takes a stream of consciousness as apodictic or self-evident but positions this stream within the body: the lived body experiences and the corporeal body hosts experience. As I have earlier shown, Merleau-Ponty refines this distinction into the notions of phenomenal and objective bodies in recognition of the body's malleability. Ultimately, it is the phenomenal body which is conflated with the subject in a claim that "I am my body": the body-subject. Arguably, newer schools of medicine can become preoccupied with their expanded medical and biological knowledge. As biochemist and macular degeneration patient DeWitt Stetten observes of the ophthalmologist interested in vision but not in blindness, physicians can be distracted by pathophysiology rather than patient experience.¹

Medicine, and especially surgery, works on the objective body. It imagines that the sutures between the phenomenal and objective bodies will follow the literal sutures of the surgical intervention. As phenomenologists from Merleau-Ponty onwards have observed, this connection can come apart.² Therapeutic responses to this decoupling can take either aspect of the body-subject as their target, working to train the phenomenal body to new conditions of embodiment or more restoring the objective body to expected conditions of embodiment. These responses are often effective, so much so that the mainstream structure of health and medicine encourages therapists to attend to one aspect or the other in isolation in a proliferation of specialisations. Multiple specialists thereby work on their particular domains to ensure that ultimately the two aspects of body-subject, phenomenal and objective, will match or overlap. It is far rarer for therapy to be concerned with the relationship between the two aspects. Rather, this relationship is thought to be a more or less automatic result of a neat fit between the phenomenal and objective.

It is this relationship to which I refer by the term incorporation. Incorporation brings certain objective conditions into the phenomenal body. These are most frequently biological but can also sometimes be artificial. As Merleau-Ponty puts it, incorporation is the process of "dilating our being in the world or altering our existence through incorporating new instruments."³ This relationship is

¹ DeWitt Stetten, "Coping with Blindness," *New England Journal of Medicine* 305, no. 8 (1981): 458.

² Merleau-Ponty, *Phenomenology of Perception*, 84, 366.

³ *Ibid.*, 144-45.

frequently overlooked in therapeutic decision-making. Neurologist and phenomenologist Sadaf Soloukey and colleagues argue that, in the context of a medical device, the process of incorporation – what they sometimes simplify to embodiment or transparency – makes a significant difference to the benefit or otherwise of an intervention. They argue that engineers, doctors and relevant experts ought to explicitly consider a “patient transparency diagnosis” in their therapeutic processes and that “Diagnosing incorporation, embodiment, transparency or en-wheelment, should be as much a part of our repertoire as the diagnostic process of the underlying diseases already are.”^{4,5} What is required to achieve transparency, and in fact the level of transparency sought, will differ with each patient. A patient transparency diagnosis therefore requires a sincere discussion of the patient’s needs and preferences in respect of their body-subjectivity.

A focus on transparency reflects Merleau-Ponty’s view that the incorporated object is brought behind the horizon of perception, where ordinary spatiality no longer applies. This is perhaps most starkly put in Drew Leder’s claim that the body is ordinarily absent, only being thematised when dysfunctional through its “dys-appearance”.⁶ Soloukey’s view of incorporation is more nuanced than just apparent absence or silence. Guided by patient preferences, she argues that incorporation of a device requires three criteria to be satisfied: trust in its functionality, appropriate proprioceptive feedback from it, and a certain affective tolerance or comfort with it.⁷ This makes explicit some of the components of what I have characterised as the transparent fidelity of the horizons of the body-subject. The need for proprioceptive feedback is not immediately apparent in Merleau-Ponty’s account, but it is not inconsistent with his view so long as the feedback of an object is absorbed into the synaesthetic unity of the body-subject. In doing so, feedback, which may or may not be perceptible, should provide a provisional assurance of its successful incorporation, one which forestalls reflective questioning.

Transparency does not suppose that medical devices must be light or small. Soloukey’s inclusion of “en-wheelment” in her call to prioritise patient transparency is no accident: wheelchairs and prostheses can join Merleau-Ponty’s famous cane in slipping behind a phenomenal border independent of ordinary spatial dimensions. Joel Reynolds and colleagues have argued that ventilators can be incorporated, though Nathan Emmerich and I have argued for an alternative

⁴ Tbalvandany et al., “Embodiment in Neuro-Engineering Endeavors: Phenomenological Considerations and Practical Implications,” 239.

⁵ Soloukey et al., “Diagnosing Embodiment Should Become Part of Our Repertoire.”

⁶ Leder, *The Absent Body*, 84.

⁷ Soloukey et al., “Diagnosing Embodiment Should Become Part of Our Repertoire,” 235.

phenomenological route to protect personal ventilators from reallocation in reverse triage.^{8,9}

Regardless, it is not the case that the external components of an artificial heart system – their size, weight, exteriority, or visibility – should necessarily prevent it from being incorporated. The body-subject can dilate so that objects and devices might alter their ontological status between one period and the next just as a part of the body can move from an object of, say, medical investigation to a part of one's synaesthetic unity. But these devices must be weaved into the preflective activity of the patient. They must not interrupt the body-subject in the course of their intended motion or perception.

5.0.1 Structure

In this chapter, I consider the incorporation of artificial hearts. I begin by revisiting the paracorporeal elements of artificial heart systems which patients are required to carry at all times. Next, I consider the experience of organ transplantation as described by phenomenologist-patients Jean-Luc Nancy and Francisco Varela. These are key resources for identifying obstacles to the incorporation of visceral interventions. Though artificial hearts entail different complications to organic transplants, I argue that barriers to incorporation are comparable. I make these comparisons in my analysis of two of the three criteria for incorporation suggested by Soloukey: trust, and affective tolerance. First, the immunological complications of organic transplants can be compared to reluctance to trust artificial hearts and the risk they pose of injury and infection. Second, patients' affective tolerance of interventions is troubled by perceptions of gendered contagion, of femininity in organic transplants and masculinity in artificial hearts. I do not identify an organic analogue for the third criterion, proprioceptive feedback, but I outline how the displacement of the physiological cardiac rhythm by either fixed pulsatility or pulseless artificial heart devices is a particular barrier for artificial hearts.

As I described above and in Chapter 1, the process of incorporation facilitates the movement of objects from positional to situational space. Nancy's transplant phenomenology attributes to the heart the special role of mediating between what is brought into the body and what remains in the world: that is, between interior and exterior. Drawing on the notion of expressive subjectivity established earlier I show how this theme appears in other accounts of the heart, particularly in the writer and phenomenologist María Zambrano's essay *The Metaphor of the Heart*. This essay gives a

⁸ Joel Michael Reynolds, Laura Guidry-Grimes, and Katie Savin, "Against Personal Ventilator Reallocation," *Cambridge Quarterly of Healthcare Ethics* 30, no. 2 (2021): 275.

⁹ Nathan Emmerich and Pat McConville, "Reverse Triage and People Whose Disabilities Render Them Dependent on Ventilators: Phenomenology, Embodiment and Homelikeness," *Etikk I Praksis - Nordic Journal of Applied Ethics* 15, no. 2 (2021).

compelling account of how the rhythmic sound and motion of the heart relates the human subject to their world. I use an illustrative early modern *noli me tangere* painting to show the common sense of this theme in these expressive writings and illustrate that even these ostensibly metaphorical references to the heart are deeply implicated with the anatomical heart as organ and location. Artificial hearts dis- or re-place the heart as a site of literal and figurative feedback. I consider how they might unbalance the heart toward exteriority through careful medical management and, in the case of some postauricular implantations, radically realign the meaning of the heart.

5.0.2 Carrying the system

Artificial heart drivelines penetrate the body and run to a substantial external apparatus required by the artificial heart system. Perhaps the largest part of the heft and bulk of these systems is their power supply, in the form of a bank of batteries connected to the device and a number of reserves. Pacemaker and ICD batteries are small enough to be included in or implanted alongside devices, but artificial hearts are considerably more energy-intensive than other cardiac devices. At present, power is transmitted within the driveline, but alternative charging options have been suggested. One team including electrical engineer Tomasso Campi and colleagues have suggested that a single wirelessly charged implantable battery could be used to power a network of implantable medical devices, such as a Left Ventricular Assist Device (LVAD) and an ICD.¹⁰ Wireless charging through transcutaneous energy transfer (TET), with a receiver coil below and a transmitter above the skin, have been used with previous devices and are in development for future devices.¹¹

Eliminating drivelines may help to reduce the attention demanded by artificial heart systems and increase their chance of transparency and incorporation. Sociologist and science and technology scholar Gill Haddow has referred to cybernetic “smart” medical technologies with an increasing capacity for connectivity and remote operation and monitoring. She particularly notes the new vulnerabilities such connectivity creates, including malicious interference and hacking.¹² Existing artificial heart devices are operated and monitored by use of a controller carried alongside batteries outside the body. Cardiac surgeon Yuriy Pya and colleagues have designed a system which supplements TET by also wirelessly relaying information between the internal device and external

¹⁰ T. Campi et al., "Centralized High Power Supply System for Implanted Medical Devices Using Wireless Power Transfer Technology," *IEEE Transactions on Medical Robotics and Bionics* 3, no. 4 (2021): 996-97.

¹¹ Mark S. Slaughter and Timothy J. Myers, "Transcutaneous Energy Transmission for Mechanical Circulatory Support Systems: History, Current Status, and Future Prospects," *Journal of Cardiac Surgery* 25, no. 4 (2010).

¹² Haddow, *Embodiment and Everyday Cyborgs: Technologies That Alter Subjectivity*, 107-08.

controller casing.¹³ If artificial heart devices could be powered and controlled wirelessly, patients may be able to avoid ongoing discomfort and challenges of wound and infection risk management.

Practical TET systems have been difficult to develop and increase the complexity of artificial heart systems, but percutaneous driveline-related complications are among the most common safety and lifestyle issues of artificial hearts and would be substantially alleviated by wireless systems.

Patients would still be required to carry with them a power supply able to transmit energy to the device wirelessly. Accounting for a potential loss in transfer efficiency, the power supplies of wireless systems would likely be equivalent or even larger than the batteries required by existing, wired systems. As I have mentioned, batteries are typically carried in a bag, backpack or holster.

Impromptu options, such as diving belts, represent patient-generated responses to the discomfort and inconvenience of porting batteries.¹⁴ These and more consciously designed solutions might allow the carrying of batteries to become a more routine part of dressing or preparing for the day. Even so, a balance must be struck between ensuring that power supplies are adequate and that they are not a constant source of anxiety and preoccupation for patients. For the foreseeable future, this will require the alerts and alarms which form part of the patient safety features of artificial heart systems, commanding the attention of the patients and their maintenance of the system as a separate, technical object.

The dangers of not attending to incorporation in the therapeutic process are not solely medical or biological. It is not that a clinical or surgical criterion like mortality or patient safety is jeopardised, although this may be the case: an intervention that saves a patient's life or makes a major functional difference to a patient can fail in its therapeutic purpose if a patient abandons or misuses it based on a failure to adjust to it. But just as urgent are the things that make the therapeutically supported life fuller. I hesitate here to invoke some of the expressions used in medical literature – health-related quality of life, wellbeing – though certainly these ways of accounting for patient experience are valuable and have made important contributions to clinical practice. But in addition to these oft-quantified aspects of patient life, I also mean those things that affirm a certain energy or *élan* particular to an individual, that prevent a person from being mired in and preoccupied by the involuntary atomisation of their situation.

¹³ Yuryi Pya et al., "First Human Use of a Wireless Coplanar Energy Transfer Coupled with a Continuous-Flow Left Ventricular Assist Device," *The Journal of Heart and Lung Transplantation* 38, no. 4 (2019): 340.

¹⁴ Alessia Martina Trenta et al., "Self-Care in Adults with a Retro-Auricular Left Ventricular Assist Device: An Interpretive Description," *Clinical Nursing Research* 31, no. 3 (2022): 4.

Both clinical and non-clinical difficulties arise from a failure to properly incorporate a medical object such as transplanted biological material or a device. Immunologist Edgardo Carosella and philosopher Thomas Pradeu argue that visible transplants confront their recipient and family with reminders that their identity is under reconstruction. They note that a “donated organ exercises not only an organic function, but also the expression of this function”. Insofar as an apprehended body expresses a certain subjectivity, non-incorporation of a transplant can impede the rebuilding of a recipient’s identity. They point to the stark example of a recipient of a hand transplant who, after refusing his prescribed immunosuppressants, had his new organ re-amputated.¹⁵ Philosopher Jenny Slatman uses the same case to coin a notion of affective limits.¹⁶ A hand transplant remains a novel and rare procedure and there remain relatively few transplant procedures involving visible or surface organs. Although still rare, the transplantation of visceral organs, including the heart, lungs, kidneys and liver, are more common than surface organs. These procedures are by now relatively mainstream, albeit complex, and the principal limitation on them tends not to be their demanding post-surgical management but rather the availability of organs for transplantation.

5.1 Organ transplantation

I suggested some of the difficulties describing the visceral body in Merleau-Ponty’s account in Chapter 1. Attempts have been made by phenomenologists like Drew Leder, Richard Zaner and F. J. J. Buytendijk to draw Merleau-Ponty’s phenomenology of perception down to the internal organs. Merleau-Ponty takes as read the importance of the anonymous and secret organs to the history of the body and feels no need, therefore, to expand on it. As far as I am aware Merleau-Ponty expressed no view on visceral organ transplantation – his death in 1961 fell between the first kidney transplant in 1954 and heart transplant in 1967 – and his phenomenology offers no straightforward applications to it. It seems likely to me that obstacles to sustained success in transplantation, especially the problems of rejection of the transplanted organ by the recipient’s immune system, would have motivated his interest in the viscera as an expressive aspect of the body-subject. Rejection underscores the role of the immune system in negotiating biological identity. Despite acknowledging the challenges to the still-dominant uses of the terms “self” and “non-self” in immunology, Pradeu claims a unique position for the immune system in drawing boundaries around living beings.¹⁷

¹⁵ Edgardo D. Carosella and Thomas Pradeu, “Transplantation and Identity: A Dangerous Split?,” *The Lancet* 368, no. 9531 (2006): 183.

¹⁶ Slatman, *Our Strange Body: Philosophical Reflections on Identity and Medical Interventions*, 80-81.

¹⁷ Thomas Pradeu, *The Limits of the Self: Immunology and Biological Identity* (Oxford: Oxford University Press, 2012), 13.

Philosopher Jean-Luc Nancy and enactivist Francisco Varela have offered phenomenological reflections on their own respective heart and liver transplants. Their accounts are strikingly similar. Both men observe the newness and technical achievement of transplant procedures. For them, transplantation is unprecedented in human history and thus the transplant experience is a “metaphysical adventure” that requires us to “invent a new way of being human”.^{18,19} Although they attribute a special role to their surgeons and surgery, the largest part of their medical accounts is dedicated to the regimes of immunosuppressant medications which accompany the organ transfer. Contemporary organ transplantation involves the removal of diseased or failing organs from a person’s body and their replacement with healthy and functional organs taken from another person’s body. Recipients’ immune systems frequently identify the new organ as a threat to the body. In rejection, rather than receive the assistance of the new organ, it is attacked with an immune response. To protect the new organ, recipients receive medications such as cyclosporine which suppress their immune system. The double effect of this treatment is an increased vulnerability to genuine pathogens, including those already present in the body but usually rendered unproblematic by a robust immune system.

Nancy’s essay on his transplant experience is entitled *L’Intrus*, translated to English as *The Intruder*. The title has many referents: his own heart as cardiomyopathy, a disease of the heart muscle, leads into heart failure and alienates him from his health; the transplant heart which replaces his native organ; the various stages of his immunological treatment, including the emergent belligerence of dormant viruses; a cancer of unknown origin, and its corresponding chemo- and radio-therapies; and ultimately of Nancy himself, “No other than the one, the same, always identical to itself and yet that is never done with altering itself”.²⁰ Each aspect signified deserves and receives philosophical treatment. What is perhaps most germane to the transplant experience, rather than the illness experience, is Nancy’s summary that

At the very least, this is what it amounts to: identity is equivalent to immunity, the one identifying itself with the other. To reduce the one is to reduce the other. Strangeness and strangeness become ordinary, everyday occurrences.²¹

Varela’s essay was written shortly after and is guided by Nancy’s image of the intruder. With perhaps more the sensibility of a biologist Varela acknowledges from the outset the use of the term “self” in

¹⁸ Nancy, “L’intrus,” 3.

¹⁹ F. J. Varela, “Intimate Distances. Fragments for a Phenomenology of Organ Transplantation,” *Journal of Consciousness Studies* 8, no. 5-6 (2001): 260.

²⁰ Nancy, “L’intrus,” 13.

²¹ *Ibid.*, 9.

immunology. With this biological perspective in mind he declares the diseased and donor organs to be foreign. He asserts that “intrusion is always already happening” in a “process-identity of making a somatic home I call self”.²²

Whereas Nancy writes of the temporal discontinuity between his body and a younger heart, Varela argues that “Intrusion is thus temporality itself... for the body-technologies are out of synchronization with the temporality of the welcoming that is our basic condition.”^{23,24} The body-technologies to address rejection “disable the ongoing process of identity, weaken the links between the components of the organism.” In a move that recalls S. Kay Toombs’ analysis of illness as spatiotemporal transformation, which I discussed in Chapter 3, and Merleau-Ponty’s famous example of blind man incorporating a cane, Varela concludes that:

Weakening the links that are the backbone of the temporality of the lived-body, this alteration is experienced as a newly acquired attention to symptoms, as a travelling to destinations of unknown hygiene. Immunosuppression is a walking stick; I feel the world as through an extension.²⁵

Organ transplantation complicates the ways in which biology informs identity just as it provides a solution to problems of organ failure. The example mentioned earlier from Pradeu and Carosella, whose perspectives originate firmly in biology rather than phenomenology, concludes with the amputation of the hand transplant after immune rejection. Their focus is on affective rejection. Despite being less visible than surface organs such as the hand, visceral organs also generate complications of subjectivity prior to immunological symptoms. Nancy’s receipt of a younger heart leads him to declare that “I am no longer my own age”, a claim that surely challenges Merleau-Ponty’s organo-historical view of the body.²⁶ But perhaps the greater preoccupations of transplant recipients are what is expressed in the act of an organ’s transplantation and the subjective qualities carried by that organ from the person from whom it was taken. I have resisted the use of terms of donation for organ transplantation since, as existential anthropologist Michael Jackson points out, the gift relationship is deeply complicated and ultimately asocial since death is a precondition for the bestowal of vital organ transplants.²⁷ Nonetheless, the notion of transplant organs being ‘donated’ or

²² Varela, "Intimate Distances. Fragments for a Phenomenology of Organ Transplantation," 263.

²³ Nancy, "L'intrus," 12.

²⁴ Varela, "Intimate Distances. Fragments for a Phenomenology of Organ Transplantation," 264.

²⁵ Ibid.

²⁶ Nancy, "L'intrus," 12.

²⁷ Michael Jackson, "Familiar and Foreign Bodies: A Phenomenological Exploration of the Human-Technology Interface," *Journal of the Royal Anthropological Institute* 8 (2002): 338-39.

taken from 'donors' has been and remains dominant in the language and social imaginary of transplantation for a multitude of reasons.

Nancy claims that the symbolism of the gift is disappearing among transplant recipients and diminishing in the rapidly accumulating history of organ transplantation. But he does affirm that transplantation testifies to the possibility of a universal network based in an "elementary obligation of humanity" unlimited by attributes such as sex, ethnicity, or even life and death.²⁸ Varela too regards the organ as representative of obligations. This obligation is particularised in the individual from whom the organ is taken, since "gifts have lost the power to be the ground of social links". Only later is it generalised into intersubjectivity as an offer.²⁹ Whether in general or in particular strategies adopted by transplant recipients to respond to this sense of obligation include extreme gratitude, guilt, or even the narrative cleansing of the organ, for example by baptism. Jackson asserts that the logic of these strategies is an attempt to balance reciprocity based in an imaginary "often at odds with the objectivist, commoditizing, depersonalized language preferred by surgeons and other transplant professionals."³⁰ Such strategies, and the overwhelming potency of gift symbolism, have been observed since the earliest studies of transplantation undertaken by medical sociologists Renée Fox and Judith Swazey.³¹

Many of these studies describe the unproven but persistent belief among transplant recipients that a new organ brings with it attributes of the person from whom it has come. In the particularised phase of Varela's sense of obligation he recounts that

... in anthropological studies one constant is the stable nature of the rights of the giver over the gift. This translates on the imaginary level to the presence of the donor in the gift itself, attached to it, and following its transferences.³²

Margrit Shildrick frames this attachment positively, as extending the feminist bioethical concern with relationality into a more open notion of coconstruction and concorporeality in which multiple bodies are brought together in one.³³ Sociologist Margreta Sanner has a more pessimistic, and common, interpretation that these transferences speak to a logic of contagion. This logic that objects

²⁸ Nancy, "L'intrus," 8.

²⁹ Varela, "Intimate Distances. Fragments for a Phenomenology of Organ Transplantation," 266-68.

³⁰ Jackson, "Familiar and Foreign Bodies: A Phenomenological Exploration of the Human-Technology Interface," 340.

³¹ Renée C. Fox and Judith P. Swazey, *The Courage to Fail: A Social View of Organ Transplants and Dialysis* (Chicago: University of Chicago Press, 1978). and subsequent works.

³² Varela, "Intimate Distances. Fragments for a Phenomenology of Organ Transplantation," 267.

³³ Margrit Shildrick, "Visceral Phenomenology: Organ Transplantation, Identity, and Bioethics," in *Feminist Phenomenology and Medicine*, ed. Kristin Zeiler and Lisa Folkmarson Käll (Albany: State University of New York Press, 2014), 62.

are “once in contact, always in contact” is particularly apparent among those who conceive of an “influenced body” – roughly comparable to the body-subject – as opposed to the body as pure materiality. This helps her explain attitudes which oppose organ transplants from animals or unknown human donors, especially those organs which are more personal, among which the heart is included.³⁴

5.2 Incorporation criteria

Even though animal materials are routinely used in medicine, including in medical devices, the transplantation of organs from animals has persistently been the least popularly palatable of transplantation options. Xenotransplantation has tended to evoke strong feelings of disgust and unease, perhaps at the transgression of species boundaries and perception of animal uncleanness, both of which are extreme manifestations of concerns around contagion.³⁵ If organic material taken from animals are at one end of a spectrum of contamination or cleanliness, one might expect artificial organs which have no prior contact with biological materials to occupy the other end. Artificial organs are manufactured in technical environments according to processes guided by abstract and impersonal sciences and composed principally of highly engineered materials. They are packaged carefully and cleanly and handled only in the most antiseptic settings. They emerge from conditions of objectivity: they are the very model of objects, of technical artefacts and uninfluenced materiality. Thus they avoid prior intersubjective associations out of which might grow perceptions of contagion, a fact reinforced by their attraction of only minor immune responses compared to their biological counterparts.

Haddow has extended investigations on attitudes towards transplantation to include artificial options within an embodiment frame she has labelled “animal, mechanical, and me”. Consistent with prior findings, she found xenotransplantation to be the least preferred among her informants. But mechanical organs were only slightly more preferred. Despite, or perhaps because of, their sterility artificial organs were less preferred than all human options, which themselves proceeded from least to most preferred: organs from unknown deceased persons; from known living donors; and biological organs 3D-printed from autologous material.³⁶ The issues prompting informants’ reservations around mechanical organs are varied. They include religious convictions and beliefs around naturalness and the value of humanity compared to the value of fungible or mouldable

³⁴ Margareta A. Sanner, “Exchanging Spare Parts or Becoming a New Person? People’s Attitudes toward Receiving and Donating Organs,” *Social Science & Medicine* 52, no. 10 (2001): 1497.

³⁵ Haddow, *Embodiment and Everyday Cyborgs: Technologies That Alter Subjectivity*, 72-74.

³⁶ *Ibid.*, 67.

material. The grounds for these kinds of reasons are more or less axiomatic to an individual. Although an exploration of them would be interesting it may not be revealing in respect of the phenomenality of artificial organs. Other reasons, however, reflect more directly on artificial organs rather than individual belief systems. While they do not map directly to the bio-immunological or intersubjective contagion concerns observed with biological organ transplantation, they do track surprisingly closely to them.

5.2.1 Trust and safety

Reservations towards artificial organs arise from concerns about their safety and reliability, bearing directly on Soloukey's incorporation criterion on trust in a device's function. The story- and history-ladenness of biological organs at least demonstrates that they have been tried and tested in a living being. Notwithstanding that transplantation is a relatively recent medical innovation, biological organs themselves do not appear to be read as experimental. Artificial organs, on the other hand, routinely evince fears that they will break or malfunction, and patients do not always have confidence that they will reliably perform their function.³⁷ As I have earlier recounted, the development timeline for artificial organs, or at least artificial hearts, is similar to or longer than solid organ transplantation. The complexity of engineering artificial organs has meant that the viability of the two organ options has not progressed uniformly. Evaluating the risk of device malfunction against other clinical factors is complex, even assuming robust regulatory frameworks for medical devices. The outcomes for patients using early or developmental models of artificial hearts have often been poor, and even second and later generation devices continue to be plagued by high rates of device failure.^{38,39}

Many risks of biological and artificial organs are different, but they do generate comparable risks of blood-related and infectious complications. Since they are constructed of non-biological materials, artificial organs do not trigger the same immunological response as solid biological organ transplantations. The approval of the immunosuppressant cyclosporine in 1983 provided a path forward for the expansion of heart transplantation.⁴⁰ Immune rejection was never an issue for artificial hearts, but other barriers ensured that it was not until 2001 that the clinical trial Randomized Evaluation of Mechanical Assistance for the Treatment of Congestive Heart Failure (REMATCH) demonstrated Ventricular Assist Devices (VADs) were superior to medical

³⁷ Ibid., 76.

³⁸ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 21.

³⁹ Jens Garbade et al., "Current Trends in Implantable Left Ventricular Assist Devices," *Cardiology Research and Practice* 2011 (2011): 2.

⁴⁰ Sherman, *Drugs That Changed the World: How Therapeutic Agents Shaped Our Lives*, 163.

management for heart failure.⁴¹ This comparative conclusion, however, masked significant mortality after two years and a substantial risk of device failure.⁴² Subsequent generations of these devices have tended towards continuous-flow mechanisms, which are smaller, with fewer moving parts and less wear and tear. Continuous-flow devices use spinning rotors to impel blood at a constant rate; in the newest models, these rotors are suspended within the flow of blood by magnetic levitation rather than mechanically attached to the rest of the device.

These changes have dramatically improved device durability, but adverse events leading to morbidity remain a risk. The surfaces of artificial heart devices tend to accumulate blood, leading to thromboembolism and subsequent stroke. REMATCH-era devices exhibited thromboembolic events in a range from 5 to 50 percent.⁴³ Continuous-flow devices are also associated with haematological complications, including the destruction of red blood cells and the depletion of an important clotting factor called Von Willebrand's Factor.⁴⁴ They also continue to pose a 20 percent risk of stroke.⁴⁵ Strokes can be disabling and even minor strokes can significantly affect a body-subject. As I discussed in Chapter 1, Merleau-Ponty famously drew on the case of Johann Schneider to illustrate the body-subject.⁴⁶ Schneider suffered a traumatic brain injury, not a stroke, but his neurological symptoms are strikingly consistent with certain types of stroke. In Schneider's case Merleau-Ponty observes a breakdown in spatiality, which splinters into positional and phenomenal space; and motor intentionality, which splinters into abstract and concrete movement. Stroke can decouple abstract and concrete ways of being just as biological transplantation can damage the links between the components of the organism. The consequences of device-related injury threaten the integrity of the body-subject – they threaten incorporation.

Whereas organic transplantation is associated with autoimmune management, artificial heart transplantation is associated with infection and antibacterial management. The workload of hearts and artificial hearts is considerable and devices performing this work require significant energy which they derive from external electrical sources such as batteries and mains power outlets. To this end, almost all artificial hearts use a driveline running from the device located inside the body through the patient's skin to power sources and a control unit outside the body. These percutaneous lines, named for their penetration of the skin, are, in effect, persistent open wounds vulnerable to

⁴¹ McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 216.

⁴² Garbade et al., "Current Trends in Implantable Left Ventricular Assist Devices," 2.

⁴³ Ibid., 4.

⁴⁴ Miller, "We Always Need a Pulse, or Do We?," 299-300.

⁴⁵ James K. Kirklin et al., "Quantifying the Impact from Stroke During Support with Continuous Flow Ventricular Assist Devices: An Sts Intermacs Analysis," *The Journal of Heart and Lung Transplantation* 39, no. 8 (2020): 793.

⁴⁶ Merleau-Ponty, *Phenomenology of Perception*, 105 ff.

infection, inflammation and the entry of pathogens. To minimise the risk of infection, patients with artificial heart devices have to radically alter their everyday behaviour. One patient recalls:

Each night, my wife had to put on a surgical mask, suit and gloves to minimize chances of infecting me, and then disinfect the opening of my stomach where the driveline went in, and then bandage everything up again. I was not allowed to bring any water around the opening for fear of infections. That meant no showers! I can tell [you] that using washcloths daily is not easy and no fun. All this went on every day for six months.⁴⁷

Inevitably though, serious device-related infections occur in anywhere between 18 and 80 percent of patients.⁴⁸ Driveline infections are most common, and in these cases antibiotic therapy is typically indicated at the point which local infection borders on signs of systemic infection.⁴⁹ Should the infection extend, expanded antibiotic treatment may be indicated. Minor local infections can also be symptoms of underlying infections of the device pocket or implantation site which ultimately require device removal or replacement.⁵⁰

Some artificial organs do contain bioprosthetic components.⁵¹ Among prominent artificial heart models, for example the Carmat C-TAH, all surfaces in contact with blood are coated with a combination including organic bovine content similar to those sometimes used in bioprosthetic valve replacements. These partial uses of xenograft or animal biological materials do not appear to trigger the same problematic immune responses as whole organ xeno- or allo-transplantation. This is partly the result of the special treatment of the biological tissues used in bioprosthetic valve and partly to an apparent immune privilege of the valve site, in which the constant flow of blood prevents dangerous inflammation.⁵² Biological valves do, however, tend to calcify over time seemingly in correlation to general immunological strength, suggesting possible chronic immune

⁴⁷ Ruth Halben, *Heart 2 Heart: Stories from Patients with Left Ventricular Assist Devices* (Michigan: Michigan Publishing, 2017), 71.

⁴⁸ Garbade et al., "Current Trends in Implantable Left Ventricular Assist Devices," 4.

⁴⁹ Alexander M. Bernhardt et al., "Prevention and Early Treatment of Driveline Infections in Ventricular Assist Device Patients – the DESTINE Staging Proposal and the First Standard of Care Protocol," *Journal of Critical Care* 56 (2020): 110.

⁵⁰ Hannah Copeland and David Baran, "A Persistent Problem—the Dreaded LVAD Driveline Infection," *Journal of Cardiac Surgery* n/a, no. n/a: 1.

⁵¹ Whether bioprosthetic materials complicate the permissibility of artificial hearts among certain patients with convictions opposed to the use of animal products is beyond my study. On religious convictions, the clerical consensus appears to be that such materials are permissible but that patient (mis)beliefs may yet complicate the informed consent duties of physicians. Ya'arit Bokek-Cohen and Mahdi Tarabeih, "The Use of Porcine-Derived Materials for Medical Purposes: What Do Muslim and Jewish Individuals Know and Opine About It?," *Journal of Bioethical Inquiry* (2022).

⁵² Morgan Ashley Hill et al., "Immune Privilege of Heart Valves," *Frontiers in Immunology* 12, no. 3165 (2021): 4-6.

rejection.⁵³ Although artificial heart devices do not elicit the same acute immune reaction as transplant hearts, driveline and device infections and their antibiotic treatments are comparable to the immune therapies for organ rejection and the attendant sense of intrusion on everyday being. The use of bioprosthetic components may complicate their seeming immunological innocence.

5.2.2 Affective tolerance and cyborg contagion

Concerns about contagion through artificial hearts act as a barrier to the incorporation criterion relating to affective tolerance. I have argued that artificial organs are perceived as sterile, in contrast to biological organs which tend to be perceived to carry with them the social and gendered histories of the person from whom they were taken. I have already referred to the notion of social contamination and contagion in transplantation documented in the social sciences and debated at length in both social and medical literatures. Of these contagious attributes, gender is prominent. Transplant recipient Claire Sylvia attributed a new masculine outlook to her receipt of a heart and lungs from a male donor.⁵⁴ But in general, women tend to be underrepresented among transplant recipients and overrepresented among organ donors.⁵⁵ Sanner notes that about half of the male participants in one study expressed concerns that receiving an organ from a woman donor would make them more effeminate. Both male and female recipients felt that organs from male donors would be stronger than organs from female donors.⁵⁶ In biological organ transplantation, the feminising properties of donor hearts from women appears to be a dominant concern relating to social contagion.

In contrast, artificial organs are ascribed a male or masculinising quality. Haddow has developed the notion of “everyday cyborgs”, a term which evokes a level of normality and even banality at the same time as it invokes the complex imaginary of Donna Haraway’s posthuman, cybernetic “creature of social reality as well as a creature of fiction”.⁵⁷ Haraway’s metaphor of the cyborg is, according to Haddow, “a means of highlighting and invalidating the inherent impurity of any dualistic system”. But it also “says as much about gender dynamics in present-day society... as it does about the future status of robots, androids and cyborgs”.⁵⁸ Haddow draws on an extensive feminist tradition of

⁵³ Rizwan A. Manji, Whayoung Lee, and David K. C. Cooper, “Xenograft Bioprosthetic Heart Valves: Past, Present and Future,” *International Journal of Surgery* 23 (2015): 281.

⁵⁴ Claire Sylvia and William Novak, *A Change of Heart: A Memoir* (Little Brown and Company, 1997).

⁵⁵ Francesca Puoti et al., “Organ Transplantation and Gender Differences: A Paradigmatic Example of Intertwining between Biological and Sociocultural Determinants,” *Biology of Sex Differences* 7 (2016): 1.

⁵⁶ Margareta A Sanner, “Transplant Recipients’ Conceptions of Three Key Phenomena in Transplantation: The Organ Donation, the Organ Donor, and the Organ Transplant,” *Clinical Transplantation* 17, no. 4 (2003): 395, 96.

⁵⁷ Donna Haraway, *Simians, Cyborgs, and Women: The Reinvention of Nature* (New York: Routledge, 1991), 119.

⁵⁸ Haddow, *Embodiment and Everyday Cyborgs: Technologies That Alter Subjectivity*, 96-97.

cultural criticism to claim that the cyborg is typically portrayed as strong and invulnerable, rational and unfeeling, and male; in contrast to the vulnerable, emotional and sexualised human female. The occasional appearance of fictional female cyborgs tends to reinforce rather than subvert the norms of cyborg gender through overt sexualisation or a focus on care. Unlike the biological heart transplant, the receipt of which is perceived through a lens of potential feminisation, the everyday cyborg resulting from the implantation of an artificial organ is presumptively male.

These diverging characterisations of the organic and artificial heart might also be mapped onto the perceptions of cardiac health. Health researcher Carol Emslie and colleagues note the opposing cultural images of the feminine feeling heart and the masculine heart as a machine.⁵⁹ When described by the medical sciences and particularly in the context of pathophysiology, hydraulic and machine metaphors which illustrate the heart's pumping function, or what I have described as its commodity, tend to predominate. Such metaphors are frequently mapped to cardiac diseases like coronary heart disease and heart failure, which are essentially complex matters of haemodynamics. It is on this particularly disenchanted set of metaphors that writer Susan Sontag bases her claim that heart disease is apt for straightforward, mechanical resolution.⁶⁰ It is tempting to regard artificial hearts as literal hydraulic, machine interventions which reify such metaphors. Internists Nicholas Braus and Paul Mueller caution against such the straightforward application of the hydraulic metaphor to artificial hearts. They argue that LVADs mystify heart failure and "may multiply metaphors rather than simplifying them."⁶¹

Anne Pollock has proposed alternative ways to frame the medical heart that could escape the hydraulic imagery in her notion of heart feminism.⁶² Anthropologist Stefan Helmreich suggests an electrophysiological approach which reads the heart as transducing electrical potential into biographical potential.⁶³ Yet this framing has not displaced machine metaphors even in the context of electrophysiological conditions. It may be that hydraulic metaphors are sustained not primarily by being the most plausible analogues of physiological function, but by fitting with existing gendered presumptions. Cultural theorist Claire Colebrook describes a metaphysical hierarchy, descended from Aristotle and dominant in philosophy, that elevates matter "insofar as it is formed, forms itself,

⁵⁹ Carol Emslie, Kate Hunt, and Graham Watt, "Invisible Women? The Importance of Gender in Lay Beliefs About Heart Problems," *Sociology of Health & Illness* 23, no. 2 (2001): 207-10.

⁶⁰ Susan Sontag, *Illness as Metaphor* (New York: Farrar, Straus and Giroux, 1978), 9.

⁶¹ Nicholas Braus and Paul Mueller, "Destination LVAD Therapy and the Trappings of Metaphor," *The American Journal of Bioethics* 17, no. 2 (2017): 16.

⁶² Anne Pollock, "Heart Feminism," *Catalyst : Feminism, Theory, Technoscience* 1, no. 1 (2015): 5-6.

⁶³ Stefan Helmreich, "Potential Energy and the Body Electric: Cardiac Waves, Brain Waves, and the Making of Quantities into Qualities," *Current Anthropology* 54, no. S7 (2013): S143.

or actualizes itself into the form that it *properly and potentially is*” over the unactualised potential of mere matter. Historically, an “axiology of gender” has associated the former with the masculine and the latter with the feminine. Such a pattern which might be read onto the hydraulic machine, formed or repaired into its proper form, over the electrical potential.⁶⁴ Whether a cause or a symptom of gender, alternative metaphors remain marginal. In the main, the heart remains disposed to masculine and machine figuration and so too, therefore, does the everyday cyborg.

This gendered coding is reproduced by the clinical selection of candidates for smart medical devices and composition of cyborg populations. Haddow’s work has a technological focus on Implantable Cardioverter Defibrillator (ICD) devices as a case of “smart” medical devices which manifest the model of everyday cyborg, an example which shares its cardiac and circulatory target with artificial heart devices. 80 percent of ICDs are implanted into men.⁶⁵ This disparity is replicated for LVADs and even greater for total artificial hearts (TAHs).^{66,67} Implantation of these devices reflect gendered disparities in expensive, high-tech and cardiological care generally.⁶⁸ As I earlier discussed, the most prominent variety, the SynCardia TAH, is largely unsuitable for most women due to its size. Slightly more than 50 percent of recipients of a smaller 50cc version are female, but the company advertises its total recipient population at 60 patients compared with 1 700 patients for the larger model.⁶⁹ Haddow reads this kind of therapeutic stratification as a form of “cyborg sexism”.⁷⁰

Those women who do receive an artificial heart device experience gendered challenges. Already prefigured as masculine, artificial heart devices tend to either mitigate the performance of femininity or present unique burdens to women users. Reflecting on the adjustments made by a destination-therapy LVAD recipient, her family noted “using the device caused at least one change as she had to acquire and wear clothing that either fit over the device or under it.”⁷¹ A more systematic analysis of design considerations undertaken by industrial designer Jessica Dunn and colleagues found that women with VADs experienced aesthetic and comfort issues. These include the poor fit of wearable

⁶⁴ Claire Colebrook, “On Not Becoming Man: The Materialist Politics of Unactualized Potential,” in *Material Feminisms*, ed. Stacy Alaimo and Susan Hekman (Bloomington: Indiana University Press, 2008), 57-58.

⁶⁵ Haddow, *Embodiment and Everyday Cyborgs: Technologies That Alter Subjectivity*, 100-01.

⁶⁶ Dennis Wells, Chet R. Villa, and David Luís Simón Morales, “The 50/50 Cc Total Artificial Heart Trial: Extending the Benefits of the Total Artificial Heart to Underserved Populations,” *Seminars in Thoracic and Cardiovascular Surgery: Pediatric Cardiac Surgery Annual* 20 (2017): 16.

⁶⁷ Jadry Gruen et al., “Sex Differences in Patients Receiving Left Ventricular Assist Devices for End-Stage Heart failure,” *JACC: Heart Failure* 8, no. 9 (2020): 772.

⁶⁸ Hilde Lindemann, *An Invitation to Feminist Ethics* (New York: Oxford University Press, 2019), 146-47.

⁶⁹ SynCardia, “Our Products,” SynCardia Systems, LLC, <https://syncardia.com/clinicians/our-products/see-all-our-products/>.

⁷⁰ Haddow, *Embodiment and Everyday Cyborgs: Technologies That Alter Subjectivity*, 102.

⁷¹ Halben, *Heart 2 Heart: Stories from Patients with Left Ventricular Assist Devices*, 25.

components which are not designed with the curvature of the female body in mind and the inadequacy of a “unisex” carry bag to meet the needs of women patients.⁷² Philosophers such as Shaun Gallagher sometimes draw a distinction between two aspects of body experience: body image and body schema.⁷³ The former relates to self-perception or conscious awareness of the body. The latter relates to the prereflective performance of the body usually associated with incorporation. Those who hold to this distinction might think aesthetic considerations reflect mostly on body image and less on body schema.

However, there are reasons to think that body image might go along with body schema as a jointly bearing on affectivity, phenomenology and comportment. Stephen Gadsby has observed that patients with anorexia nervosa experience distortions of body representation along the two separate axes of body image and body schema, with neither axis clearly primary. Patients mentally picture and feel that their own body is larger than it is, reflectively constructing a body image which is propositionally misaligned with the world. They also draw on a prereflective body schema to act as though their body is oversized such as when walking through a door or judging which clothes might fit them. He argues both these distortions contribute to body affect.⁷⁴ Soloukey describes a patient prevented from achieving adequate transparency in relation to her medical device because she feels its siting is unfeminine so that body image becomes an obstacle to incorporation.⁷⁵ And more generally Iris Marion Young and many subsequent feminist phenomenologists have shown that phenomenology and comportment is gendered by multiple and various interpenetrations of body image and body schema.

If a distinction between image and schema exists it is not marked by any bright line. The coding as male of everyday cyborgs and their devices, both reflectively and prereflectively, personally and socially, has the potential to generate gendered phenomenological complications, especially for patients who identify as women. Whether these are posed to the body image or the body schema, they result in a distortion of bodily affect. Affective tolerance is a key criterion in Soloukey’s framework for patient transparency. To the extent that associations with a medical device jar with a patient’s social, narrative or otherwise affective notion of themselves, it will be difficult to meet the threshold for affective tolerance required to permit incorporation. Neither this criterion nor the

⁷² Jessica Lea Dunn et al., “Human Factors and User Experience Issues with Ventricular Assist Device Wearable Components: A Systematic Review,” *Annals of Biomedical Engineering* 47, no. 12 (2019): 2447.

⁷³ Shaun Gallagher, “Body Image and Body Schema: A Conceptual Clarification,” *The Journal of Mind and Behavior* 7, no. 4 (1986): 544-45.

⁷⁴ Stephen Gadsby, “Anorexia Nervosa and Oversized Experiences,” *Philosophical Psychology* 30, no. 5 (2017).

⁷⁵ Tbalvandany et al., “Embodiment in Neuro-Engineering Endeavors: Phenomenological Considerations and Practical Implications,” 239.

preceding one are inherent or inevitable features of artificial hearts. These are empirical concerns. Further development and communication of, and perhaps greater experience and familiarity with, artificial hearts as a safe and effective therapy will help to improve patient and clinician trust in these devices. Addressing the causes of cyborg sexism, through interventions in health systems, cultural representations of gender and technology, and design of devices will assist in improving the probability of achieving affective tolerance of artificial hearts.

5.2.3 Proprioceptive feedback and programmed rhythm

The last of Soloukey's criteria for incorporation is that devices furnish appropriate proprioceptive feedback, the benchmark for which is established by the organic heart's rhythm and beat. Merleau-Ponty defines his body-subject with reference to a "genius for ambiguity".⁷⁶ Among the conditions of human life are those physiological elements "taken for granted, and to which I entrust the care of keeping me alive".⁷⁷ We rely on the "stable organs" which, in performing their functions without our reflection or volition, make space for human freedom.⁷⁸ Among these organs is the heart. Merleau-Ponty notes the body is in the world as the heart is in the organism. Temporality shares with the heart the qualities of "passive synthesis": that

I am not the author of time, any more than am I the author of my own heartbeats... but no matter what I do, once I am born, time flows through me.⁷⁹

And he relates the reflex which reveals the style of the individual to the heartbeat felt at the periphery of the body. The contraction of the heart is a present whose immediate horizons "secretly feed" the specific past that is our body.⁸⁰ I explore María Zambrano's essay "The Metaphor of the Heart" more below, but it is relevant here that this essay includes the claim that the heart:

reveals the bipolarity that both opens the living being and holds it in its grasp... commanding him to go forth... only this single rhythm inhabits time in its extension and internalizes it... without the necessity of either perception or the counterproductive will...

For Zambrano, the heart rhythm is the momentary touchstone which testifies to life of the body-subject and its participation in the world. Outside perception proper, or at least unable to be pinned

⁷⁶ Merleau-Ponty, *Phenomenology of Perception*, 195.

⁷⁷ *Ibid.*, 86.

⁷⁸ *Ibid.*, 89.

⁷⁹ *Ibid.*, 451.

⁸⁰ *Ibid.*, 87.

down or to be determined or deliberately willed, it is the key to a passive, organic synthesis which renews the horizons within which the body-subject can act.

Most artificial heart devices operate according to rates and rhythms defined by clinicians, not the intrinsic or physiologic rhythm of the native heart. Pulsatile artificial heart device rhythms can be felt by a patient through vibrations on the patient's abdomen.⁸¹ These rhythms can constitute a form of proprioceptive feedback from the device which may or may not be appropriate depending on the patient's prior sensitivity to their heart rhythm and their amenity to the new, machine rhythm. A growing consensus among cardiologists, engineers and designers seems to favour continuous-flow devices as the future of artificial hearts.⁸² Continuous-flow devices do not generate the kind of external vibrations observed to induce the sensation of a simulated heartbeat. Some continuous-flow devices have a capability to simulate a pulse using software which can modulate the speed of the rotor but the effect is purely haematological, not sensible.⁸³ The rotors of continuous-flow devices are suspended in the blood flow, away from the endocardial wall of the ventricle. A surge of simulated pulsatility is unlikely to be able to generate a perceptible heart rhythm, at least while remaining at a speed safe from haemolysis or device damage.

Detaching the heart rhythm from the internal state of a patient, such as their emotional state, has unpredictable consequences. In the late nineteenth century the psychiatrist Carl Lange and philosopher and psychologist William James independently proposed theories that physiological changes associated with emotions – what are now called somatic markers – are not merely correlated with emotions but in fact constitute them. Without the corresponding physical responses, James argues, all that remains would be “feelingless cognition”.⁸⁴ Somatic marker hypotheses remain contested, as do the physiological determinants and correlates of emotion.⁸⁵ It is important, however, to note that the implantation of non-physiologic artificial hearts alters or eliminates the possibility of somatic markers being presented in the heart which may be significant for individual patients in respect to appropriate proprioceptive feedback. Regardless of debates on the importance of somatic markers, artificial hearts bring the underlying states relating to somatic markers into the

⁸¹ Blas Couto et al., "The Man Who Feels Two Hearts: The Different Pathways of Interoception," *Social Cognitive and Affective Neuroscience* 9, no. 9 (2013): 1258.

⁸² McKellar, *Artificial Hearts: The Allure and Ambivalence of a Controversial Medical Technology*, 239.

⁸³ Cheng, Williamitis, and Slaughter, "Comparison of Continuous-Flow and Pulsatile-Flow Left Ventricular Assist Devices: Is There an Advantage to Pulsatility?," 578.

⁸⁴ William James, "What Is an Emotion?," *Mind* 1884, no. 34 (1884): 194.

⁸⁵ Barnaby D. Dunn et al., "Listening to Your Heart: How Interoception Shapes Emotion Experience and Intuitive Decision Making," *Psychological Science* 21, no. 12 (2010): 1835.

realm of both perception and will, at the very least reforming the epistemic relation of a bearer of an artificial heart to their body. I say more about this in the next chapter, on motor intentionality.

5.3 Interiority, exteriority

Apart from the clinical criteria for incorporation, artificial hearts face the challenge of emulating the interpositional role of the heart. Nancy's transplant phenomenology considers the heart to demonstrate that interior and exterior are ambiguously related. He describes an amalgam of intrusion in which what is his own, his interiority, is already infused with what is foreign. Cultural studies scholar Tatjana Gajic argues that this dyad embodies a paradox in which both resistance and vulnerability to a foreign intruder are required for the experience of interiority, and it is this sense of exposure which defines the subject. She interprets Nancy's becoming foreign to himself in illness as producing "a void at the center of subjectivity, hollowing the body".⁸⁶ Even when his transplant surgery is concluded, Nancy claims that, "I am closed open. There is in fact an opening through which passes a stream of unremitting strangeness..."⁸⁷ Emptiness and incompleteness, expressed in the metaphorical and physical void in the heart and the heart cavity, is vital to the subject. For Gajic, the conclusion that the self is "never done altering itself" marks it "as *nothing but* a passage, gap or opening created at the intersection between the technological modification of nature... and the person".^{88,89}

Gajic identifies these themes of intrusion and interiority also in the work of phenomenologist María Zambrano. Gajic's claim that "Zambrano foreshadows Nancy's description of the heart as a marker of the precarious borders of the human" is engaging and compelling. She draws principally on Zambrano's 1958 book *Person and Democracy* [*Persona y democracia*] to recover Zambrano's views on the sources of a human history in which subjectivity can exist and be exercised. This space requires the eviction of the "oppressive fullness" of gods and nature. Gajic's reading is thus that "For Zambrano, the paradoxical status of the human being consists of carrying inside a hollowness, an opening in space and time that makes human existence possible."⁹⁰ As compelling as this analysis is, it is curious that Gajic does not draw on Zambrano's earlier 1934 essay "The Metaphor of the Heart". Its title signals that the piece is an extended metaphor of the type I have earlier argued is broadly

⁸⁶ Tatjana Gajic, "(Re)Moving the Heart: Interiority and Intrusion in María Zambrano, Jean Luc Nancy and Claire Denis," *Journal of Spanish Cultural Studies* 16, no. 4 (2015): 399-400.

⁸⁷ Nancy, "L'intrus," 10.

⁸⁸ *Ibid.*, 13.

⁸⁹ Gajic, "(Re)Moving the Heart: Interiority and Intrusion in María Zambrano, Jean Luc Nancy and Claire Denis," 400.

⁹⁰ *Ibid.*, 402.

compatible with the method of Merleau-Ponty.⁹¹ This essay gives a rich and explicit account of the heart as mediating between interior and exterior.

5.3.1 The Metaphor of the Heart

In her essay, Zambrano imagines the heart on the verge of speaking. It wants to speak a new word, its own word, separate from and independent of the world which existed before its bearer's birth. Ultimately, the heart is denied this opportunity for novelty because it is already part of a world and living according to the vocabulary of nature. Yet its urge to speak "is the inner voice that identifies with some voices, with some words that are heard either inside or outside, we do not know which, since they are heard from within."⁹² For Zambrano, the unutterable uniqueness of the heart is heard faintly between the inner and outer worlds. Zambrano's ineluctable interior both motivates and proscribes what Nancy labels modern humanity's "general program of 'mastery and possession of nature.'"⁹³ Nancy claims the truth of the subject is "its exteriority and excessivity: its infinite exposition", in and through nature, and stated completely in the combination of expressions *corpus meum*, my body, and *interior intimo meo*, more inward than my innermost. This ongoing relation of interior and exterior is "an intimacy more profound than any interiority".⁹⁴

Zambrano also explores the heart's burden and responsibility for the maintenance of the world. She invokes a motif of movement and especially of the beating, contracting heart. Under the weight of the world, there is a risk that the heart may sink beneath the "waters of post-creation" and yield to the dominance of the sterile world, replacing its native affect with will: that is, with reason and intellect.⁹⁵ In these decisive moments of world-weariness, the heart might either succumb and "become a thing, a fact" or resist the ossifying world and stay

... faithful to the feeling that founds the simple perception of the heart's pulsation as the centre of our lives... Against it all reason is reasonless, whilst the truth approaches it as its betrothed. But only as the betrothed who is in no hurry to be wed, who waits still.⁹⁶

This resistance is made possible by the heart's affective feeling, but also by literally feeling it, feeling its motion and movement within the body of its bearer. The pulse, the "reiterated beat of the heart",

⁹¹ Tania Gentic, "Creating Poetic Subjectivity in María Zambrano and José Lezama Lima," *Revista Hispánica Moderna* 63, no. 2 (2010): 179, 74.

⁹² Zambrano, "The Metaphor of the Heart," 989.

⁹³ Nancy, "L'intrus," 6.

⁹⁴ *Ibid.*, 12-13.

⁹⁵ Zambrano, "The Metaphor of the Heart," 990.

⁹⁶ *Ibid.*, 991.

reveals its ceaseless work and that its “unforgettable news yet to be revealed remains: for it to continue being revealed.” Against the fixity of eternity, against the final Revelation, the heart reveals the constant becoming of the subject, its status as a work-in-progress. And while the heart conducts its labour, it tolerates an ambiguous relation to the unfulfilled “barely perceptible white presence of the promise of truth”.⁹⁷ It balances faith to both the world and itself by resisting crystallisation.

Zambrano argues in the final section and coda of her essay that “In the realm of the human no movement, even those of the heart, appears free of intention...”.⁹⁸ The movement of the heart is directed internally, to knowing itself. Its intentionality is an “Active passivity” which permits it to maintain its innocence and its ambiguity: it does not so much receive the external world as objects of consciousness as it does bear them on, carry them, suffer the weight of their reason and worldly pain. The heart “is the cup of pain”. It is not inured to this pain but persists despite it, in spite of being “subjected to the time it wants to exceed”, to mortality. Unlike Augustine of Hippo’s *toto ictu cordis*, the “whole effort of the heart”, this heartbeat cannot transcend time to touch eternity.⁹⁹ It is a reminder of what is sacred and courageous in finite human existence, not some shard or imitation of the eternal. And without answering once and for all questions of knowing or being, for Zambrano, as in Jean-Luc Marion’s erotic reduction, life and love and love of life is sufficient to propel its bearer into an uncertain future.¹⁰⁰

5.3.2 Sacred and secret

Both Nancy and Zambrano are concerned with the heart as the material intersection between inner and outer worlds. It is in the heart that humanity, individually and in totality, meets and, for Nancy at least, attempts to negotiate with nature. What I sought to identify above are those parts of Nancy and Zambrano’s works which most clearly go to the heart as a place of passage between interior and exterior. What may not yet be fully expressed is the preoccupation with religion shared by both thinkers. Although Zambrano draws on a range of Western traditions, including ancient Greek mythology and drama, her work is shot through with her own mystical Catholicism. Perhaps most clearly, as Christian Sernad observes, she places Catholic and Augustinian thought at the very foundation of the idea of Europe.¹⁰¹ For his part, Nancy is deeply conscious of the Western context of

⁹⁷ Ibid.

⁹⁸ Ibid., 992-93.

⁹⁹ Marjorie O’Rourke Boyle, “Augustine’s Heartbeat: From Time to Eternity,” *Viator* 38, no. 1 (2007): 19.; Augustine, Bishop of Hippo, *Confessions*, 9.10.22-24.

¹⁰⁰ Jean-Luc Marion, *The Erotic Phenomenon*, trans. Stephen E. Lewis (Chicago: University of Chicago Press, 2007), 19-26.

¹⁰¹ Christian Sernad, “The Reasons of Europe: Edmund Husserl, Jan Patočka, and María Zambrano on the Spiritual Heritage of Europe,” *History of European Ideas* 44, no. 7 (2018): 873.

his work. He takes Christianity to be inseparable from the West and its deconstruction to be part of his project.¹⁰² Not merely a symptom of cultural reflexivity, any number of his works take direct inspiration, provocation or influence from overtly Christian material.

What is striking about this shared heritage is not their cultural or theological alignment but the anatomical significance it implies. These resonances can be brought into relief through an important work of Christian art. As part of a broader study into Renaissance artist Michelangelo Buonarroti's understanding of the internal organs, Christian Kleinbub examines Michelangelo's cartoon for a work subsequently executed in oils by Jacopo Pontormo. Michelangelo and Pontormo's work is a treatment of the frequent subject of Christian art known as *noli me tangere*, after which the work takes its title. This genre depicts an episode told in the Gospel of John (20:11-18) following Christ's crucifixion but prior to his ascension in which he appears to the saint Mary Magdalene. When she addresses him, he replies "touch me not [*noli me tangere*]; for I am not yet ascended to my Father." Typical depictions show Magdalene reaching out to Christ, who sidesteps or recoils to avoid her hand. Nancy, who has written extensively on this genre, finds this common depiction less remarkable than when the two make contact or the exceptional cases in which Christ touches Magdalene.¹⁰³ Michelangelo and Pontormo's *Noli me tangere* (ca. 1531-1532) is one of these cases.

In this painting, Magdalene lunges her torso forward, her right arm swung out and behind her, her left arm outstretched behind Christ, as though preparing to embrace him. Christ leans back slightly and with his right arm following the straightened angle of his body and a twist of his wrist extends a finger to Magdalene's breast. Kleinbub dwells on this gesture, so transgressive of this figurative genre, the Gospel narrative and the subject matter, to demonstrate that Christ does in fact make contact.¹⁰⁴ Kleinbub considers various explanations, or rather elisions, of this puzzling aspect of the work before offering his own. His explanation is that it is not so much the scripture that Michelangelo seeks to illustrate but rather its Augustinian hermeneutic. Augustine, a major influence on Michelangelo, describes this episode as "teaching faith to the woman who recognized and called him Master, and that Gardener was sowing a grain of mustard in her heart as though in his garden."¹⁰⁵ Kleinbub argues that it is this image and other aspects of Augustinian exegesis which

¹⁰² Jean-Luc Nancy, *Dis-Enclosure: The Deconstruction of Christianity*, trans. Bettina Bergo, Gabriel Malenfant, and Michael B. Smith (New York: Fordham University Press, 2008), 142.

¹⁰³ *Noli Me Tangere: On the Raising of the Body*, trans. Sarah Clift, Pascale-Anne Brault, and Michael Naas (New York: Fordham University Press, 2008), 34.

¹⁰⁴ Christian K. Kleinbub, *Michelangelo's Inner Anatomies* (Philadelphia: Penn State University Press, 2020), 109-10.

¹⁰⁵ Augustine, "Tractate 121," in *Tractates on the Gospel of John, 112-24; Tractates on the First Epistle of John*, The Fathers of the Church (Washington D.C.: Catholic University of America Press, 1995), 58.

Michelangelo seeks to evoke in order that to show Christ's literal touch effecting Magdalene's "turn of heart" and change in her "internal perception".

Kleinbub identifies the material, anatomical specificity of this painting, tracing its lineage from Augustine so that we might more clearly see how touching and being touched, the heart, and perception relate. He recalls the tradition of juxtaposing the *noli me tangere* with depictions of another episode from the Johannine Gospel (20: 24-29) known as the incredulity of Thomas, in which the disciple Thomas probes the wounded side of Christ on the cross. Thomas requires direct tactual experience of Christ's wound to believe in his resurrection, whereas Magdalene's experience comes through understanding "that by not touching, she now touches".¹⁰⁶ The lesson that faith ought be founded in belief of the unseen and unfelt, is no theological innovation. But by having Christ touch Magdalene, this subversion of the *noli me tangere* equivocates. Magdalene's faith is sowed by a touch other than the one she seeks and over which she has no control. It comes from outside, from the incarnate Christ, and yet it is felt also inside. Magdalene's faith does not rely on pure exteriority as Thomas's does, but neither is it a matter of pure interiority. Faith is borne in the place of the heart and its interior-exterior communication.

For Zambrano and Nancy, modern disenchantment of the heart has done little to dampen the potency of these relations. The ambiguity of the source of this touch, Christ or the heart itself, recalls Zambrano's heart voice "heard either inside or outside, we do not know which" and Nancy's intimacy exceeding interiority. This *noli me tangere* gives expression to the heart as simultaneously seat of the self and object of the world, as passage between the two, as body-subject. In both Zambrano and Nancy, exteriority is nature. More particularly, exteriority is nature as life, equally relentless and perilous because always beyond solicitation and control. It is Zambrano who makes most explicit, in sections six and seven of her metaphor of the heart, that the sign of life is the movement of the pulse. Like Michelangelo and Pontormo's touching Christ, the motion of the heart renovates at the same time as it announces its imminent evacuation; it promises without guaranteeing; its fleeting touch is a ground for faith, hope, and love ultimately left to interior realisation.

5.3.3 Displacing the passage

Existing artificial heart devices include a literal passage from the implanted device inside a patient's body to the balance of the system outside the body. Internally, devices either replace the heart or attach to it, relieving it of a proportion of its work. Externally, batteries and a controller unit are carried or worn by the patient in a backpack or bag which may or may not be designed for the device

¹⁰⁶ Kleinbub, *Michelangelo's Inner Anatomies*, 119.

or the patient. These two components are joined by six or so wires enclosed within a single sheath known as a driveline which perforates the patient's skin, usually at the abdomen. The driveline exit site is secured by layers of gauze, dressings and compression belt, all of which must be kept away from water and cleaned and changed each day to prevent infection. Artificial heart devices must be actively attended in accordance with the requirements of medical management. Though meticulously managed, the wound from which the driveline exits is not permitted to heal over, leaving the post-operative artificial heart patient, to borrow Nancy's expressions, "closed open".

Most patients with artificial hearts receive and manage an abdominal driveline but some have the option of their device exiting from behind their ear. The Jarvik 2000 allows for a postauricular mounting, in which a driveline runs from the implanted device to a pedestal screwed to the skull, just behind the patient's ear, then to batteries and controller. Patients also have an option to use two devices for biventricular support, with bilateral skull pedestal implantations. Although this implantation technique is well established in Europe, approval in the US is pending clinical trial.^{107,108} Perhaps as a result, there is relatively little research on patient experience with postauricular connectors.¹⁰⁹ Medically, the fixity of the skull-mounted pedestal and the vascularity of the cranium appear to make them less susceptible to infection or damage than abdominal drivelines. They also permit a freer range of motion and activity including bathing and showering, leading Dunn and colleagues to recommend widespread adoption of postauricular implantation.¹¹⁰ Since a pulsatile device mounted in the postauricular position may overwhelm the patient's other perceptions this recommendation may also imply that all future artificial hearts should be continuous-flow.

A postauricular connection moves the percutaneous driveline to a safer and arguably less obtrusive position on the body, farther from and more discontinuous with the native site of the heart. Although it may be felt, deliberately or accidentally, a postauricular pedestal cannot be seen directly by its bearer, hidden as it is behind their ear and line of sight. Although it must be handled with care, it does not require the same exacting maintenance regimen of abdominal drivelines. Both these features represent a change in reflective attention on and active negotiation with the device, assisting it to become more transparent and thus more capable of incorporation. At the same time,

¹⁰⁷ Craig Selzman et al., "Evolutionary Improvements in the Jarvik 2000 Left Ventricular Assist Device," *ASAIO Journal* 64, no. 6 (2018): 829-30.

¹⁰⁸ "Evaluation of the Jarvik 2000 Left Ventricular Assist System with Post-Auricular Connector--Destination Therapy Study," U.S. National Library of Medicine, <https://clinicaltrials.gov/ct2/show/NCT01627821>.

¹⁰⁹ Michela Luciani et al., "Adults Living with a Retro-Auricular Left Ventricular Assist Device as Destination Therapy: An Interpretive Description," *Journal of Cardiovascular Nursing* 35, no. 6 (2020).

¹¹⁰ Dunn et al., "Human Factors and User Experience Issues with Ventricular Assist Device Wearable Components: A Systematic Review," 2444.

however, postauricular devices removed from the chest and without proprioceptive feedback displace the heart as a site of passage. Even abdominal devices, the opening for which is more proximal to the traditional heart site, call regular attention to the driveline exit site in a way that tips the balance of passage away from interior and toward the exterior.

I mentioned in the previous chapter the process of disenchantment of the body and the heart begun by modern medical knowledge. Understandings of death have also been destabilised by the new concept of brain death. Contemporary scientific and philosophical, even phenomenological, investigations of mind and body can hardly avoid a vocabulary of neuroscience and neural correlates of consciousness. The accounts given above are only examples of a huge Western cultural tradition which is rapidly transporting the seat of the self from the torso to the head, the heart to the brain. Postauricular drivelines might have the effect of accelerating that transition, by the artificial heart's general assertion of cognitive control over cardiac functions and by the topological relocation of the heart to the head. There is perhaps nothing inherently wrong with attributing the rhetorical figurations of the heart to other parts, to the extent that new totems can continue to discharge the social and subjective functions of the heart. But we should be wary of allowing what the heart stands for to be annexed by or surrendered to the brain. Doing so may narrow or even seal that portal between interior and exterior so emblematic of human life.

5.4 Conclusion

Incorporation is a phenomenological issue. As medical devices and other interventions which alter the conditions of embodiment become more prevalent in medical therapy, it is increasingly also a clinical issue. Artificial hearts face various challenges in fulfilling the prerequisites for incorporation. As with biological heart transplants, the consequences of interventional complications pose a direct challenge to incorporation: immunological in the case of transplantation; circulatory, haematological and neurological in the case of implantation. The apprehended risk of artificial hearts also undermines trust in their functionality, indirectly undermining incorporation. Disparities in healthcare and the prevailing connotations of cyborg technologies, of which artificial hearts are a category, may make it difficult for some patients to achieve an affective ease with their artificial heart devices. These factors are principally empirical matters, which could be addressed through medical research, clinical practice, and healthcare policy. Perhaps more difficult to overcome is the inability of artificial hearts to match the resonances of the heart as a passage between interior and exterior which are expressed in the literal and metaphorical feedback of a life-affirming rhythm at the centre

of a person's being. Satisfying this criterion may require more substantial technological, design and cultural transformations.

These phenomenological observations are important to stakeholders. Patients should be made aware of these challenges to incorporation. Improving the reliability and trustworthiness of artificial hearts will already be an aim of device designers and engineers, but the challenges of incorporation provide an additional medical imperative for getting these matters right. Affective tolerance is a matter not only for engineers, though industrial designers will be concerned to make devices more responsive to aesthetic and body image concerns, but also for architects of public health systems and medical and surgical specialty leaders. Addressing gender disparities in the diagnosis and therapy of cardiovascular disease, and ultimately the cyborg sexism amongst patients receiving artificial heart implants, is a matter of fairness for those patients and for ensuring that artificial hearts are, as an interventional category, oriented to justice. Proprioceptive feedback should be considered by engineers, designers and physicians with regard to its relevance to incorporation. This will mean considering actual and simulated pulsatility and other haptic factors not only, as it has been, in its contribution to physiology but also in its phenomenology.

A deeper question of comportment and culture is raised by attending to the meaning of the heart as a passage between interior and exterior, a meaning brought out by a close phenomenological analysis. Such matters are arguably not new, animating the thought of theologians like Augustine and philosophers like Descartes. The artificial heart reifies, materialises and renders these questions bodily. A phenomenological analysis suggests the heart's role as an intermediary passage for the body-subject is experienced secretly or prereflectively. Like other horizons of the body-subject, it is renewed by a certain transparent fidelity, the sensible manifestation of which may be the heart rhythm. It is made possible by a certain passivity towards the sensations and resonances generated by the heart. Artificial hearts invite reflection on whether these sensations and resonances, literal and metaphorical associations with the heart, should be considered as interiority or exteriority, subject or body, self or world. The body-subject is sustained by its ambiguity, an ambiguity that is interrogated by the artificial heart. The possibility of placing the external apparatus of an artificial heart at the postauricular site, behind a patient's ear rather than near their breast, underlines the fundamental questions asked by artificial hearts.

CHAPTER 6: MOTOR INTENTIONALITY

Motor intentionality is the most basic and originary form of intentionality for the body-subject. This interpretation of intentionality grounds the body-subject's perception of and comportment to the world in the possibilities of movement and action available to it. The perception of motor possibilities, and therefore the ways in which the world appears, change based on the situation in which the body-subject understands itself to be. Changes in situation include changes in the phenomenal body, such as through incorporation, or changes in skills and capacities acquired by the body-subject. Equally, elements of the phenomenal body may disappear or be lost, and capacities of the body-subject may disappear or degrade, affecting the ability of the body-subject to achieve or even perceive those elements of the world which corresponded to a particular motor capacity. Illness is often associated with the loss of certain bodily capacities which were once available to the body-subject. As I discussed in Chapter 3, S. Kay Toombs particularly understands illness as a series of losses across all dimensions of the body-subject but which, I think, are clearly reflected in motor intentionality. In this chapter, I concentrate on the effects of illness – and artificial heart therapy – on motor intentionality.

Heart failure is the key indication for the implantation of an artificial heart device. During failure the heart is unable to pump enough blood to meet the requirements of the body. Its symptoms can be dramatic and debilitating. They include fatigue, shortness of breath, a cough or wheeze, the swelling of legs or abdomen due to fluid retention, which places pressure on other organs, and even a sensation of drowning as the lungs become congested. Treatment and management can sometimes arrest further injury but heart failure is an incurable and frequently progressive condition. Serious heart failure is an example of the kinds of serious illness discussed by phenomenologists of health and illness. Heart failure even bears symptomatic similarity to the chronic respiratory illness on which Havi Carel's analysis of illness as a form of bodily doubt, discussed in Chapter 3, is based. Since heart failure frequently prevents patients from undertaking normal activities, it also parallels the kinds of spatiotemporal transformations and limitations imagined in these accounts.

Patients will be functionally impaired by the time they are candidates for an artificial heart. A key tool for measuring heart failure is the New York Heart Association (NYHA) Functional Classification. NYHA classes discriminate heart failure severity symptomatically. At the earliest stage, Class I, patients are essentially unlimited in ordinary physical activity. At the latest stage, Class IV, they display symptoms of cardiac distress even at rest. Artificial heart devices supplement or supplant the failing organic heart's pumping functions in order to alleviate the suffering caused by these symptoms. These devices can be effective at addressing symptoms and removing or mitigating some of the transformations brought about by cardiac distress. Georges Canguilhem describes medical

repairs as physiological innovations.¹ In fact, Canguilhem's claim could be extended beyond physiology. Medical repairs, and device interventions, are phenomenological innovations. That artificial heart device implantation is, except in the case of destination therapy, a bridging *modus vivendi* rather than a medical repair makes this observation no less true. In this chapter, I consider some of the ways in which artificial hearts change the phenomenological possibilities of their bearers in the domain of motor intentionality, or the ways in which body-subjects relate to themselves and their world.

First, I recall aspects of illness which make up bodily doubt. I argue that patients with heart failure often suffer from bodily doubt caused by their body's failure to achieve things which used to be and still appear possible for it. I observe a number of restrictions introduced by artificial hearts, which I liken to the inhibited intentionality described by Iris Marion Young. I argue it can be more beneficial for patients to be normalised to new possibilities which reflect their health and illness status, rather than attempt to rehabilitate prior relations disallowed by their continued illness. Artificial hearts can be emblematic of a therapeutic mindset aimed at curing or overcoming heart failure rather than adapting to it. Such a mindset tends to embed rather than solve bodily doubt. Second, I argue that new ways of understanding and relating to the body are generated by the representations produced by artificial hearts. These new understandings are epistemic relations which require their bearer to reinterpret the meaning of their visceral bodies, supplementing their native, prereflective interoception with reflective representations. These compulsory reflections trouble and disrupt the body-subject's original relation to the world in favour of one replete with information.

6.1 Normalisation and bodily doubt

Bodily doubt modifies motor intentionality. Bodily doubt inserts into motor intentionality a countervailing hesitation. Simultaneous to the positive intentionality that Merleau-Ponty expresses as "I can", bodily doubt expresses an equally concrete negative "I cannot."² Motor possibilities are perceived as invitations for the body-subject to turn their body and capacities to action with a presumption of success. Bodily doubt transforms these solicitations into prohibitions, or rather builds into motor possibilities equal and opposite presumptions. With basic motor intentionality confused, possibilities must be judged with conscious planning and estimations of bodily capacity. Bodily doubt arises for patients when they fail to engage in or accomplish the motor possibilities which used to be achievable to them and which still appear possible. This may be because of a failure

¹ Canguilhem, *The Normal and the Pathological*, 196.

² Carel, *Phenomenology of Illness*, 95.

to align their situation with their objective circumstances. As in the discussion of incorporation in the previous chapter, this realignment can be addressed in two ways. Patients can be encouraged to adapt their perception of possibilities to their new circumstances, so that the possibilities which appear are more reliably achievable. Alternatively, their world can be made or restored to conditions more amenable to the possibilities at which they aim, including by treating the objective body.

I claimed above that heart failure is a clear case of the kinds of serious, debilitating illness discussed by phenomenologists of health and illness. Carel limits her analysis to those conditions which are “serious, chronic, and life-changing... where the onset of illness is not followed by complete recovery within a short period of time.”³ Her definition is designed to exclude fleeting or trivial conditions that occasion only inconvenience rather than threatening the broad sweep of a person’s life. This definition can be parsed in terms of both nature and degree. All heart failure, for example, affects a central physiological system. It is progressive and degenerative. But although heart failure can be identified in the context of directly- or indirectly-related symptoms, it is not necessarily life-changing at its early stages. According to NYHA classification, Class I and II heart failure poses no or only slight limitation of ordinary activity. Cardiologists in Australia and New Zealand disaggregate symptomatic and objective criteria so that heart failure can be diagnosed even in the absence of symptoms.⁴ By the time heart failure has progressed to Class III or IV, however, limitations on patients can be significant and debilitating.

More emphatically, I argue that heart failure is a severe and globally disruptive condition which, if not a paradigm case of illness, at least invites analysis under the established phenomenological frames. Advanced heart failure is associated with restrictions in blood oxygenation due to the lungs filling with fluid and a lack of blood circulation around the body due to insufficiency of the heart’s pumping. This lack of vital nutrition is associated with extreme mental and physical fatigue, dizziness and light-headedness, forgetfulness and inattention, weakness, shortness of breath, coughing or wheezing, and a variety of other hardships including swelling or oedema, sensations of drowning, and persistent fears about the symptomatic and existential risks of heart failure. The breadth of these symptoms cover the range of losses articulated by Toombs in her account of illness: of wholeness, certainty, control, freedom to act, and the familiar world.⁵ Nursing researchers Marie Ryan and Mary Farrelly find four themes in the experiences of advanced heart failure patients which

³ Ibid., 2.

⁴ Atherton et al., "National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand: Guidelines for the Prevention, Detection, and Management of Heart Failure in Australia 2018," 1137.

⁵ Carel, *Phenomenology of Illness*, 41-46.

confirm these losses, more or less respectively: running on empty; living in the shadow of fear; a restricted life; and battling the system.⁶

As illness progresses, patients continue to perceive the activities to which they are habituated as motor possibilities but are confronted with an inability to achieve them. Merleau-Ponty's intentionality frames motor possibilities as implying that "I can". As I described in Chapter 3, Carel's phenomenology of illness reformulates intentionality in terms of bodily doubt, where motor solicitations appear instead as prohibitions or foreclosures declaring "I cannot".⁷ She describes three aspects of bodily doubt. First, loss of continuity causes a patient to assure themselves by checking and rechecking reflectively on progress towards their goal. In doing so, patients attend not only to their progress but also to the objective performance of their body towards that progress. This results in the second aspect, loss of transparency. Lastly, loss of faith in one's body erodes one's confidence in their body's ability to perform an action. Rather than pursuing a motor possibility within the situational space structured by the body-subject, bodily doubt demands the abstract, propositional, reflective and opaque justifications which operate in positional space. In making these demands, bodily doubt refuses to take the capacity to act on faith and enters into motor activity hesitantly, pending guarantee.

Heart failure patients frequently retain motor intentions learned prior to their illness. The disappointment of these intentions and expectations caused by the pathological incapacitation results in a prevailing bodily doubt, in which many or all motor intentions are tinted with futility. Ryan and Farrelly identify a sense of "can't do" among advanced heart failure patients. They give an illustrative example, in which a patient unfavourably compares their own performance of a motor possibility, walking, to others':

I'm 54 years old—still young—and when I see 70 yr olds walking the street and passing me by
I feel like a right ejit (idiot)—they're flying up the street and I'm crawling up it⁸

Bodily doubt not only impairs performance but is part of a vicious cycle in which the corporal part of the body-subject is minimised, subjectivity is emphasised, and motor possibility appears to be a

⁶ Marie Ryan and Mary Farrelly, "Living with an Unfixable Heart: A Qualitative Study Exploring the Experience of Living with Advanced Heart Failure," *European Journal of Cardiovascular Nursing* 8, no. 3 (2009).

⁷ Carel, *Phenomenology of Illness*.

⁸ Ryan and Farrelly, "Living with an Unfixable Heart: A Qualitative Study Exploring the Experience of Living with Advanced Heart Failure," 227.

matter of will. Acting on any motor intention against the resistance of futility can add what Toombs calls existential fatigue to the patient's existing exhaustion.⁹

Bodily doubt can be alleviated either through rehabilitation or adaptation. A patient might regain an ability to perform a certain action by recovering from their illness or otherwise developing an ability to overcome obstacles. This is frequently the object of rehabilitation. A different approach is to adapt motor intentionality to a patient's new situation and the new motor possibilities which follow.

Toombs, who suffers from multiple sclerosis and used a wheelchair, presents her own impression of watching others walk or climb stairs:

Try as I might, I can no longer remember how it was to move like that. It is not simply that I cannot recall the last occasion when I walked upright. It is that I cannot recollect, or re-imagine, the felt bodily sense of "walking."¹⁰

Toombs' description indicates that the perception of motor possibilities can change. Just as the body-subject perceives new possibilities in new situations or having acquired new skills or resources, so too can possibilities recede from perception or solicitations to action fade in their allure. Bodily doubt describes a situation in which motor solicitations continue to invite, or perhaps haunt, the patient to act in a certain way even as they caution against it.

Heart failure patients tend not to encounter a decisive moment in which their possibilities are explicitly challenged and adaptation catalysed. Heart failure affects the whole cardiovascular system, not an isolated body part. Its decline tends to be gradual. Primary care researchers Marilyn Kendall and Scott Murray observe that patient narratives of heart failure do not have obvious cultural markers upon which to draw, nor clearly defined illness trajectories. They claim that illnesses resulting in biographical disruption are usually accompanied by epiphanic experiences.¹¹ I am not convinced that illness disruption need occur in sudden realisation – in coining the term 'biographical disruption', sociologist Michael Bury argues that "non-communicable diseases do not 'break-out' they 'creep up'" – but it is the case that heart failure is not typically punctuated by routines of diagnoses, prognoses, treatment calendars, tests and checks, remission, or recurrence that are common to other illnesses.¹² Maddi Olana-Lizarraga and colleagues observe that maintaining family, social and work roles and hiding their heart failure from others is a priority for patients in middle

⁹ Toombs, "Reflections on Bodily Change: The Lived Experience of Disability," 253.

¹⁰ Ibid., 254.

¹¹ Marilyn Kendall and Scott Murray, "Poems from the Heart: Living with Heart Failure," in *Narrative Research in Health and Illness*, ed. Brian Hurwitz, Trisha Greenhalgh, and Vieda Skultans (London: John Wiley & Sons, 2004), 67-68.

¹² Bury, "Chronic Illness as Biographical Disruption," 170.

stage failure.¹³ These patients frequently continue to perceive familiar possibilities consistent with their pre-illness normality, though their health status makes these tasks increasingly difficult, unachievable and infused with doubt.

6.1.1 Paradigm of psychological maladaptation

As I outlined in Chapter 2, Canguilhem offered a philosophical account of the normal as against the pathological. Norms of life are those able to sustain themselves, so that any way which enables a patient to continue to live should be regarded as legitimately normal. Canguilhem also argues that the inability of a norm to respond to new circumstances but instead stay fixed to a certain normality is pathological. It is the ability to be abnormal, to diverge from established norms when the situation requires, which characterises health. I have argued that Merleau-Ponty agrees with Canguilhem to the extent that a normalised body-subject, one which tends towards health and away from pathology, should be novel, dialectical, and polarising. That is, a normalised body-subject will engage with the world as it is now, as a complete form of existence and without clinging on to those sources of pleasure or pain which may have applied at other times. The possibilities and solicitations perceived in this new engagement are polarised by the normalised body-subject according to the new rhythms and values of this life.

Healthcare discourses and dispositions towards heart failure, including a reluctance to confront its incurability and an excess of enthusiasm for strong intervention, can prevent motor possibilities from being repolarised in light of illness. Clearly the symptoms of heart failure are inherently pathological. Patients who bear them suffer. Heart failure is also frequently additionally pathological because it is weakly, if at all, normative. It leaves patients largely unable to adapt to new circumstances and thus constrains the milieu in which they are able to live and flourish. As I explored above, a lack of medical or biographical markers which might clearly announce that a body-subject is living under new conditions of illness mean that patients' worlds are often still polarised in terms of pre-illness normality. Patients are still drawn to and compelled to engage in activities which might once have generated stability or positive value but now result in further suffering. The motor intentions of patients invite them to run, walk, or engage in physical activity generally as they might have prior to illness, but such activities are thwarted and frustrated by new realities of living.

Psychologist Andrew Steptoe and colleagues have observed that the perception of limitations by heart failure patients are only partly correlated to severity of disease, a finding that Ryan and Farrelly

¹³ Olano-Lizarraga et al., "Redefining a 'New Normality': A Hermeneutic Phenomenological Study of the Experiences of Patients with Chronic Heart Failure," 280.

interpret in favour of efforts to deemphasise the physical and instead foster psychological adaptation to new, more realistic possibilities.^{14,15} Olano-Lizarraga and colleagues make this suggestion explicit:

We have shown that the ability to continue with their day-to-day activities that do not require excessive physical effort gives CHF [Chronic Heart Failure] patients great satisfaction and promotes the experience of normalization in their lives. Furthermore, we have seen that for these patients, adapting their daily routines to their possibilities brings them normality. Nurses should therefore help CHF patients discover the activities that they can continue to perform, with some modifications, so that they can focus more on these activities.¹⁶

Ryan and Farrelly explain the prevailing reluctance among healthcare providers to assist patients with such an adjustment in expectations and intention by observing a general disinclination to reckon with the incurability of heart failure. Instead, healthcare providers may sometimes be more inclined to apply therapy to the pathophysiology and symptoms of heart failure rather than assist patients to, “find ways to help them *live with* rather than *fix* their situations of advanced chronic illness.”¹⁷ An attitude of palliation could continue to target the symptoms of disease, such as through cardiac rehabilitation and pharmaceuticals to slow or halt the progress of heart failure, and instruction in strategies for undertaking activities requiring exertion. This attitude could continue to indicate strong medical interventions for patients for whom the benefits are significant or life-saving. But it would also, even primarily, be directed at enabling patients to reframe their horizons to focus on current motor possibilities, not recovering motor impossibilities or improbabilities.

6.1.2 Extraordinary interventions, ordinary paradigms

As the strongest somatic intervention for heart failure in the medical armamentarium, artificial hearts may sustain the fantasy of cure among both patients and clinicians. Artificial hearts are mostly employed as bridging devices to sustain a patient until a suitable transplant heart becomes available. They are undoubtedly an exceptional option for maintaining and extending the lives of heart failure patients, though their patchy history gives reason to temper our enthusiasm for them as a solution. Ventricular Assist Devices (VADs) may improve cardiac function such that heart muscle

¹⁴ Andrew Steptoe et al., "Health Related Quality of Life and Psychological Wellbeing in Patients with Dilated Cardiomyopathy," *Heart* 83, no. 6 (2000): 650.

¹⁵ Ryan and Farrelly, "Living with an Unfixable Heart: A Qualitative Study Exploring the Experience of Living with Advanced Heart Failure," 229.

¹⁶ Olano-Lizarraga et al., "Redefining a 'New Normality': A Hermeneutic Phenomenological Study of the Experiences of Patients with Chronic Heart Failure," 283.

¹⁷ Ryan and Farrelly, "Living with an Unfixable Heart: A Qualitative Study Exploring the Experience of Living with Advanced Heart Failure," 229.

can recover. This so-called bridge to recovery can enable some patients to regain functional capacities comparable to healthy controls after device explantation.¹⁸ However, artificial hearts are increasingly used as responses to heart failure in their own right. Some patients already receive an artificial heart as a destination therapy, with the express purpose making use of the device until the end of their life. This group is enlarged by patients who initially received a bridging device but for whom a suitable transplant heart cannot be found or who are delisted for other reasons.

Some devices may ease the symptoms of heart failure but many impose their own physiological limitations which, though usually not as severe as end-stage heart failure, represent a kind of mild failure-like cardiac condition. Artificial hearts do not herald the complete restoration of cardiac function or the return of pre-illness life. The term destination therapy refers to a clinical decision not to list the patient for further intervention, not the arrival of the patient at a desired end-point in terms of their capacity or wellbeing. Neither does device therapy do anything to repolarise or adapt the motor possibilities of the patient to the inexorable situation of heart failure. Even where this is not the explicit clinical objective, Toombs observes that patients tend to understand the meaning of medical technologies to be a restoration of certainty and control, which might also be expressed as the alleviation of bodily doubt.¹⁹ While artificial heart devices might be effective in alleviating some such doubt, they also tend to reinforce or lock-in a base level of doubt and preclude the repolarisation of motor possibilities which is an emergent product of normativity.

Both the treatment frame for artificial hearts and the rigidity of the devices define the limits to which they can assist normalisation. In the organic heart, heart rate varies depending on the needs and activities of the patient. Most artificial heart devices, however, are controlled by settings such as pump speed, fill volume and cardiac output which are fixed by technicians at a given moment, usually with a patient at rest, in clinic. Devices with static functionality certainly improve the patient's ability to meet some bodily demands, particularly when those conditions match the clinical environments in which the device was set-up, which may make them more normative than unmitigated heart failure. But the fixity of devices reaffirms their place in the realm of pathology and palliation, not normativity. Responsive, physiologic controllers able to respond to changing bodily demands will surely become more prevalent among artificial heart devices. Many are currently under development. Some devices already incorporate pseudo-adaptation to exercise by maintaining some

¹⁸ Djordje G. Jakovljevic et al., "Left Ventricular Assist Device as a Bridge to Recovery for Patients with Advanced Heart Failure," *Journal of the American College of Cardiology* 69, no. 15 (2017): 1929.

¹⁹ Toombs, *The Meaning of Illness: A Phenomenological Account of the Different Perspectives of Physician and Patient*, 94.

space in the ventricle for the additional venous return generated during exercise.²⁰ But even assuming significant progress in engineering, healthcare that aims at the symptoms of heart failure risks continuing to align to obsolete norms of life.

6.1.3 Liminality and limitation

Medical anthropologist Sharon Kaufman and colleagues have described Internal Cardiac Defibrillators (ICDs) as ironic technologies. Patients suffering from severe heart failure are sometimes also at risk of sudden cardiac death, which ICDs can help to mitigate. However, they do not manage or reduce the symptoms of heart failure. As a result, the life that ICDs sustain may be one with significant debility and possibly worsening, or even terminal, heart failure. As Kaufman et al put it,

The goal of avoiding death in ever older, sicker patients fosters, also, new pathways to death and new qualms for patients and families facing the responsibility of choosing one form of dying over another.²¹

The transformation from sudden cardiac arrest risk to progressive heart failure risk may obscure the fact that these are both, still, risks of dying. Kaufman and colleagues note that the framing of the possibility of ICD implantation influences a sense of desire and obligation to consent to the procedure.²² Elsewhere, Kaufman describes this framing as expressing clinically a technological imperative and an obligation to longevity, in which it becomes almost impossible for individuals to consider treatment as balanced against anything other than the quantity of life it is likely to yield.²³

Artificial hearts are also life-saving devices which complicate the process of dying. Perhaps more than ICDs, however, artificial hearts also complicate the process of living. Notwithstanding bridge-to-recovery uses of Ventricular Assist Devices (VADs), which might ameliorate cardiac function enough to allow explanation of the device, anthropologist Frances Barg and colleagues ascribe a similar ironic quality to Left-VADs (LVADs). They describe a sense of obligation to undertake LVAD implantation among patients and caregivers. This obligation can be based in a clinical discourse of candidacy for novel or scarce interventions which encourages the patient to already be invested in

²⁰ Clare Nicholson and Jaime C. Paz, "Total Artificial Heart and Physical Therapy Management," *Cardiopulmonary Physical Therapy Journal* 21, no. 2 (2010): 18.

²¹ Kaufman et al., "Ironic Technology: Old Age and the Implantable Cardioverter Defibrillator in Us Health Care," 7.

²² *Ibid.*, 9.

²³ Sharon R. Kaufman, *Ordinary Medicine: Extraordinary Treatments, Longer Lives, and Where to Draw the Line* (Duke University Press, 2015), 39-40.

the prospect of implantation prior to the informed consent process.²⁴ It can also be based in a sense of desperation and fear that death is imminent or what they, following fellow medical anthropologist Helen Chapple, call a culture of rescue and salvation ethos. But while this logic can carry patients and carers through implantation and the period immediately following what Barg et al see as ironic is that LVADs, “can rescue a patient from severe symptoms and even death, but [] not save a patient from living in a liminal state.”²⁵

The notion of liminality refers to the ambiguous condition of passing from one social status to another. Consistent with other uses of the term in the literature on health and illness, Barg et al describe the suspension of LVAD patients in a condition of neither health nor critical illness.²⁶ Such a condition is not uncommon or entirely unexpected during therapy or recovery, although liminal periods tend to be relatively bounded. Acute and sustained states of liminality have been remarked upon in the context of cancer treatment and remission, and conditions for which prognoses are long-term or difficult to foresee.²⁷ Similarly, in an effort consonant with my own, Jackie Leach Scully has begun to sketch a notion of therapeutic liminality – that is, caused by therapy – using LVADs as a key example.²⁸ Medical sociologist Holly Standing and colleagues consider the liminal existence of people who have received a VAD as a bridge-to-transplantation measure. Perhaps unsurprisingly, many of these patients regard time with the device as an arduous waiting period which is untenable in the long-term and endured solely for the prospect of transplantation.²⁹ Given that demand for transplant hearts outstrips supply, many patients will ultimately not reach this motivating telos.

Adjustment to life with an artificial heart is precarious and can break down unexpectedly. Standing et al offer the story of one patient who after having “got our heads around living with the VAD” forever, then contracted a life-threatening infection and was listed for an urgent heart transplant. On the basis of this kind of instability, Standing et al claim that “the liminality experienced by VAD recipients may be best conceived not as a state in itself, but rather the loss of a fixed state.”³⁰ Barg and colleagues focus particularly on destination therapy uses of LVADs. Patients’ sense of their

²⁴ Frances K. Barg et al., “LVAD-DT: Culture of Rescue and Liminal Experience in the Treatment of Heart Failure,” *The American Journal of Bioethics* 17, no. 2 (2017): 6.

²⁵ *Ibid.*, 9-10.

²⁶ *Ibid.*, 7.

²⁷ Miles Little et al., “Liminality: A Major Category of the Experience of Cancer Illness,” *Social Science & Medicine* 47, no. 10 (1998): 1492-93.

²⁸ Jackie Leach Scully, “Response—a Commentary on Miles Little Et Al. 1998. Liminality: A Major Category of the Experience of Cancer Illness. *Social Science & Medicine* 47(10): 1485-1494,” *Journal of Bioethical Inquiry* 19, no. 1 (2022): 50-53.

²⁹ Standing et al., “‘Being’ a Ventricular Assist Device Recipient: A Liminal Existence,” 144-45.

³⁰ *Ibid.*, 145.

artificial heart as a decisive *deus ex machina* appears to last for up to two years following implantation. After this two-year period, Barg et al observe that “the LVAD can change from a heroic, miracle device to a needy machine that can be perceived as a form of disability.”³¹ For them, an ostensible therapeutic destination is uncomfortably juxtaposed with demanding ongoing medical management.

Patients also report a dependence on and constant concern about their artificial heart devices which can turn to feelings of powerlessness and loss of autonomy, leading one informant to suggest that with an LVAD, “You’re not as free as you used to be.”³² One restriction of living with an artificial heart frequently cited by patients and carers is the need to carry significant weights and volumes of equipment to support the device’s operations. A patient expresses a fear of going away, partially because it means leaving carers who are able to help them but also because “first of all you have to take so much stuff with you. It’s almost not worth it to me.”³³ Social worker Ruth Halben records a narrative from a patient who invites readers to, “Imagine carrying a nine-pound computer as a 90-lb person who hasn’t walked for more than a month, you will get the picture.”³⁴ Paediatrician and phenomenologist Michael van Manen reports of a child with a VAD backpack that, “The backpack is not that heavy, but it is a constant weight.”³⁵ The hardware of an artificial heart is a literal burden to their bearers.

It is not only the weight of an artificial heart which is restrictive. Percutaneous drivelines require new daily routines and lifestyle changes, such as avoiding submersion in water. Aside from these conscious and discrete adjustments, patients are also tethered in their everyday movements by their drivelines. One paediatric patient says, “The driveline is just a little short, so it’s a little hard to just put it down. Like in class, I just don’t have quite enough slack to hang it off the chair to get comfortable.” Another admits,

Sometimes the VAD really does get in the way. I cannot reach to help with laundry or carry heavy things because I feel the pull on the driveline. I try to be active by doing things like sit-ups, but if I stretch in the wrong way, it can really hurt. I guess it kind of holds me back.³⁶

³¹ Barg et al., “LVAD-DT: Culture of Rescue and Liminal Experience in the Treatment of Heart Failure,” 7-8.

³² Ibid.

³³ Ibid., 7.

³⁴ Halben, *Heart 2 Heart: Stories from Patients with Left Ventricular Assist Devices*, 41.

³⁵ Van Manen, “The Ventricular Assist Device in the Life of the Child: A Phenomenological Pediatric Study,” 798.

³⁶ Ibid.

An adult patient describes to Casida and colleagues that the length of the artificial heart driveline determines how disturbed their sleep is: "... the cord has to be long enough so that I can get into the bathroom; otherwise, I have to disconnect from the machine and put the batteries back on."³⁷

Longer drivelines generate a different set of challenges as tangle hazards which protrude into the general flow of patients' activities. Biomedical engineer Heinrich Schima and colleagues report 20 percent of their informants had unintentionally disconnected a vital cable at least once. 67 percent of this group attributed this to their own carelessness and 19 percent reported a disconnection while changing clothes.³⁸ Nursing researchers Linda Marcuccilli and colleagues note concerns from artificial heart bearers that device components, particularly drivelines and batteries, get in the way of sexual activity.³⁹ Ko et al observe that some patients feel uncomfortable in everyday activities as a result of obtrusive devices, particularly driving and sleeping.⁴⁰ The main solution to this set of problems suggested by a similar team, Dunn et al, is to mount devices in the bearer's skull, at the postauricular position.⁴¹ This would better secure lines, keep the area immediate in front of the bearer clear, and mitigate the risk of tissue damage leading to infection at the entry site. But nursing researchers Alessia Trenta et al also report driveline obstruction issues in patients with postauricular connectors, who attach their driveline to their pillow in order to turn their head more comfortably at night.⁴²

Patients and carers are acutely aware of a responsibility to guard their devices from external disturbances or shocks. Van Manen's paediatric narratives speak to this concern. One says, "I tend to brace my arm around my bag that carries the battery and controller. I clench onto it when I am out"; another, "You always remember that [the artificial heart is] there, and it's something that you are always aware of, and you are cautious about it. So, it is never like, oh I forgot I had this really." After a doctor attempted to take one patient's VAD carry bag: "He didn't know my VAD was in there, and my dad and I freaked out and we like just grabbed the bag and pulled it back closer."⁴³ Patients and

³⁷ Casida et al., "Lifestyle Adjustments of Adults with Long-Term Implantable Left Ventricular Assist Devices: A Phenomenologic Inquiry," 515.

³⁸ Heinrich Schima et al., "Usability of Ventricular Assist Devices in Daily Experience: A Multicenter Study," *Artificial Organs* 38, no. 9 (2014): 753.

³⁹ Linda Marcuccilli et al., "Sex and Intimacy among Patients with Implantable Left-Ventricular Assist Devices," *Journal of Cardiovascular Nursing* 26, no. 6 (2011): 508.

⁴⁰ Keum Hee Kimmi Ko et al., "What Really Matters? Understanding Quality of Life Determinants Impacting Ventricular Assist Device Stakeholders," *ASAIO Journal* 66, no. 6 (2020): 630.

⁴¹ Dunn et al., "Human Factors and User Experience Issues with Ventricular Assist Device Wearable Components: A Systematic Review," 2444.

⁴² Trenta et al., "Self-Care in Adults with a Retro-Auricular Left Ventricular Assist Device: An Interpretive Description," 556.

⁴³ Van Manen, "The Ventricular Assist Device in the Life of the Child: A Phenomenological Pediatric Study," 798, 95, 96-97.

carers both are vigilant to any potential threats to the device and acutely aware of the patient dependence on its safety and operation. Barg et al provide an adult patient view that, "I'm always concerned about the tube, with the four wires in it, because it looks fragile, the wires are very small and it moves with the bag."⁴⁴

The overall comportment of patients and carers is marked by a certain alertness to and defensiveness of the peripersonal space surrounding the bearer. Limits and interference relating to the physical dimensions of artificial hearts affect the motor dispositions of device bearers. Strategies such as careful component design or assisted adaptation might help to mitigate these obstacles. But the cumulative effect of these changes can be compared to the comportment described by the feminist theorist Iris Marion Young as displayed by women in the patriarchal historical settings of advanced urban, industrial and commercial societies of the late twentieth century. In contrast to the unencumbered, idealised phenomenology offered by Merleau-Ponty, Young describes a phenomenology marked by ambiguous transcendence, inhibited intentionality, and discontinuous unity. While each of these qualities might be considered in the context of artificial heart devices, Young suggests that female body-subjects posit an existential enclosure outside the strictly lived or phenomenal body to which movement is restricted. She argues the feminine body is "*positioned* by a system of coordinates which does not have its origin in her own intentional capacities."⁴⁵

A similar inhibited intentionality is displayed by bearers of artificial hearts. Young's account is mostly descriptive, but it also suggests that the source of this comportment, more akin to the phenomenology expected of objects than subjects in classical phenomenological accounts, is social. For her, others regard women with an objectifying attitude, leading women to actively take up their bodies as mere things.⁴⁶ The source of the artificial heart bearer's inhibited intentionality is no doubt substantially social. Perceptions of bearer fragility in domestic and public settings is clearly taken up by patients and carers. However, the inhibited intentionality generated by artificial hearts is likely also partly material. By the time of implantation most patients will have already experienced some of the losses which Toombs' ascribes to illness, including losses of wholeness and freedom to act. The need for care in relation to devices is real, a fact that is impressed upon, emphasised and reinforced to patients and devices in treatment centres in the name of patient safety. Standing et al give the example of a patient frustrated that motor intentional changes have also caused their family role to change, or in this case collapse:

⁴⁴ Barg et al., "LVAD-DT: Culture of Rescue and Liminal Experience in the Treatment of Heart Failure," 8.

⁴⁵ Young, "Throwing Like a Girl: A Phenomenology of Feminine Body Comportment Motility and Spatiality," 151.

⁴⁶ Ibid., 154.

I can't play with the bairn [child] properly, she can't jump on us, stupid little things, it's the small things that you wouldn't have thought would get to you that do⁴⁷

Such changes may be necessary. Clinician appeals to avoid activities associated with trauma are deliberately geared to produce a certain inhibited intentionality which is protective of the patient's treatment and, it follows, the patient's life. How instructions to avoid risk are received by and manifested in patients and carers are unpredictable. Balancing genuine caution with enhancing the life priorities of patients and carers, and particularly preserving those abilities and activities which are most meaningful for them, is of great importance.

6.2 Human-machine relations

Don Ihde articulates a phenomenology of human-machine relations arising from “embodied technics”, or the use of technological artefacts such as tools and devices. Ihde outlines three relations, each of which might be of interest in relation to medical devices. The one he describes as the hermeneutic relation, however, is perhaps most germane to artificial hearts and their associated systems. A hermeneutic human-machine relation takes a machine either to be or to produce something like a text about the world. Ihde gives the example of gauges displaying the functioning of a heating system for a building. By experiencing these machine-gauges, one can be relieved of the need to visit the various rooms and check their temperature. In this case, the machine provides ready and convenient access to an aspect of the world already within our grasp. Machines can also disclose previously inaccessible parts or understandings of the world, including the workings of the machine itself. Since these cannot be verified by ordinary experience, machine interpretations of themselves and the world are epistemically productive. Hermeneutic human-machine relations can both convey and create knowledge.

Bjørn Hofmann and Fredrik Svenaeus elaborate a typology of ways in which medical technologies can create, alter or shape illness. Their account includes a broad range of technologically motivated changes, from the announcement of physiological markers causing patients to experience their bodies as newly ill or vulnerable; to digital and wearable technologies that run from the management of illness to the promotion of health.⁴⁸ Part of Hofmann and Svenaeus's typology covers the modification of illness experience by medical technologies. Some of their examples include required – that is, medically indicated – therapeutic technologies such as pharmaceuticals and insulin pumps

⁴⁷ Standing et al., “‘Being’ a Ventricular Assist Device Recipient: A Liminal Existence,” 143-44.

⁴⁸ Bjørn Hofmann and Fredrik Svenaeus, “How Medical Technologies Shape the Experience of Illness,” *Life Sciences, Society and Policy* 14, no. 1 (2018): 8.

which display blood sugar measurements.⁴⁹ Annemarie Mol considers blood glucose monitoring to create self-monitoring regimes and tighten self-regulation.⁵⁰ Federica Lucivero and Lucie Dalibert consider a point-of-care technology, an ingestible sensor called the Nanopil, the results of which must be relayed to and from clinicians.⁵¹ Self-tracking technologies have been considered from a postphenomenological perspective by Yoni Van Den Eede.⁵² Deborah Lupton extensively considers the sociological consequences of quantification.⁵³ In general, however, the phenomenology of compulsory, unmediated, and patient-facing medical technologies, such as artificial heart devices, and the representations which accompany them is less well developed.

6.2.1 Interpreting cardiology

As I mentioned in Chapter 1, most phenomenologists of health and illness argue that the internal or visceral body is largely inaccessible to perception. Richard Zaner describes the internal organs as forming the “body uncanny” with which we are implicated despite never having visibility of its processes.⁵⁴ Drew Leder describes sensation in the recessive body as blunt, spatially ambiguous and spatiotemporally discontinuous since visceral responses to stimuli are not usually perceived immediately or with much precision.⁵⁵ I concur that it is not usually possible to understand the activity or state of the viscera at a given moment through ordinary perception. However, I will continue to try to show that the visceral body, or at least the cardiac and circulatory elements of the visceral body, are far richer in both direct and indirect percepts and phenomenological effects than this picture supposes. Cardiac interiority and integrity, rate and rhythm, judgements of bodily ability and other phenomena are within the grasp of ordinary, albeit sometimes prereflective, perception.

A diverse range of cardiological technologies aim at illuminating the state of the heart. Most basically and recognisably, the stethoscope is used to assist with auscultation of the heart and lungs. It enhances the audibility of the heart rhythm or blood flow. It can be used with or without the sphygmomanometer or blood pressure cuff, by which a patient’s systolic and diastolic blood flow can

⁴⁹ Ibid., 4-5.

⁵⁰ Annemarie Mol, “What Diagnostic Devices Do: The Case of Blood Sugar Measurement,” *Theoretical Medicine and Bioethics* 21, no. 1 (2000): 13-14.

⁵¹ Federica Lucivero and Lucie Dalibert, “Should I Trust My Gut Feelings or Keep Them at a Distance? A Prospective Analysis of Point-of-Care Diagnostics Practice,” in *Bridging Distances in Technology and Regulation*, ed. Ronald Leenes and Eleni Kosta (Oisterwijk: Wolf Legal Publishers, 2013), 156.

⁵² Yoni Van Den Eede, “Tracing the Tracker: A Postphenomenological Inquiry into Self-Tracking Technologies,” in *Postphenomenological Investigations: Essays on Human–Technology Relations*, ed. Robert Rosenberger and Peter-Paul Verbeek (Lanham: Lexington Books, 2015), 144-51.

⁵³ For example, Deborah Lupton, *The Quantified Self* (Malden: Polity, 2016).

⁵⁴ Zaner, *The Context of Self: A Phenomenological Inquiry Using Medicine as a Clue*, 47-55.

⁵⁵ Leder, *The Absent Body*, 39-49.

be detected and quantified. Hofmann and Svenaeus observe that this quantification can make the very idea of hypertension appear.⁵⁶ Primarily, though, these technologies clarify, rather than constitute, conditions which are already within the reach of ordinary perception. Other technologies both clarify and create. Cardiac monitoring displays and records heartbeats which are frequently already sensible to perception, as well as usually imperceptible electrical activity across the rest of the cardiac cycle. Monitoring devices include clinic-based electrocardiography (ECG/EKG) equipment as well as portable, personal, and wearable devices. Technologies in clinical settings make novel opportunities to understand and interpret cardiac states available, predominantly to clinicians and technicians. Echocardiograms (ECGs) use ultrasound technologies to investigate beneath the breastbone and map and measure the heart. Invasive cardiac catheters can monitor internal pressures and haemodynamics ordinarily unfelt by patients.

Whether clarifying perceptible states or isolating and expressing aspects states beyond ordinary perception, medical technologies act to view, measure and ultimately resolve visceral affairs into determinate representations. Such measurements and determinate representations are essential to most aspects of modern medicine. Australian cardiologists distinguish between Heart Failure with reduced- or preserved-Ejection Fraction (HFrEF/HEpEF) based on calculations of the ratio of blood volume emptied with each systole.⁵⁷ Electrophysiological interventions are planned on the basis of EKG recordings. Any number of pharmacological prescriptions are based on concerns that physiological markers are either signs or the actual stuff of pathology. Successful medical and surgical interventions are borne out as much, perhaps more, by bringing these markers into line with agreed ranges than they are the amelioration of patient suffering or experience. Contemporary medicine, along with contemporary science and technology, produces and depends on a veritable library of these propositional representations of physiology. These representations enable and guide therapy, and greater and more accurate access to these representations arguably expands the reach and efficacy of medicine. These and other representations are produced and resolved in the processes of assessment, planning and preparation for the implantation of an artificial heart.

Artificial hearts also produce new information and representations particular to the devices themselves which are made available to clinicians, technicians, and patients. Artificial heart systems comprise both internal pumping mechanisms and external controllers which monitor, manage and regulate functions of the device. Systems vary, but controllers typically display some combination of

⁵⁶ Hofmann and Svenaeus, "How Medical Technologies Shape the Experience of Illness," 9.

⁵⁷ Atherton et al., "National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand: Guidelines for the Prevention, Detection, and Management of Heart Failure in Australia 2018," 1135.

pulse rate or pump speed; fill volume, rate of blood flow or cardiac output; and power usage. VADs may also show information relating to the interaction of device and patient anatomy such as pulsatility index, an indirect measure of organic ventricular function. Some of these figures, such as flow rates, are calculated using relationships between other measurements tracked by the system rather than measured directly.⁵⁸ As well as showing these measurements on the unit, controllers can interface with separate terminals primarily for use by clinicians and technicians to review real-time and historic data and program new haemodynamic parameters. Finally, battery supplies and power reserves are displayed, principally for use by patients and carers in judging when batteries should be exchanged or charged.

The representations selected for clinical and technical reasons to be presented on artificial hearts can come to be priorities or preoccupations in everyday life. A focus on these outward-facing representations is, in some ways, deliberate: an awareness of and attention to battery levels and power consumption of an artificial heart is vital for patient safety, and sudden and spontaneous changes in representations may signal a problem which requires urgent investigation. These are necessarily medicalised. But the representations chosen by device designers and medical technicians to summarise the functioning of the device may accrue an oversized significance in a patient's circulatory or health narrative. The information produced and presented by artificial hearts can come not only to inform an understanding of circulation but to shape it, even to be reduced to it. As Lupton notes of visualisations related to tracking devices, data may come to be viewed as more credible than bodily sensations.⁵⁹ Further, Hofmann and Svenaeus argue that technologies can prompt reinterpretations of experiences to try to reconcile them with representations.⁶⁰

The replacement of organic sensations with sharply defined measurements of mechanical operation, which can be accessed both immediately and continuously, heralds a new epistemic relationship with one's body. In the previous chapter, I considered the implications of artificial hearts along the axis of incorporation; how devices which replace, displace and redistribute the heart can transform understandings of interiority and exteriority. Artificial hearts, which abolish, take control of, or supplement visceral sensations, challenge interiority in both material and metaphorical ways, shifting the heart's centre of gravity to outside the body. This balance is also affected along the axis of intentionality, where the resolution of visceral states into definite representations challenges the very method of understanding interiority in favour of the method usually only employed to

⁵⁸ Alexander L. Medvedev et al., "Unlocking the Box: Basic Requirements for an Ideal Ventricular Assist Device Controller," *Expert Review of Medical Devices* 14, no. 5 (2017): 397.

⁵⁹ Deborah Lupton, *Digital Health: Critical and Cross-Disciplinary Perspectives* (Abingdon: Routledge, 2018), 102.

⁶⁰ Hofmann and Svenaeus, "How Medical Technologies Shape the Experience of Illness," 5.

understand exteriority. The visceral state which is usually only weakly or obliquely perceived is brought into precipitous relief. If these representations are taken to be sincere and accurate reflections of circulatory status, if we conflate machine status with bodily status, they provide a new form of knowledge about oneself. They supplement or even replace the disclosure of bodily states through interoception with crystalised propositions, extending and potentially transforming self-understanding.

6.2.2 Zero-point to 0-datapoint

This transformation of self-understanding by medical metrics is a central theme for many phenomenologists and philosophers of health and illness. Jean-Paul Sartre noted the potential for metric understandings of the body to undermine first-person or lived experience in favour of what he called being for the Other.⁶¹ Martin Heidegger considered this to have the ability to “destroy the body as body”.⁶² The move from prereflective interoception to reflection on representations in the context of self-understanding and bodily alienation is one significant concern. Crowding out the lived body as the locus of intentionality, the zero-point of perception, is another. Merleau-Ponty identifies the body with the subject, the body-subject. In attempting to understand if there is a doctrine of the subject in Canguilhem’s work and, if so, what it might comprise, Alain Badiou paraphrases a formula frequently cited by Canguilhem and attributes to him the view that “The subject is the ensemble of functions which resist objectification.”⁶³ Neither Canguilhem nor Badiou are phenomenologists or philosophers of the subject, but I have earlier described the compatibility of Canguilhem with Merleau-Ponty. Another matter of convergence might be the priority of living over science, relation over proposition.

For Merleau-Ponty, intentionality, the way in which the body-subject becomes aware of and relates to the world, is described in terms of motor or operative intentionality. Motor intentionality indicates that the prereflective awareness of a body-subject is shaped, originally and principally, by the range of motor or action possibilities available to it. Motor possibilities are determined by what Merleau-Ponty calls the intentional arc, which unifies “our past, our future, our human milieu, our physical situation, our ideological situation, and our moral situation”.⁶⁴ Motor intentionality combines the lived body through which we are accustomed to act, including the skills and habits we

⁶¹ Jean-Paul Sartre, *Being and Nothingness: An Essay on Phenomenological Ontology*, trans. Sarah Richmond (Abingdon: Routledge, 2018), 474.

⁶² Martin Heidegger, *Zollikon Seminars* (Evanston: Northwestern University Press, 2001), 170.

⁶³ Alain Badiou, “Is There a Theory of the Subject in the Work of George Canguilhem?,” in *The Adventure of French Philosophy* (London: Verso, 2012), 47.

⁶⁴ Merleau-Ponty, *Phenomenology of Perception*, 137.

have acquired, and the physical and medical reality of our objective body. As Gabrielle Benette Jackson shows the balance of each of these elements in motor intentionality is a matter of some scholarly debate.⁶⁵ But this debate does not need to be settled for it to be prudent to exercise caution about the evacuation of a certain kind of subjective perspectival zero-point and the elevation of a certain kind of objective null-datapoint.

6.2.3 Interrupting transparency

Merleau-Ponty's references to our ideological and moral situations and the human milieu in its totality speak to the important existential quality of Merleau-Ponty's phenomenology. These aspects of the intentional arc, and indeed significant parts of Merleau-Ponty's phenomenological and other writings, suggest that the perception of possibilities is shaped by an interplay between phenomenology and social constructivism. Examination of this complex relationship is beyond this study, but some consideration of socio-cultural influences on phenomenology is made by Hofmann and Svenaeus in their typology of how illness can be shaped by technology.⁶⁶ The ideological aspect of the intentional arc can also be expressed at a personal level as the projects, convictions and, in the case of artificial heart devices, preoccupations of an individual body-subject. The motor possibilities which appear along the intentional arc are those which the body-subject not only has the ability and opportunity to perceive but also those to which they are presumptively oriented, and which persist among a cacophony of competing solicitations. The ways in which motor possibilities appear and are taken up has been explored by philosopher Hubert Dreyfus, who outlines a concept of absorbed or skilful coping.

By absorbed coping, Dreyfus understands a system in which body-subjects execute motor actions without any need for reflection. He interprets Merleau-Ponty's claim that "[T]o move one's body is to aim at things through it; it is to allow oneself to respond to their call, which is made upon it independently of any representation" as entailing a distinction between the imperative of an appropriate action and any sense of the consequences or success of that action.⁶⁷ The implication is that absorbed coping "does not require that the agent's movements be governed by an intention in action that represents the action's success condition" but instead "is led to move so as to reduce a sense of deviation from a satisfactory gestalt".⁶⁸ Taken together, absorbed coping expresses a system of action which is not planned out and premeditated to achieve a certain imagined outcome. Rather,

⁶⁵ Jackson, "Maurice Merleau-Ponty's Concept of Motor Intentionality: Unifying Two Kinds of Bodily Agency," 771-72.

⁶⁶ Hofmann and Svenaeus, "How Medical Technologies Shape the Experience of Illness," 6-7.

⁶⁷ A slightly different translation is at Merleau-Ponty, *Phenomenology of Perception*, 140.

⁶⁸ Hubert L. Dreyfus, "A Merleau-Pontyan Critique of Husserl's and Searle's Representationalist Accounts of Action," *Proceedings of the Aristotelian Society* 100 (2000): 293.

coping involves a flow of responses to possibilities, perceived as solicitations, present in a given situation. Such a system operates entirely prior to reflection and deliberation and without any conscious intervention or guidance. At various points Dreyfus emphasises that explicit, conscious reflection will tend to stand in the way of skilful coping.⁶⁹

Komarine Romdenh-Romluc largely agrees with Dreyfus's reading of motor intentionality as absorbed coping. She agrees that once engaged by a solicitation, a body-subject will tend to unreflectively adapt their movements to cope with the unfolding of the situation. However, she wonders by what mechanism the body-subject initially engages with a solicitation and how, while absorbed and impelled by a series of motor anticipations, they might disengage from a certain trajectory of coping. Romdenh-Romluc argues that these two bookends of absorbed coping, start and finish, are managed by abstract thought and decision-making. They can be achieved by a person reckoning with the motor possibility of an imagined situation and drawn towards those imagined potentialities.⁷⁰ Dreyfus's response to Romdenh-Romluc is to insist that it is not necessary to supplement coping with abstract thought. Rather, the absorption in absorbed coping is never total. In any engagement, the body-subject remains prereflectively aware of alternative ways of coping and tasks or projects on the outer horizon of current situation, for which they might adjust or abandon a current engagement.⁷¹ The demand for reflection implied in representation disrupts the transparent fidelity of the body-subject's horizons.

One of Dreyfus's other key contributions in phenomenology is a model of skill acquisition in which a person moves from basic propositional and reflective ways of knowing through more advanced form of absorbed and prereflective understanding. His resistance to explicating a role for abstract thought in absorbed coping is not just because he feels it is already implied. The guidance of action and perception by propositional knowledge, the kind associated with abstract thought, is correlated with a certain novice distance. A continued reliance on representations will constrain a body-subject's coping. Eventually, an expert will ensure that "what transparently *must* be done *is* done."⁷² This model builds on, among other things, Dreyfus's interpretation of Samuel Todes's phenomenology.⁷³ In this interpretation, determinate conceptual representations come only at the end of an action, resolved either by their achievement, failure or by adopting an attitude of non-engagement.

⁶⁹ "Merleau-Ponty and Recent Cognitive Science," 234.

⁷⁰ Komarine Romdenh-Romluc, "The Power to Reckon with the Possible," in *Reading Merleau-Ponty on Phenomenology of Perception*, ed. Thomas Baldwin (London: Routledge, 2007), 53-56.

⁷¹ Hubert L. Dreyfus, "Reply to Romdenh-Romluc," *ibid.*, 65-67.

⁷² "From Socrates to Expert Systems: The Limits of Calculative Rationality (1985)," 34-36.

⁷³ "Todes's Account of Nonconceptual Perceptual Knowledge and Its Relation to Thought," 93-96.

Representations are the residue of a motor solicitation, something that comes after and outside, not before or during, a body-subject's engagement with it.

The appearance, reappearance or compulsory presentation of representations, such as by those constantly announced by artificial hearts, can interrupt coping. To some extent, such disruption and preoccupation is a deliberate outcome of device design. Patients and carers are expected to be alert to the operation of their artificial heart. Serious issues will command their attention, either by the onset of symptoms of device failure or announcement by device alarms, but device representations can spontaneously also intrude into patients or carers' awareness. Nursing researcher Jessie Casida observes patients and carers can be permanently vigilant about the figures and statuses displayed on device controllers, including during otherwise immersive activities such as sex.⁷⁴ This permanent vigilance can overthink or force unwarranted meanings from representations. Industrial designer Jessica Dunn and colleagues associate the constant reference to artificial heart indices with user experiences of fear.⁷⁵ Their advocacy of an ambient solution for patients to check the status of their device, such as a watch, highlights one very physical dimension of data obtrusion.⁷⁶ Design researcher Keum Hee Kimmi Ko and colleagues observe that carers can adopt strategies of recording and tracking device-related measurements to mitigate anxiety, but these strategies themselves tend to contribute to burnout.⁷⁷

6.3 Conclusion

Motor intentionality describes the possibilities which are open to a body-subject and the ways in which those possibilities might be realised, shaped by the many factors envisaged in the intentional arc. I have tried to show that the illness which indicates the implantation of an artificial heart, typically heart failure, already changes the motor possibilities of a body-subject. Interventions aimed at adapting patients to new relationships to the world are likely to be more successfully normalising than those which seek to rehabilitate prior relations. Within a restorative treatment frame, the normalising potential of artificial hearts is limited both by practical efficacy and by the static cardiac output which devices are programmed to produce. Artificial hearts bearers are restricted in their movements by the literal limits of external components and the inculcation in patients of an

⁷⁴ Jessie Casida, "The Lived Experience of Spouses of Patients with a Left Ventricular Assist Device before Heart Transplantation," *American Journal of Critical Care* 14 (2005): 149.

⁷⁵ Dunn et al., "Human Factors and User Experience Issues with Ventricular Assist Device Wearable Components: A Systematic Review," 2442.

⁷⁶ *Ibid.*, 2447.

⁷⁷ Ko et al., "What Really Matters? Understanding Quality of Life Determinants Impacting Ventricular Assist Device Stakeholders," 632.

existentially bounded, positional spatiality rather than a more expansive, situational spatiality. I have also shown that artificial hearts disrupt the prereflective relation of the body-subject to their own body and the world. New, reflective representations about internal cardiac states can crowd out important interoceptive experience and interrupt prereflective coping.

These motor intentional consequences of artificial hearts are important for patients to understand, particularly when seeking therapy aimed substantially at responding to the degradation of their motor possibilities. Artificial hearts tend to move patients from a state of illness to a state of liminality. It is also important for physicians, nurses and other healthcare professionals assisting patients with artificial hearts to accept that not only are these devices not a cure, but that they generate distinct motor intentional challenges for patients which an attitude of cure will tend to exacerbate. Artificial heart phenomenology provides an additional impetus for engineers to seek to develop dynamic or physiologic devices which are capable of being responsive to patient's real-time cardiac requirements. Patients, social workers and psychologists, designers and engineers will benefit from consideration of the potentially disruptive implications of representing internal cardiac states. Meanwhile, patients and carers and their physicians should be mindful of the intellectual, epistemic, emotional, and existential work which is created and required of patients by their participation in the artificial heart and healthcare systems.

CHAPTER 7: TEMPORALITY

The previous chapter considered motor intentionality and the body-subject's comportment to the spaces of the world. Beneath this architecture of solicitations is its temporalisation. Temporality is a basic concern of phenomenology. As I discussed in Chapter 1, Merleau-Ponty provides a particular account of the prepersonal and anonymous temporalisation of the body-subject. In this chapter, I return to some of Merleau-Ponty's comments on temporality and the organs, especially the heart. These comments gesture to an important role for the viscera in the temporalisation of the body-subject, but fail to specifically elaborate this role. I supplement these comments with a reading of María Zambrano, whose complementary description of the heart brings out more clearly the ways in which the heart can be both prepersonal and connected to personal circumstances. I consider some plausible interpretations of the heart's role in temporality and locate both phenomenological and empirical support for them. Anthropologist Stefan Helmreich claims of the heart that the electrophysiology of the heart "can tune us into new ways of making connections between very small scale presents and long-term promissory futures".¹ I explore this claim by considering how artificial heart devices can affect temporality in the short, medium, and long terms.

In the short-term, I argue that empirical research in neuroscience suggests a role for the heart and the pulse in the fine-grained flow of subjective time. Cardiac rhythm may provide a means by which the body-subject is temporally situated or anchored and suggests that changes to it might effect a certain disorientation. Artificial hearts may supplement, replace or compete with existing intrinsic cardiac rhythms and bring about changes in temporal perception and sedimented temporality at the granular or short-term scale. In the medium-term, I argue that the dependences and requirements of artificial hearts, and the new expectations artificial hearts generate for their bearers, create new ways of structuring days and weeks such that temporality comes to resemble the habits and routines of the machine. In the long-term, the uses of artificial hearts mean that prospective and current recipients of artificial hearts tend to be held in perpetual anticipation. Implantation, explantation, replacements and upgrades are terms not only of technical processes, but also of becoming. Artificial hearts offer new possibilities of long-term becoming in which the body-subject transforms into a disconnected figure arrested in a never-ending or asymptotic present.

As I noted in Chapter 1, Merleau-Ponty criticises Husserl for positing an absolute stream of time which is not constituted by a living subject.^{2,3} Merleau-Ponty argues that the field of presence for

¹ Helmreich, "Potential Energy and the Body Electric: Cardiac Waves, Brain Waves, and the Making of Quantities into Qualities," S140.

² Husserl, *Ideas: General Introduction to Pure Phenomenology*, 165.

³ Zahavi, *Husserl's Phenomenology*, 86-88.

such a time has no thickness, since thickness – the quality of having horizons of a retained history and a protended future – can only belong to embodied subjects.⁴ Mark S. Muldoon observes that Merleau-Ponty marks out the phenomenal body as “the datum where time authentic to our existence will arise.”⁵ For Merleau-Ponty, time is a dimension of the body-subject and its prereflective engagement with the world. He makes clear that, “my body takes possession of time and makes a past and a future exist for a present”.⁶ It is the “thickness of the pre-objective present, where we find our corporeality” that constitutes and keeps apart our temporal horizons.⁷ That is, the body and the body-subject itself anchors these horizons in a prereflective, prepersonal way and, with it, brings time and temporality into existence.

The organs are among these pre-personal conditions of temporality, but the place of the heart remains unclear. Merleau-Ponty claims that when in danger, awareness of our body can be erased in favour of an anonymous “pre-personal adhesion to the general form of the world”.⁸ The body-subject relies on its organs, which are “taken for granted, and to which I entrust the care of keeping me alive”.⁹ In performing their functions independent of reflection or volition, these “stable organs” make space for human freedom.¹⁰ Among these organs is the heart, which Merleau-Ponty singles out from this general description of organic anonymity to suggest a more nuanced and personal role. He claims that temporality in general shares with the heart the quality of “passive synthesis”: that

I am not the author of time, any more than am I the author of my own heartbeats, nor am I the one who takes the initiative of temporalization; no matter what I do, once I am born, time flows through me.¹¹

At the same time, the heart is in the organism in the same way the body is in the world – which I take to mean actually and co-nascently – and that “... even reflexes have a sense, and the style of each individual is still visible in them just as the beating of the heart is felt even at the periphery of the body.”^{12,13} Another construction of this analysis might be that the body-subject’s temporal horizon is

⁴ Al-Saji, “The Temporality of Life: Merleau-Ponty, Bergson, and the Immemorial Past,” 177-90.

⁵ Muldoon, *Tricks of Time: Bergson, Merleau-Ponty and Ricoeur in Search of Time, Self, and Meaning*, 136.

⁶ Merleau-Ponty, *Phenomenology of Perception*, 249.

⁷ *Ibid.*, 457.

⁸ *Ibid.*, 86. Merleau-Ponty also cites here Antoine de Saint-Exupéry, an insightful reading of which can be found in Eran Dorfman, “Overwriting the Body: Saint-Exupéry, Merleau-Ponty, Nancy,” *Continental Philosophy Review* 49, no. 3 (2016).

⁹ Merleau-Ponty, *Phenomenology of Perception*, 86.

¹⁰ *Ibid.*, 89.

¹¹ *Ibid.*, 451.

¹² *Ibid.*, 209.

¹³ *Ibid.*, 87.

felt in the rhythm of the heart. The beating of the heart is a present which “secretly feeds” the body. It is the felt phenomenon by which the body-subject recovers and lives its specific past.¹⁴ The heart stands out as neither prepersonal nor personal.

Merleau-Ponty’s account must be supplemented to clarify the relationship between the prepersonal temporality of the organs and the personal temporality of actual visceral and cardiac conditions. Despite being contemporaries there is no evidence to my knowledge that Merleau-Ponty and phenomenologist María Zambrano knew about or read each other’s work. As I argued in Chapter 3, there are affinities between Merleau-Ponty and Zambrano in philosophical manners, matters and methods, particularly a shared belief in the value of metaphor. Zambrano’s extended inquiries into the metaphorical meaning of embodied experience, for which her full and vivid “The Metaphor of the Heart” is exemplary, can be brought into communication with the body-subject and supplement his account of the heart. An additional source of sympathy is the work of phenomenologist Max Scheler. Karolina Enquist Källgren and Íngrid Vendrell Ferran have noted the significance of Scheler’s thought to Zambrano and, indeed, Spanish philosophy more broadly.¹⁵ Jonna Bornemark notes Scheler’s influence on Merleau-Ponty’s account of intersubjectivity and draws a particular parallel between their phenomenologies as descriptions of the fetal development of the heart.¹⁶

Two key themes emerge from Zambrano’s treatment of the heart. First, the heart is prereflectively, transparently implicated in actual and existing beings. Second, the heart is correlated with sound and motion. Both Zambrano and Merleau-Ponty regard the heart as a site of the co-naissance of the individual and the world, mutually constitutive but also entirely involuntary since dwelling and perceiving follow inevitably from living itself. Living provides an originary situation for the individual and the world, and so cannot be reduced to the reflective logic of the world. Its priority and its irreducibility – its place as a condition of perception rather than a percept – makes it transparent or, in a term employed by both thinkers, secret. Despite being divorced from the will of its bearer, this temporalising secret is revealed in its actual and personal expression – the sounds and motions of the heartbeat which dimly but inescapably set and reset the horizons of being – and which can and do vary according to actual and personal circumstances. The combination of Merleau-Ponty’s and Zambrano’s analyses helps to bridge the gap between the prepersonal and the actual conditions of the body-subject, and thus to consider the effects of visceral change on temporality.

¹⁴ Ibid.

¹⁵ Karolina Enquist Källgren and Íngrid Vendrell Ferran, “Scheler and Zambrano: On a Transformation of the Heart in Spanish Philosophy,” *History of European Ideas* 48, no. 5 (2022).

¹⁶ Jonna Bornemark, “The Genesis of Empathy in Human Development: A Phenomenological Reconstruction,” *Medicine, Health Care, and Philosophy* 17, no. 2 (2014): 263-68.

Two sections – Section II and Section VIII – of Zambrano’s essay *The Metaphor of the Heart* are representative of the coextension of Merleau-Ponty and Zambrano’s understanding of temporality. In Section II, Zambrano focuses on the heartbeat. She begins by drawing attention to the unique audibility of the heart. She emphasises the life-sustaining function of the heartbeat with reference to its sonic aspect, not its circulatory one. In fact, it is clear that Zambrano regards the heartbeat not only as nutritive, but also imperative. The heartbeat commands its bearer to live and *a fortiori* to be. It is the phenomenon by which one is “condemned to proceeding”. The procession to which one is condemned is to move in tune with the earth and to inhabit time. In this way, it parallels the mysterious natality of Merleau-Ponty’s temporality in which “once I am born, time flows through me.”¹⁷ What Zambrano’s essay offers in addition is a plausible candidate for the very form and manner of that flow, written into the bodily motions of the heart:

Because the inalienable sound of which man is the bearer is his original rhythm, or cadence, when time is not traversed in monotony or in a vacuum. But only this single rhythm inhabits time in its extension and internalizes it, so as to revitalize it.¹⁸

On the one hand, the heartbeat’s continuation without pause refers simply to the physiological link between circulation and life: it reflects its bearer’s continued living. On the other hand, it is this particular rhythm in this particular world, rather than in a vacuum, which is felt and heard to be the bearer’s original rhythm. These observations make a step towards reconciling prepersonal and personal temporality, by emphasising the actuality of their circumstances and by noting the heart rhythm’s expression in real and audible phenomena.

Zambrano also notes that the heartbeat’s constant and unbroken instruction to life also contains “the gift of the vacuum which is necessary for the emergence of what lies there waiting to master the face of the present”. I take this vacuum, which Zambrano also calls an “imperceptible pause... like a breath for man”, to be the gap between heartbeats. The diastole prepares the heart for the systole, which carries its bearer into the present. This period of latency resembles the description of temporal expectation outlined by Eugène Minkowski. Expectation causes one to wait for the future to approach and “englobes the whole living being, suspends his activity, and fixes him, anguished, in expectation. It contains a factor of brutal arrest and renders the individual breathless.”¹⁹ With each new heartbeat, each contraction or systole, the heart’s bearer is brought once again to the present and thrust forward into a future. Zambrano’s poetic idea that the heartbeat prepares its bearer to

¹⁷ Merleau-Ponty, *Phenomenology of Perception*, 451.

¹⁸ Zambrano, “The Metaphor of the Heart,” 988.

¹⁹ Minkowski, *Lived Time: Phenomenological and Psychopathological Studies*, 87.

engage with the present may be echoed in neuroscientific studies. According to some studies, subjects appear to better and more accurately perceive – Zambrano might say ‘master’ – stimuli when presented at cardiac systole than diastole.²⁰

Later, in Section VIII of her essay, Zambrano announces the difficulty of a reflexive analysis of the heart, since it cannot or will not reduce itself to an external view. Instead, “It is secluded, almost transparent, in a kind of revelation of its own interiority” given to itself not to know or analyse, but to feel.²¹ The heart is entirely prereflective. It strives to maintain this ambiguous quality even when paired with reason: “Together, intelligence and the heart form that being which, able to reveal its being without any reflection at all, beats and encourages–without seeing itself reflected in anything...”²² This beating and encouragement shows up through what is otherwise the heart’s silence. This is the method by which it “keeps a secret without concealing it”. The proof of the revelatory silence of the heart is “the way in which time passes without being noticed”. This closely parallels Merleau-Ponty’s view that heartbeat denotes a present whose immediate horizons “secretly feed” the specific past that is our body.²³ In what follows, I consider how it is that this secret might feed the temporality of the body-subject.

Cardiophenomenology is a recent attempt to reconcile first-person experience with apparent visceral and neurological correlates of consciousness. Phenomenological thought is increasingly engaged with psychology and neuroscience through a family of related approaches to cognition known collectively as 4E: embodied, embedded, extended and enactive. One prominent concept in these approaches is neurophenomenology, originally developed by Francisco Varela, which aspires to map subjective experiences onto scientifically observable neural phenomena. Natalie Depraz and Thomas Desmidt have attempted to bridge what they see as an incommensurability of scale in the two elements of Varela’s neurophenomenology by suggesting what they call cardiophenomenology. Under this approach, correlations are instead sought at “the cardiovascular level of emotional dynamics of lived experience” which they claim is capable of furnishing both organic, third-person and lived, first-person data “based upon one unique pre-conscious experience”.²⁴ They outline a number of ways in the heart-system and other viscera “creates the inner dynamics of the living body

²⁰ Sarah N. Garfinkel et al., “Fear from the Heart: Sensitivity to Fear Stimuli Depends on Individual Heartbeats,” *The Journal of Neuroscience* 34, no. 19 (2014): 6578-81.

²¹ Zambrano, “The Metaphor of the Heart,” 991.

²² *Ibid.*, 992.

²³ Merleau-Ponty, *Phenomenology of Perception*, 87.

²⁴ Natalie Depraz and Thomas Desmidt, “Cardiophenomenology: A Refinement of Neurophenomenology,” *Phenomenology and the Cognitive Sciences* 18, no. 3 (2019): 496.

and gives access to affective-embodied cognition.”²⁵ They draw an analogy between the heart and the unified body-subject and the phenomenal and objective bodies, to indicate how affectivity relates the physical and the phenomenal.

Ultimately, Depraz and Desmidt argue that the heart and the organs more generally provide an affective background prefiguring the orientation of the brain toward action. They make primary use of Husserl’s temporal dynamics of retention and pretension, but they emphasise that their method was anticipated by Merleau-Ponty.²⁶ They note while teaching at the College de France, Merleau-Ponty offer a hypothesis of “pre-neural dynamics” based on the work of embryologists of the time, observing that

At nine and a half weeks, the principal aspects of the human electrocardiogram area present in the same way as in the adult state. Yet at this date, there is no nervous control of the heart.²⁷

What they suggest, and the phenomenological reading they support, is one in which the heart establishes a preconscious, pre-personal affective background of the body-subject’s existence. Importantly, this is background is a dynamic one – a temporal one -- set within a field of presence necessarily bounded by past and future and changing in response to physical conditions. Cardiophenomenology help to decrypt the secret of how the viscera feeds temporality in a way which is at once personal and physical, and prepersonal and phenomenal.

Alternative interpretations of temporality ascribe greater importance to the physical and sensible aspects of the viscera. William James explored a theory for the perception of time. His temporality holds two ideas in tension: that the perceived present is formed by the subject, and that it is composed of empirical sensations. His interest in experience aligns James with Henri Bergson, whose thought Christian Dupont argues was a precursor to the French reception of Husserl.²⁸ In fact, the model for time which James offer is reminiscent of the field of presence characteristic of phenomenology. For him, time is perceived in the accumulation of discrete and contrasting durations. He argues that the “specious present” has a certain duration, stretching into past and future, such that the “the practically cognized present is no knife-edge, but a saddle-back.” Unified durational events can, however, be sectioned or subdivided into individual beats of sensation. People

²⁵ Ibid., 501.

²⁶ Ibid., 504.

²⁷ Maurice Merleau-Ponty, *Nature: Course Notes from the College De France*, trans. Robert Vallier (Evanston: Northwestern University Press, 2003), 148.

²⁸ Christian Dupont, *Phenomenology in French Philosophy: Early Encounters* (Dordrecht: Springer, 2014), 53.

then spontaneously organise these beats into rhythms in order to precisify their judgements of time. The more separate sensations within a certain duration, the longer the perceived time. James supports his theory with reference to experimental psychology of his time.²⁹

James claims that “we have no sense for empty time”. He argues that time cannot be perceived or judged over a period totally devoid of stimulus or variety.³⁰ His explanation for any seeming sense for such time is that duration is never truly empty, and he cites approvingly the poet Alfred, Lord Tennyson’s image of “time flowing in the middle of the night”. James argues that “the twilight of our general consciousness” is filled with sensations generated by rhythmic physiological processes, among which are respiration, heartbeat and involuntary pulses of attention.³¹ He stops short of reducing temporality entirely to sensation and physiology, but he does insist that there is an inextricable correlation between the two. These “inward sensible series” are always felt. Though they might be overshadowed by more prominent external stimuli, they constitute a minimum viable awareness of change and thus undergird our temporality. New efforts in the tradition of experimental psychology further elucidate the ways in which the body enables the flow of time. In what follows, I track more recent research to confirm and clarify the relationship between the personal conditions of the heart and temporality.

7.1 Short-term: Bodily rhythm

The links between physiology and temporality continue to be tested by researchers of interoception. Interoception is the subjective sense of the physiological condition of the body. It relates to afferent signals – information oriented to and running towards the brain – from the internal body and organs. Proprioceptive signals from skin and muscles are sometimes also included under the interoceptive umbrella. An inadequate understanding of the extent of afferent processes in the early and mid-twentieth century resulted in the mainstream belief that the principal function of interoception was the autonomic maintenance of homeostasis, without bearing on lived experience.³² Interoceptive research, especially psychological research, was relegated to the fringes. As physiological evidence of afferents improved, interest in interoception began to recover. By the 1980s, interoception once again became a domain for interdisciplinary research on matters as diverse as perception, self-perception, alimentary conditions, fear responses, pain, and temporality. A marked shift in the concerns of contemporary interoception researchers from homeostasis to

²⁹ William James, “The Perception of Time,” *The Journal of Speculative Philosophy* 20, no. 4 (1886): 386.

³⁰ *The Principles of Psychology*, vol. 1 (New York: Henry Holt and Company, 1918), 619.

³¹ “The Perception of Time,” 388.

³² Dieter Vaitl, “Interoception,” *Biological Psychology* 42, no. 1 (1996): 2.

awareness or experience has even prompted a proposal from Drew Leder for a phenomenology of interoception.³³

Cardiac interoception, or cardioception, has been central to interoception research. Referring to felt sensations of the heart and physiological information originating in the heart, cardioception is studied for its own sake, but it has also been adopted as a standard proxy for interoceptive awareness more generally. Heartbeat counting and monitoring tasks dominate interoception research. The use and reliability of cardioception as any sort of measure is contested, owing to the difficulties in distinguishing between genuine interoception and non-interoceptive processes. For example, participant reports about whether they have felt or counted heartbeats may be affected by preestablished beliefs about their heartrate.³⁴ Depending on the scope of any interoceptive study, the decision to categorise heart sensations as being detected within the heart or on the skin may also be controversial.^{35,36} Notwithstanding these complications, an expansive literature has suggested correlations between cardioception and intuition, learning and memory, body image, and more.^{37,38,39} Some studies suggest that low interoceptive awareness is a cause of self-objectification, a finding which could have wider implications for phenomenology.⁴⁰

One of the richest veins of cardioception research has been the heart's influence on our perception of time. A prominent researcher of this topic, neuropsychologist Marc Wittmann, offers an account strikingly close to James's notion that bodily processes underpin and give substance to time. A contemporary version of James's basic theory relating beats of sensation to judgements of duration is known as the pacemaker-accumulator model. Wittmann's research occurs in the context of a variant of this model in which beats are added to perceived duration only when attention is directed to them. He claims "The more attention paid to the passage of time, the longer duration is

³³ Drew Leder, "Inside Insights: A Phenomenology of Interoception," in *The Interoceptive Mind: From Homeostasis to Awareness*, ed. Helena de Preester and Manos Tsakiris (Oxford: Oxford University Press, 2018).

³⁴ Olivier Desmedt, Olivier Luminet, and Olivier Corneille, "The Heartbeat Counting Task Largely Involves Non-Interoceptive Processes: Evidence from Both the Original and an Adapted Counting Task," *Biological Psychology* 138 (2018): 187.

³⁵ S. S. Khalsa et al., "Bolus Isoproterenol Infusions Provide a Reliable Method for Assessing Interoceptive Awareness," *International Journal of Psychophysiology* 72, no. 1 (2009): 42.

³⁶ Couto et al., "The Man Who Feels Two Hearts: The Different Pathways of Interoception," 1254.

³⁷ Dunn et al., "Listening to Your Heart: How Interoception Shapes Emotion Experience and Intuitive Decision Making."

³⁸ Gaby Pfeifer et al., "Feedback from the Heart: Emotional Learning and Memory Is Controlled by Cardiac Cycle, Interoceptive Accuracy and Personality," *Biological Psychology* 126 (2017).

³⁹ Giorgia Zamariola et al., "Can You Feel the Body That You See? On the Relationship between Interoceptive Accuracy and Body Image," *Body Image* 20 (2017).

⁴⁰ Vivien Ainley and Manos Tsakiris, "Body Conscious? Interoceptive Awareness, Measured by Heartbeat Perception, Is Negatively Correlated with Self-Objectification," *PLoS One* 8, no. 2 (2013): 7.

experienced.”⁴¹ In an experiment in which subjects describe and estimate the time spent in an isolation float tank, completely removed from external stimuli, he found that subjects experience time passing very slowly yet underestimate the time spent in the tank. Wittmann reads this as the undiluted and particularly intense experiencing of time.⁴² With Karin Meissner, he hypothesises that “attending to time” is equivalent to “attending to bodily signals.”⁴³

A greater capacity to attend to interoceptive signals, for which the heartbeat is a yardstick, seems to be associated with better judgements of duration. Wittmann and Meissner argue this may result from better access to visceral feedback.⁴⁴ Subjects with greater awareness of their heartbeat appear to be better at synchronising their heartrate with experimental intervals; that is, understanding phases of duration as multiples of their cardiac cycles.⁴⁵ Accurate perceivers of time tend to mark time according to their heart rhythm. Relatedly, interoceptive awareness is correlated with heartrate variability. Heartrate variability is a measure of the ability of the heart rate to change and is associated with activity of the vagus nerve. A prompt response to new demands on the heart corresponds to high vagal tone, whereas a delay in varying the heartrate constitutes low vagal tone. Higher vagal tone seems to contribute to interoceptive and temporal awareness, possibly because vagal tone is associated with attentional efficiency.^{46,47} More specifically, the deceleration of the heart rate and its quick return to an intrinsic or resting rhythm is correlated with more accurate judgements of time.

The importance of vagal tone may be that temporality is founded on the intrinsic rhythm of the heart. Wittmann claims that “Because I have a body, I perceive the passing of time. Physiological processes over time provide a temporal reference for processes in the external world.”⁴⁸ As I discussed in Chapter 1, the body-subject avoids having to reappraise the world at each moment by relying on the transparent fidelity of their horizons. As Al-Saji observes that habit bypasses the need

⁴¹ Marc Wittmann and Karin Meissner, “The Embodiment of Time: How Interoception Shapes the Perception of Time,” in *The Interoceptive Mind: From Homeostasis to Awareness*, ed. Manos Tsakiris and Helena de Preester (Oxford: Oxford University Press, 2018), 65.

⁴² Marc Wittmann, *Felt Time: The Psychology of How We Perceive Time*, trans. Erik Butler (Cambridge: MIT Press, 2016), 132.

⁴³ Wittmann and Meissner, “The Embodiment of Time: How Interoception Shapes the Perception of Time,” 68.

⁴⁴ Karin Meissner and Marc Wittmann, “Body Signals, Cardiac Awareness, and the Perception of Time,” *Biological Psychology* 86, no. 3 (2011): 293.

⁴⁵ Olga Pollatos et al., “How Much Time Has Passed? Ask Your Heart,” *Frontiers in Neurobotics* (2014): 7.

⁴⁶ Nicola Cellini et al., “Heart Rate Variability Helps Tracking Time More Accurately,” *Brain and Cognition* 101 (2015): 62.

⁴⁷ Gwonhi Park and Julian F. Thayer, “From the Heart to the Mind: Cardiac Vagal Tone Modulates Top-Down and Bottom-up Visual Perception and Attention to Emotional Stimuli,” *Frontiers in psychology* 5 (2014): 6.

⁴⁸ Wittmann, *Felt Time: The Psychology of How We Perceive Time*, 133.

for synchronisation between body-subject and world.⁴⁹ The body-subject whose heart returns swiftly to its resting or intrinsic rhythm is on firmer grounds for judging time than one who must navigate the relatively unfamiliar territory or elevated or depressed heart rates. Proposing a theory for a physiological basis for emotion, developed only a short time before his theory of time, James glibly remarked “That the heart-beats and the rhythm of breathing play a leading part in all emotions whatsoever, is a matter too notorious for proof”.⁵⁰ Similarly, upon being told about the search for the internal clock, Wittmann recalls a friend’s curt response: “That’s obvious: the heart.”⁵¹ A growing body of evidence substantiates the heart’s role in temporality.

7.1.1 Arrhythmia

Disorders of electrophysiology can detach heart rates and rhythms from the needs of the body. Ordinarily, heart rate and rhythm are responsive to moment-to-moment circulatory demands, such as nutrition and oxygen requirements. Heart rate increases to cope with physical exertion, stress conditions or anticipations of needs based on stimuli. Conversely, heart rate returns to a base rate when individuals are at rest. These responses are generally involuntary and automatic, and the constant adjustment of heart rate is a principal function of the autonomic nervous system. High levels of heart rate variability and vagal tone are correlated with health. They represent an exemplary instance of vital normativity, insofar as they enable their bearer to adapt to demands and milieus as required. The disconnection of heart rate from circulatory requirements is usually either a sign of some exogenous disruption, such as when lowered by a beta blocking medication or increased by a stimulant such as pseudoephedrine, or a symptom of a functional disorder of the body. Heart rate and rhythm disorders include cardiac arrhythmias in which heart rhythms are irregular, and those which are ineffective because they are too fast, called tachycardias, or too slow, called brady- or brady-cardias.

Patient narratives provide some insight into the phenomenological experience of arrhythmia. The broadest patient narratives are available through patient groups, such as the Arrhythmia Alliance.⁵² Others are made available by treatment providers or manufacturers of therapies such as pacemakers, and turn quickly to clinical details and expressions of gratitude for clinical intervention.⁵³ Such

⁴⁹ Al-Saji, “A Past Which Has Never Been Present”: Bergsonian Dimensions in Merleau-Ponty’s Theory of the Prepersonal,” 66.

⁵⁰ James, “What Is an Emotion?,” 192.

⁵¹ Wittmann, *Felt Time: The Psychology of How We Perceive Time*, ix.

⁵² Arrhythmia Alliance, “Patient and Carer Stories,” Arrhythmia Alliance, <https://www.heartrhythmalliance.org/aa/uk/patient-stories>.

⁵³ For instance, Penn Medicine (<https://www.pennmedicine.org/for-patients-and-visitors/find-a-program-or-service/heart-and-vascular/cardiac-arrhythmia/patient-stories>),

narratives must be read with a degree of circumspection. Nonetheless, patient stories do record the way in which arrhythmias occur and resolve spontaneously and indicate relief when patient reports are finally verified and believed after being captured in the clinic or by medical technologies. Many describe the more severe consequences of their arrhythmia such as shortness of breath, exhaustion, loss of consciousness and fear of sudden death. Depending on the arrhythmia, patients might describe a pounding or a fluttering in their chest, or extra or missed heartbeats. In the case of irregular rhythms which vary in pattern as well as rate, heartbeats may be triggered along multiple, conflicting electrophysiological pathways in the heart. In some of these cases, patients describe the heart as competing against or being out of synchronisation with itself.

Patients make use of intuitive temporal terms to describe their heart, such as racing or slowing. Importantly, the implication is not merely that the heartrate has increased or decreased but rather the heartrate and the heart is too fast or too slow *in relation* to the patient. This disjunction might also be expressed in terms of a spatially displacement: that is, racing ahead of or dropping behind the patient. Occasionally, a patient will make this subject-object relation explicit, such as one video narrative from a woman suffering from an unspecified supraventricular tachycardia (SVT):

... it would happen, it would be really, really fast, almost like it's out of sync, and then it would get back in sync maybe after less than a minute, then I would just kind of have to stop, catch my breath and, like, let myself catch up to my heart, if that even makes sense...⁵⁴

Although frequently less serious than ventricular arrhythmias, insofar as they are rarely immediately life-threatening and can sometimes be managed without significant medical or surgical intervention, SVTs are symptomatically typical of cardiac arrhythmias.

Such an account illustrates the phenomenal consequence of a desynchronisation of the heart and the patient across the varieties of arrhythmia. Arrhythmias tend to be interpreted by those who experience them as thematising or bringing the heart to attention. The augmentation of the sound and motion of the heart, seemingly without cause, results in the heart losing its transparency. There is little comforting about being able to attend to the heart more directly. Its sporadic and unpredictable nature often destabilises patients' confidence in their feelings about their bodies and health including, of course, their cardioception. Meanwhile, arrhythmia remains totally invisible to others. These factors contribute to the relief felt by patients when their sense of cardiac distress is affirmed, confirmed and documented by clinicians. It also has the effect of bifurcating the temporality of the patient. Sedimented temporality is slower when it is compared to a fast, tachycardic heartrate. The

⁵⁴ Aileen.M, "SVT Attack | My Experience with Supraventricular Tachycardia," (YouTube, 2017).

body-subject feels personal time speeding past a depressed, bradycardic heart rate. This profoundly disorienting desynchronisation between lived and visceral time is a source of distress as patients are torn between two apparent timelines. Attempts to reconcile timelines are played out in corrective strategies such as attention to breathing and meditation.

7.1.2 Replacing rhythm

There is no place for rhythm, nor the temporality it implies, when the heart is considered under the device paradigm. As I have discussed in previous chapters, the device paradigm describes the way a device is constructed, both conceptually and artefactually, with the concentrated aim of delivering a certain commodity. In a medical context, the commodity of the heart is its biological function defined in relation to certain goals of physiology and medicine. The paradigm function of the heart is its circulatory one, by which it pumps blood around the body. The circulatory function both constitutes and exhausts the heart under the paradigm, stripping it of surplus or extraneous phenomenal relations. Artificial heart devices exclude the phenomenal described above insofar as they are inessential to effective circulation. While the originator of the device paradigm, Albert Borgmann, argues that devices usually conceal the machinery responsible for producing a commodity, artificial heart devices are different. Artificial hearts certainly shrink the heart to its commodity, but they do so in a way which reverses its prior transparency and renders it visible and obvious.

Mechanical assistance circumvents the organic pacemaker and introduces a new, alternative cardiac rhythm independent of the heart's intrinsic electrophysiology. Artificial hearts remove rather than conceal what goes beyond the purely circulatory aspects of the heart. Depending on the device, artificial hearts may require the removal of significant organic material, replacing it with a pair of electrically or pneumatically actuated pumps. Devices are connected to the major arteries and veins, but not to the organic electrophysiological architecture. Artificial hearts constitute an entirely new basis for the heart rhythm. These devices are programmed externally. Their operating parameters – stroke or fill volume, cardiac output and pressures – are monitored and their rhythm and rate set through companion devices called controllers. Early artificial heart technologies were extremely loud. Current generation devices are far quieter. Continuous-flow devices are usually audible, but lack an obvious rhythm. Pulsatile devices remain audible and can often be felt by a patient through the motion and sound of the device and vibrations of the driveline on their skin. The rhythm of these

devices establishes a new stimulus which, according to Couto et al, can dominate interoceptive input from the existing, endogenous heartbeat.⁵⁵

Most artificial heart devices are not responsive to their bearer's circumstances. Artificial heartrate is defined manually by clinicians and technicians. Some models enable manual adjustments on-the-fly by technicians or by patients switching between preprogrammed static options. Even serial adjustments of this type cannot be genuinely dynamic to the momentary needs of patients. Shifts in circulatory demands, such as those occasioned by exercise, are accommodated by fixing the heartrate at a level higher than required at rest. Even with a higher rate, devices are constrained by a reduced stroke volume: that is, the amount of blood collected and ready to be circulated at any time.⁵⁶ It is possible to imagine that these issues might be resolved by advances in device engineering. Such a thing as artificial heartrate variability might permit stroke volume and cardiac output to be linked with metabolic demands. Even assuming this can be achieved in the long term, there remain difficulties in reconciling the physiological body not only with exogenous electrophysiology but exogenous haemodynamics as well.

As in the case of organic cardiac arrhythmias, the non-responsivity of the artificial heartrate is a cause of differentiation between circulatory temporality and lived temporality. So too do the new sounds and motions of the artificial heart distinguish themselves from the cardiac organ. Pulsatile devices sensed on the skin of patient portends the possibility of an entirely new mechanism of cardioception, and also new background resonances and conditions for the patient, who will have to become habituated to the loud operation of a pump and its various alerts and forms of warning. The other type of device, a continuous-flow device, is attended by its own distinctive sounds and movements. Powering and operating the controller of a continuous-flow device is of varying audibility and has its alerts, but continuous-flow devices are characterised by an absence of heartbeat. Blood is spun or rotated through the implanted device, leading to the disappearance of the percepts of circulation. However subtle may be a patient's usual interoceptive awareness, the heartbeat of a continuous-flow device is conspicuous in its absence.

What a patient feels and believes to be their native heartrate may still be important, even when supplemented or supplanted by an artificial rhythm received from an artificial heart device and defined by physicians and technicians. Extrinsic pacing already routinely occurs using artificial pacemakers. There is some evidence that a patient's sense of heartrate may remain intact, because

⁵⁵ Couto et al., "The Man Who Feels Two Hearts: The Different Pathways of Interoception," 1258.

⁵⁶ Justin M. Canada et al., "Exercise Capacity in Patients with the Total Artificial Heart," *ASAIO Journal* 65, no. 1 (2019): 39.

cardioception may be influenced more by prior beliefs about their heartrate than the actual facts of the matter. This suggestion has been made most starkly in an experiment by cognitive psychologist Sabine Windmann and colleagues in which patients' estimates of their heartrates remained largely the same even when their artificial pacemakers were set to drastically different rates.⁵⁷ The implication, that perceptions of heartrate are substantially independent of actual conditions, may be the result of the treatment of heartrate as one monolithic thing. Subsequent heartbeat counting studies have distinguished between interoceptive accuracy, sensibility and awareness.⁵⁸ Nonetheless, beliefs about heartrate do seem to be important. These may point to the priority of sedimented and prepersonal ways of being which have been established in and are expected by the body-subject.

Sedimentation cannot, however, permanently fortify the body-subject against objective or worldly changes. In line with Merleau-Ponty, I concur that sedimentation provides a prereflective and prepersonal starting point for the body-subject's perceptions and expectations. It grounds the transparent fidelity on which the body-subject relies to live in the world. But I argue that the body-subject is engaged with and never completely isolated from its present personal conditions. Worldly conditions are capable of eroding what is sedimented or of being a source of disjunctive desynchronisation from prepersonal temporality. The new rhythm and stimulus of the artificial heart may be one such source of desynchronisation. In their play *Timon of Athens*, William Shakespeare and Thomas Middleton have a poet remark of a painting that "It tutors nature. Artificial strife / Lives in these touches livelier than life".⁵⁹ Like the painting which tutors nature, so too might the touches and strokes of artificial hearts first displace and then remake visceral temporality according to its own rhythm. More than just the excision of the organic heart, artificial hearts may effect the excavation of sedimented interoception.

7.2 Medium-term: Machine routines

7.2.1 Temporary possibilities

As I discussed in Chapter 3, medication regimens, maintenance or charging requirements for medical devices, and periodic diagnostic appointments and engagements all have their temporal demands. Havi Carel notes that the capacities of her ambulatory oxygen tanks limit excursions away

⁵⁷ Sabine Windmann et al., "Dissociating Beliefs About Heart Rates and Actual Heart Rates in Patients with Cardiac Pacemakers," *Psychophysiology* 36, no. 3 (1999): 339.

⁵⁸ Garfinkel et al., "Knowing Your Own Heart: Distinguishing Interoceptive Accuracy from Interoceptive Awareness," 65-67.

⁵⁹ William Shakespeare and Thomas Middleton, *Timon of Athens: The Life of Timon of Athens* (Oxford: Oxford University Press, 2004), 173.

from her home, in which spare oxygen is stored, to three hours.⁶⁰ Medical anthropologist Tanisha Jowsey has identified four categories of temporal structure in chronic illness. These include calendar or clock time, and three others sometimes grouped together as lived time: biographical time, past-present-future time; and inner time, which includes physiological rhythms. Jowsey observes that these lived times can become tethered to other temporal structures. HIV patients, for example, must take antiretrovirals at specific intervals and must therefore eat or fast coincidentally with those intervals. Diabetics schedule mealtimes to fit insulin regimens.⁶¹ The temporality of illness and its management therefore has the capacity to reshape temporality of the body-subject over the short-term. As Merleau-Ponty might put it, illness can vary the weight of the day, or even the life-course.⁶²

Temporality is one half of what I have previously referred to as the spatiotemporal transformation of the world. In chapters 3 and 5, I considered how illness can be experienced as a spatiotemporal transformation of the world. In the previous chapter on motor intentionality, I sought to express what is spatial about the transformations of heart failure and of artificial heart therapy. Temporal aspects of these transformations include the timing or duration of the appearance of motor possibilities, and the continuity or punctuatedness of their performance. Some of these alternations are expressed in the narratives of patients on Ventricular Assist Devices (VADs). One patient notes the mix of positivity and trepidation at leaving hospital after a six month stay, and their experience of taking their BiVentricular Assist Device (BiVAD) outside the home:

The restaurants and movie theatre were very accommodating to seat us near an electrical outlet. Theaters have electrical outlets near handicapped seating. You see, my BiVAD compressor was the size of a small rolling suitcase, needed to be plugged in most of the time. There was only a small window of time to run on batteries.⁶³

The needs of the artificial heart devices define the appearance and disappearance of windows of possibility. The possibility of eating at a restaurant or watching a film at a cinema is bounded by the time required for the activity and the availability of infrastructure which might extend the standard time permitted to a patient for an outing. There would be no possibility of a theatre experience of more than a few hours unless the theatre afforded the opportunity to switch to mains power.

⁶⁰ Carel, *Phenomenology of Illness*, 73.

⁶¹ Jowsey, "Time and Chronic Illness: A Narrative Review," 1098.

⁶² Merleau-Ponty, *Phenomenology of Perception*, 439.

⁶³ Halben, *Heart 2 Heart: Stories from Patients with Left Ventricular Assist Devices*, 23.

Artificial hearts both shape and reflect the temporal horizons of their bearers. In his analysis of what he calls the “attached dependence” of VADs in the juvenile care setting, van Manen makes this explicit. He observes that devices,

[regulate] the awareness that the body has become temporally conscious and time dependent on the energy needed for the VAD to function... The battery measures the routine and vice versa.⁶⁴

I have previously explored some of the motor disruptions of solicitations caused by representations of physiological states given by artificial heart devices. The co-constitution of routine by body-subject and device also presages the temporal counterparts of disruptions of movement and action. One paediatric patient notes that, “The battery life [of the VAD] lasts about 4 to 6 hours so during the day we get into the habit of checking and changing the battery”. In the adult VAD cohort, a patient speaks to her habit of periodising time by checking her VAD controller:

It took me about three or four months to finally get used to this new life with the LVAD: carrying batteries and back up controller and batteries wherever I went; checking on the controller every half hour.⁶⁵

Artificial heart devices have an array of alarms and warning signals, relating to device safety and other diagnostic functions. One of the most frequently encountered alarms is the battery indicator. One child patient notes that, “The machine will actually automatically beep at you, and then it will show you like the bars on the battery.”⁶⁶ In attempting to switch power sources, a patient recalls an episode in which they “accidentally pulled out both batteries. It made this really loud screech kind of sound.”⁶⁷ In these cases, the device narrates both time and activity such that one adult patient admits, “It made me very anxious to hear any noise at all.”⁶⁸ After explantation, another says, “I vividly remember the beautiful silence; with the LVAD gone, there were no whirling or clicking noises.”⁶⁹ Rather than a background condition of experience, time is crystallised, quantified and announced by artificial heart devices and thematised by patients as a tangible, vital resource.

7.2.2 Renovating existing structures

⁶⁴ Van Manen, “The Ventricular Assist Device in the Life of the Child: A Phenomenological Pediatric Study,” 796.

⁶⁵ Halben, *Heart 2 Heart: Stories from Patients with Left Ventricular Assist Devices*, 44.

⁶⁶ Van Manen, “The Ventricular Assist Device in the Life of the Child: A Phenomenological Pediatric Study,” 796.

⁶⁷ *Ibid.*, 800.

⁶⁸ Halben, *Heart 2 Heart: Stories from Patients with Left Ventricular Assist Devices*, 42.

⁶⁹ *Ibid.*, 9.

Temporal transformation is not limited to the perception of possibilities out in the world. Artificial hearts also bring about significant temporal changes within body-subjects themselves. They particularly provide examples of new resonances for existing temporal structures, including sleep. Whereas in the daytime devices are powered by ambulatory battery packs, usually contained within a holster or in a backpack, batteries are recharged overnight and devices are typically attached to mains power. One adult patient explains:

Every few hours the batteries would have to be changed with new ones, while the old ones charged up in a stand-by unit and thus all this equipment has to be with me at all time.

While sleeping at night, I removed the batteries then plugged myself into the wall outlet.⁷⁰

I already explored in chapters 1 and 5 the ways in which artificial heart devices may and may not be incorporated into the situations and phenomenal bodies of patients. Regardless of whether artificial hearts reach the threshold of transparency for incorporation, patients explicitly connect the status of their devices with their own wellbeing. For example, patients metaphorise between the overnight recharging of the device batteries and their own rest and restoration. The battery becomes not only representative, but a surrogate for the fatigue and stamina of the bearer of the device with its gradual depletion through the day and overnight recharging.

The act of settling down to sleep has arguably always had an association with relief from labour or duty and hopes of awaking both revived and open to new possibilities. But the compline process of switching to mains power reifies these feelings. It provides a respite from the need to monitor battery levels, and the safety and sanctuary of a presumably constant supply of vital energy. One child VAD user notes. "At night time, we do not have to worry about batteries. At night time, I am plugged in."⁷¹ Rather than providing just the chance of a "good" sleep, after which one may or may not wake with renewed motivation, the material recharging of batteries provides a guarantee of new energy, at least in one meaningful sense. One patient, who felt that their VAD had improved their health and physical capacity, offers:

And with the increased energy and strength I kind of fantasized myself as one of those *Marvel* superheroes or a kind of *Robocop*. I would recharge the batteries to my pump each night, plugging them and myself into an electrical socket to keep the pump working, readying myself for the next day of action.⁷²

⁷⁰ Ibid., 71.

⁷¹ Van Manen, "The Ventricular Assist Device in the Life of the Child: A Phenomenological Pediatric Study," 796.

⁷² Halben, *Heart 2 Heart: Stories from Patients with Left Ventricular Assist Devices*, 57-58.

7.3 Long-term: Becoming

7.3.1 Preference for the present

The decision to go ahead with an artificial heart is taken after a lengthy period of assessment and planning by clinicians, patients and family. It is usually, though not always, preceded by a period of significant physiological decline. From the earliest stages of development, artificial heart devices have been employed principally as bridging devices: temporary measures to assist very ill patients with the process of healing and recovery; to be supported until an assessment and decision about heart transplantation can be made; or maintained until an appropriate donor heart can be located and assigned to them. The implantation of an artificial heart device is subject to a range of clinical considerations, and the many different models of devices are indicated and contraindicated for different circumstances. By the time of implantation of any artificial heart device, a patient has usually experienced significant turmoil, from health through different phases of illness and hospitalisation and decision-making in the face of substantial uncertainty. Each stage is occasioned by attempts at temporal recalibration prone to exhibit the disruptions of futurity documented by S. Kay Toombs.

The most important of these disruptions is a sense of the overwhelming priority of the present. Conditions of illness require patients to concentrate during the execution of actions in ways which isolate them from the forward flow of time. The present comes to dominate experience and obscure temporal horizons of past and future. For Toombs, “illness truncates experiencing”.⁷³ In Carel’s formulation, illness leaves “no space for anything else”.⁷⁴ Before patients with artificial heart devices are discharged from hospital, they and their families and carers must undergo thorough training to negotiate the device for daily use and maintenance. Patients and families develop strategies to accommodate the restrictions and requirements of devices, many of which are highly idiosyncratic to artificial heart devices, including those outlined above but also including those for carrying devices, washing while keeping devices dry, disinfecting their driveline site, and others. Attention to these new ways of coping with an artificial heart device accelerates patients’ habituation to them, and can even eclipse protensions of future interventions, even when subsequent interventions were central to initial indications for the device. One LVAD patient writes of being told a transplant heart had been allocated to him:

⁷³ Toombs, *The Meaning of Illness: A Phenomenological Account of the Different Perspectives of Physician and Patient*, 97.

⁷⁴ Carel, *Phenomenology of Illness*, 72.

Now understand, that by this time now, I had gotten used to dealing with my LVAD and just thinking about the ordeal I went through for that operation, didn't really make the thought of another operation seem very desirable. I actually told [the liaison nurse] that I didn't really want to do this now. I told her that I was OK living my life with these restrictions. She got very serious on the phone and said that there were hundreds of people waiting for years to get a young heart like this and I should NOT pass up this chance.⁷⁵

Only relatively recently has it become realistic for artificial heart devices to act as a final or destination therapy on which patients can be supported into the long-term or indefinitely. The majority of patients, for whom an artificial heart is a bridging technology, understand that its obsolescence is planned, although when their device might become redundant is usually only vaguely approximated. Artificial hearts are only one step along an illness pathway of uncertain length. And yet, given the significant gap between supply and demand for transplant hearts, transplantation often remains a distant hope rather than an immediate prospect. Even optimistic patients who fully expect to receive a transplant heart and have their device explanted must find ways of living with their device in the face of indeterminacy. In the case above, fear, anxiety, and a reasonable aversion to the trauma of reoperation make this way of living seem more appealing than risking the next stage of treatment. An artificial heart constitutes only one part of patients' interventional cascade, but it can come to preoccupy clinical attention.

Becoming habituated to the machine routine of an artificial heart does not necessarily mean that this stage of the therapeutic pathway becomes easy or stable. While a patient may forget, suppress or turn away from thoughts of future interventions, on the Merleau-Pontyan model extended by Toombs, their present continues to retain their past. One feature of this retention is an awareness that their current situation is a result of a therapeutic choice to which they have consented, informed by an awareness of, and oftentimes gratitude for, the development of artificial heart devices. This choice is informed by knowledge of therapeutic alternatives, including alternative devices, as well as an awareness that the technology for such devices has been in a state of continuous development and improvement over recent decades. The volitional grounding of therapeutic interventions and the iterative nature of medical device development, at least so-called high technology medical devices, means that the expanded present engaged in coping with an artificial heart is one which implicates the body-subject in an act of becoming.

⁷⁵ Halben, *Heart 2 Heart: Stories from Patients with Left Ventricular Assist Devices*, 72-73.

Illness turns the body-subject from background condition to thematised figure; from home territory to map. A number of phenomenologists have argued that a consequence of illness is a fuller thematisation of the body-subject, the diminution of its subjectivity and the augmentation of its objectivity, resulting in the alienation of a person from their most intimate conditions of embodiment. Phenomenological bioethicist Frederik Svenaeus reads these analyses collectively as pointing to an original state of being at home with one's body, homelikeness, which is disrupted by illness.⁷⁶ I argue elsewhere that alienation is not necessarily a feature of and does not help to explain temporality or identity in congenital illnesses. Instead, I suggest that congenital illness admits its bearer to a paradox of palliation, in which illness is both antagonist and treasure. Congenital illness patients may seek to mitigate illnesses more egregious infractions while at the same time guarding their ill body from abolition or erasure.⁷⁷ Though I resist the notion of alienation, I concur with the orthodoxy of phenomenology of health and illness that both the condition of illness and engagement with the healthcare system tend to thematise the figure of the body and the body-subject.

Toombs argues that pathogenic alienation can be aggravated by scientific and technological objectification in the course of diagnosis or therapy. Two aspects of her notion of illness as temporal disruption and truncation of experiencing, the predominance of the present and its disconnection from the future, combine to generate an enlarged decisional moment. In this expanded present, patient and clinician choices in respect of current therapies acquire a seemingly ultimate importance. That is, since the patient is stuck or suspended within the present, they may feel that additional activity is owed to their current stage of therapy and that decision-making in respect of the artificial heart device is or ought to be an open and ongoing process. Yet, while artificial hearts require ongoing maintenance, they are not typically modified without a clinical indication, such as device failure or reaching an explantation threshold like recovery or transplantation. Other reasons for intervening include serious complications, such as device infection or thrombosis, which may well warrant invasive surgery.

Artificial hearts have their own temporality. Minimally invasive exchange procedures for artificial heart devices have led to claims that "LVAD exchange should now always be discussed if upgrading to a new generation assist device would be beneficial for the patient."⁷⁸ Cardiac surgeon Jasmin Hanke and colleagues suggest the reduction of adverse events and longer battery hours as reasons to

⁷⁶ Fredrik Svenaeus, "Illness as Unhomelike Being-in-the-World: Heidegger and the Phenomenology of Medicine," *Medicine, Health Care, and Philosophy* 14, no. 3 (2011): 335-36.

⁷⁷ McConville, "Toward a Phenomenology of Congenital Illness: A Case of Single-Ventricle Heart Disease," 589-92.

⁷⁸ Jasmin S Hanke et al., "First Series of Left Ventricular Assist Device Exchanges to Heartmate 3," *European Journal of Cardio-Thoracic Surgery* 51, no. 5 (2017): 891.

consider upgrades. Device exchange is already common for pacemakers and Internal Cardiac Defibrillators (ICDs), largely due to the obsolescence of implanted batteries. Some leads and wires from these devices may be too difficult to remove and remain in the patient's body upon explantation or exchange. Artificial hearts are uncontroversially upgraded through non-invasive means such as firmware updates and the tuning of devices in clinical settings. The language of upgrading is meant to relate to the devices, but it is easy to imagine that a patient concerned with time might come to associate the temporality of their devices with their own temporal progress and becoming. Since devices implicate the body-subjects who bear them in their temporality, a patient's present may come to depend on their device's currency.

7.3.2 Resetting, resynchronising

The therapeutic pathways for which artificial heart devices are one stage, and the potentially evolving or iterative nature of that stage, make another aspect of Toombs's temporality pertinent. Toombs distinguishes between those who suffer the erosion or impediment of certain abilities and known ways of doing things, and those who never had those abilities in the first place. She argues that the task of relearning to interact with the world occasioned by degenerative and relaxing-remitting forms of illness may be more challenging than being congenitally without a capacity.⁷⁹ Jackie Leach Scully, too, notes that the progressive nature of certain disabilities or illness can prevent the assimilation of the condition into one's personal identity.⁸⁰ Planned pathways for non-destination therapy involve, at least, stages from health through physiological decline, temporary medical therapy, and temporary device therapy. Many will involve a prospect of transplantation. Each of these stages can themselves involve a number of discrete and distinct states of being. Actual and anticipated changes encountered along this pathway can result in the repeated resetting, resynchronising and reorienting of a body-subject place in the world.

Milestones of therapeutic pathways, and particularly the complex pathways of artificial heart therapies, can become milestones of biography. Device bearers regularly describe the different stages of their therapeutic pathways as lifetimes. Despite receiving an organic transplant after her artificial heart, one patient emphasises that the removal of her cardiac devices was the more significant marker of the end of her therapeutic pathway and the beginning of a new biographical stage: "That was the day that both the LVAD and defibrillator were removed from my body. That was the day my new life started."⁸¹ Another bridge-to-transplant LVAD patient describes something similar: "Life

⁷⁹ Toombs, "Reflections on Bodily Change: The Lived Experience of Disability," 251.

⁸⁰ Scully, *Disability Bioethics: Moral Bodies, Moral Difference*.

⁸¹ Halben, *Heart 2 Heart: Stories from Patients with Left Ventricular Assist Devices*, 44.

slowly started to return to normal, or what I considered my “new” normal after such a life-changing event.”⁸² Reminiscing with an acquaintance in comments attached to an online video, an LVAD patient says: “Good to hear from you after all these years! Wow, that was a lifetime ago. Hehehe... literally, for me!”⁸³ The use of ‘literally’ does not, presumably, signal a reference to his numerical life, nor is it merely emphatic. Rather, these different accounts point to the multiple temporal renovations occasioned by artificial hearts.

7.4 Conclusion

Temporality is a core concern of most, if not all, phenomenologists. The temporal conditions of the body-subject are writ into its embodied situation. Merleau-Ponty’s prepersonal temporality of the heart can be usefully supplemented with Zambrano’s account, which brings out more clearly the ways in which the heart can be both prepersonal and connected to personal circumstances. As a result, patient experiences reveal a number of important changes in temporality as a result of cardiac illnesses and interventions, including artificial hearts. These can occur across at least three scales. Short-term time perceptions are affected by changes in cardiac rhythm which are generated by all models of artificial heart. Medium-term changes come from restructuring days and weeks around the demands of machines. Long-term temporal changes occur over months or years as a result of patients’ objectification and suspension on a timeline or, just as often, loop of intervention resulting from uncertain clinical pathways and the research, development and deployment cycles of artificial heart devices.

Temporality matters because it is a fundamental dimension of experience. Illness is already temporally transformative in ways which, by definition, indicate remedy. The temporal changes which are enacted by artificial heart therapies must be weighed against the disruptions which they seek to repair. What I argue above suggests a need for life scientists to scrutinise the effects of heart rhythm abolition and change, and for engineers and designers to think of rhythm in broader terms than its haemodynamics. Greater attention should also be paid to ensuring that artificial hearts can be integrated into patients’ routines rather than the other way around, as well as closely considering the lifecycles of artificial hearts hardware and software in terms of the patient’s temporality. Artificial hearts are often prescribed by clinicians with reference to patients’ life- or health-spans, but not always to temporal distinctions more subtle than longevity. Perhaps most importantly, patients and carers should be aware of the ways in which the times made available to them by intervention will be

⁸² Ibid., 9.

⁸³ Life on Batteries, "Re: One Giant Stride (for Vadkind) - World’s First Open Water LVAD Scuba Dive," (YouTube, 2021).

defined, or refined, by their artificial heart devices. Whereas such conversations are expected to occur in the context of bridging devices, considerations of temporality are not always a feature of destination therapies.

CONCLUDING REMARKS

This dissertation is an exercise in phenomenological bioethics. Fredrik Svenaeus identifies the fundamental evaluative criterion for phenomenological bioethics as being whether a medical technology might “tend to block life-world concerns in order to prolong or even produce life as a goal in itself”. He also acknowledges that this criterion would need to be refined and developed for hard cases.¹ In my view, most medical devices fall into the category of hard cases. It can be difficult to clearly identify the contribution of medical devices to physiology and doubly challenging to isolate and evaluate their effects on lived experience. I sought early in this dissertation to develop an interpretation of medical devices based on Albert Borgmann’s device paradigm. The efforts of medical device designers tend to coalesce around specific biological or therapeutic functions derived from naturalistic biological models. Medical devices produce these functions as their commodity, in the sense of reducing them to just these functions. They strip away the context which usually accompanies this function as biologically extraneous and unnecessary. Just as the commodities of devices are separate to and independent of bodily and social context, the commodities of medical devices produce biological functions without their adjacent bodily correlates.

Grounded in this interpretation of medical devices, I considered the genre of medical devices which are artificial hearts. The biological and medical paradigm holds that the key contribution of the human heart is the circulation of blood around the body. Artificial hearts therefore seek to produce the commodity of circulation without regard for any of the phenomena usually associated with the heart. Whether the reduction of the heart and artificial heart to this commodity will tend to block the life-world concerns of patients and carers requires an extended study of what additional phenomena are produced by the heart, whether these are sacrificed or transformed by artificial hearts, and any collateral or sequel phenomena which might be introduced by artificial hearts. The post-transcendental phenomenology of the body-subject developed by Maurice Merleau-Ponty provides a useful framework for undertaking such a project. I began by extracting three key axes of analysis from the body-subject: incorporation, motor intentionality, and temporality. I supplemented these with resources from vital normativity, embodied metaphor, and phenomenology of health and illness. After providing some exposition, I applied these axes to the case of artificial hearts.

8.1 Analysis

8.1.1 Incorporation

¹ Svenaeus, *Phenomenological Bioethics: Medical Technologies, Human Suffering, and the Meaning of Being Alive*, 84.

In a chapter on incorporation, I showed that it is both a phenomenological issue and a clinical one. I outlined criteria for devices which have been indicated as part of medical treatment to be safely and sustainably brought into the body-subject: trust and safety, affective tolerance, and proprioceptive feedback. I showed that worries about complications from artificial hearts pose a direct challenge to the criterion for incorporation relating to trust and safety. In comparable ways to biological transplants, artificial hearts give rise to concerns about injury and infection which ought to be addressed in the context of device design. Artificial hearts also encounter barriers to the second criterion for incorporation, affective tolerance. Whereas biological transplants tend to give rise to concerns about feminisation, I showed that artificial hearts pose different gendered complications. Some of these complications relate to cultural perceptions of “cyborg” technologies. These could be addressed through a combination of sensitive design processes for devices and their accessories, and broader reforms aimed at redressing structural disparities in healthcare. Though I have not suggested changes here, these observations provide an intervention-level impetus for such reform.

The third criterion for incorporation is appropriate proprioceptive feedback. Most artificial heart devices operate according to rates and rhythms defined by clinicians, not the intrinsic or physiologic rhythm of the native heart. Pulsatile artificial heart device rhythms can be felt by a patient through vibrations on the patient’s abdomen. These rhythms can constitute a form of proprioceptive feedback from the device which may or may not be appropriate. A growing consensus among cardiologists, engineers and designers favour continuous-flow devices as the future of artificial hearts. Continuous-flow devices do not generate the kind of external vibrations observed to induce a heartbeat-like phenomenon. Since there is relatively little research on the effects of this kind of machine-generated cardiac rhythm and sensitivity to the heartbeat varies from patient to patient, proprioceptive feedback may or may not be a barrier to the incorporation of artificial hearts. Nonetheless, as far as I am aware, proprioceptive feedback has yet not been a consideration for device development. This matter deserves consideration by stakeholders.

In addition to these explicit considerations, I also considered the meaning of the heart as a passage between interior and exterior. Among heart-related idioms and meanings this theme is persistent, not least in expressive essays by Jean-Luc Nancy and María Zambrano. I drew on an early modern *noli me tangere* painting to connect this metaphorical meaning to the heart in its anatomy and materiality. This meaning is experienced by the body-subject viscerally and prereflectively. It is made possible by a certain passivity towards the sensations and resonances generated by the heart. The use of an artificial heart device interrogates the ambiguity of the heart, and of the body-subject. In doing so, it makes tangible and reflective what had previously been figurative and prereflective. The literal

displacement of the heart function from the torso to the head when artificial hearts are sited behind the patient's ear particularly questions the resonances of the heart as the locus of mediation between interior and exterior.

8.1.2 Motor intentionality

In a chapter on motor intentionality, I showed that incurable heart failure already changes the motor possibilities of a body-subject. These patients often suffer from bodily doubt caused by their body's failure to achieve things which used to be and still appear possible for it. It can be more beneficial for patients to be normalised to new possibilities which reflect their health and illness status, rather than to try in vain to rehabilitate prior relations which their continued illness disallows. Artificial hearts can be emblematic of a therapeutic mindset aimed at curing or overcoming heart failure rather than adapting to it. Such a mindset tends to embed rather than solve bodily doubt. Artificial hearts are themselves self-limiting, both as palliative treatments and devices programmed to simulate a previously defined cardiac norm. They constrain patients by the literal limits of external components and tend to induce a restrictive sense of spatiality. As a result, patients may benefit from forms of treatment more sensitive to motor intentionality. Such therapies would respond to what is achievable for patients in their actual circumstances rather than speculating about what could be achieved with an artificial heart assuming ideal recovery and adaptation.

I have also tried to show the potential of artificial hearts to disrupt patients' prereflective understanding of themselves and the world. Artificial hearts produce a constant stream of knowledge about patients and the devices themselves in the form of representations. Body-subjects relate to their own bodies as a zeropoint of perception. The horizons of their bodies are prereflectively determined through proprioceptive, kinaesthetic and, I argue, interoceptive information. Determinate representations, on the other hand, indicate a different and alternative form of knowing. The compulsory presentation of representations requires patients and carers to know and relate to bodies in new, reflective ways. This need is underlined by the additional need to attend to this information and its announcement not only by displays of propositional data but also device alarms. This new way of knowing the body heralds an epistemic shift. Action is also initiated and undertaken prereflectively when a body-subject responds to its situation with a form of skilled coping. Representations are the reflective residue of prereflective actions. Attention to propositional knowledge about the world tends to be associated with improficient performance or a certain detachment and distance from it. The re-presentation of artificial heart data therefore challenges ordinary motor intentionality.

8.1.3 Temporality

In a chapter on temporality, I considered the consequences of artificial hearts at the short, medium and long scales. Temporality is a core theme of the phenomenological body-subject on which this dissertation is based. This model gestures at the relationship of temporality to the internal organs, but never fully explains it. I supplement Merleau-Ponty's comments on this relationship with a reading of Zambrano's complementary "The Metaphor of the Heart", which brings out more clearly the ways in which the heart can be both prepersonal and connected to personal circumstances. While describing the temporal effects of artificial hearts in the short-term, I emphasised the robust neuroscientific evidence that cardiac phenomena bears on time perception, and the accounts of distress and alienation suffered by patient with cardiac arrhythmias. I also outlined concerns that artificial hearts may alter cardiac rhythm in unpredictable ways either by pulsatile devices replacing old rhythms with new artificial ones, or continuous-flow devices abolishing cardiac rhythm altogether. In the medium-term, I noted temporal changes are effected by the requirements of artificial hearts and their medical management. I sought to bring out how artificial hearts participate in the familiar pattern of illnesses shaping the spatiotemporal worlds of patients.

Long-term temporal changes occur over months or years as a result of patients' objectification and suspension on a timeline or, just as often, loop of intervention resulting from uncertain clinical pathways and the research, development and deployment cycles of artificial heart devices. Artificial hearts are often prescribed with reference to patients' life- or health-spans but not always to temporal distinctions more subtle than longevity. This directly reflects the central problem of Svenaeus's criterion for phenomenological bioethics. Perhaps most importantly, patients and carers should be aware of the ways in which the temporality available to them will be defined, or re-fined, by their artificial heart devices. Whereas such conversations are expected to occur in the context of bridging devices, considerations of temporality are not always a feature of destination therapies. Greater attention should also be paid to ensuring that artificial hearts can be integrated into patients' routines rather than the other way around, as well as closely considering the lifecycles of artificial hearts hardware and software in terms of the patient's temporality.

8.2 Relevance to phenomenology

The model of the body-subject which has formed the main part of my approach will already be familiar to many phenomenologists. However, I have sought to supplement this model where I

considered it deficient. Merleau-Ponty's phenomenology has been criticised for its assumption of a normate body and lacks a robust accounting for variations in health and illness. I have tried to contribute to a claim rarely made in the English-language literature that the thought of Merleau-Ponty can be reconciled with his contemporary, Georges Canguilhem, for whom vital normativity was a central concept. Similarly, I have sought to highlight the compatibility of Merleau-Ponty with María Zambrano's poetic reason and expressive subjectivity. My specific purpose in doing so for this study is to engage with Zambrano's remarkable "The Metaphor of the Heart", but metaphorical accounts are also a rich feature of illness narratives. Finally, my approach builds on much work already done by phenomenologists of health and illness, and disability. Within phenomenology, this work can sometimes be based in a Husserlian, Heideggerian, Merleau-Pontyan, Beauvoirian or other tribalism. Although my approach is based firmly in the body-subject, I have sought to be ecumenical regarding insights from elsewhere, including from patients and carers.

The approach I have taken has, in some ways, been particular to my case of artificial hearts. This project has been guided by and reliant on a rich qualitative literature on patient and carer experience with artificial hearts. It also joins an emerging field of what Jessica Stanier calls engaged phenomenology, which aims to respond to the needs of particular communities.² She makes clear that the framework of any genuinely engaged phenomenology will vary depending on its community. Nonetheless, aspects of my approach may be useful for the phenomenological analysis of other medical devices, especially artificial organs and paracorporeal systems, for which there has been little attempt so far. More efforts have arguably been made in other disciplines, such as medical anthropology and science and technology studies, but the phenomenology of the patient regularly takes a back seat in these studies. Phenomenology can be particularly revelatory for identifying and thematising matters which are no less important for being what Don Ihde self-deprecatingly calls "terribly mundane and almost too obvious".³

The phenomenology of artificial hearts I have articulated in this dissertation implies the possibility for a circulatory phenomenology. I have sought to retrieve a place for the heart in the phenomenology of the body-subject and to clarify what that place might be. I have argued that a phenomenology can be grounded in the phenomena of circulation. As well as considering the contributions of the heart across the axes of analysis of this essay, I also sketched a preliminary cross-cultural phenomenology of pulsatility. Much remains to be undertaken, but this dissertation does, I hope, point to the plausibility of a circulatory phenomenology. Equally, it is my hope that this

² Stanier, "An Introduction to Engaged Phenomenology," 235-37.

³ Ihde, "The Experience of Technology: Human-Machine Relations," 267.

dissertation demonstrates that phenomenology can make a useful contribution to healthcare and bioethical research not only by providing phenomenological perspectives on ethical issues, but also by informing the analysis of issues by experts in those fields with concepts as well as data. Bioethicist Catherine Mills and I have elsewhere expressed our hope that phenomenology may be better integrated into feminist bioethics and generate greater understanding of diverse health experiences.⁴ This responsibility lies with phenomenologists as much as others.

8.3 Consumer expertise

That some of the phenomena described in this dissertation may be oblique to the practice of some healthcare professionals points to the continued importance of patient and consumer experience and expertise with artificial heart interventions. Patients and carers will likely have encountered expectations that they should take responsibility and be held responsible for their health and illness prior to implantation of an artificial heart. Among other things these are likely to relate to diet and weight, stress, lifestyle decisions and other ostensibly health-related factors. Under any framework of patient responsibility, healthcare consumers are expected to be informed about illness and potential illness and take salutogenic decisions. By making available new forms of knowledge and transforming typical modes of embodiment, comportment and temporality, artificial hearts create new forms of ethical expectations and responsibilities. Philosopher Susanne Lettow argues that somatechnologies broadly

... constitute new modes of knowledge-power relations by enlarging and transforming medical knowledge about one's own body and its potentialities...⁵

Given the specificity of artificial heart therapy and the specialised medical circumstances which can accompany it, patients and carers are frequently expected to act as informants and instructors to healthcare professionals in general healthcare settings. Cardiac nurse Colleen McIlvennan and colleagues note that this task can fall to carers in emergency and even long-term acute care settings, such as when standard diagnostic protocols for measuring pulse or blood pressure cease to be useful or when healthcare professionals have no experience or understanding of device-related data.⁶

⁴ Catherine Mills and Pat McConville, "Phenomenology and Poststructuralism in Feminist Bioethics," in *Routledge Handbook of Feminist Bioethics*, ed. Wendy A. Rogers, et al. (Abingdon: Routledge, 2022).

⁵ Susanne Lettow, "Somatechnologies: Rethinking the Body in the Philosophy of Technology," *Techné* 15, no. 2 (2011): 116.

⁶ Colleen K. McIlvennan et al., "Bereaved Caregiver Perspectives on the End-of-Life Experience of Patients with a Left Ventricular Assist Device," *JAMA Internal Medicine* 176, no. 4 (2016): 536-37.

This reference to consumer expertise is not about enhancing consumer autonomy or relieving health systems of a duty of care which would ordinarily fall to them. Instead, it indicates a reliance on the technical knowledge of consumers. In her study of living with pacemakers and ICDs, science and technology scholar Nelly Oudshoorn points out that patients have access to first-person sensory experience which must be used as an epistemic resource for the fine-tuning of pacemakers. In an apparent equivocation towards such patient expertise, however, she notes pacemaker technicians still tend only to adjust devices in response to the strong complaints of particularly assertive patients.⁷ Similarly, artificial hearts produce knowledge which patients and carers are made responsible for perceiving, judging, and weighing in their own decision-making and narrating these evaluations to healthcare professionals. The foregoing analysis has highlighted ways in which consumer expertise is produced and transformed by artificial hearts, and the expectations of consumers to reconcile the medical and phenomenological meanings of living with an artificial heart. Acknowledging and valuing this labour, and legitimating it as grounds for patient and carer distress or decision-making, may be one lesson for a healthcare attentive to phenomenology.

8.4 Relevance to bioethics

These analyses reveal phenomena either expressed by patients and carers or which can reasonably be anticipated to complicate the use of artificial hearts. Some of these matters relate to issues which are familiar in bioethics, clinical practice, and health-related fields. Incorporation is increasingly understood as a clinical issue, bearing as it does on the outcomes of device interventions.

Phenomenology helps to think through potential barriers to successful incorporation. Many healthcare professionals understand the importance of adaptation to and normalisation of ways of coping with new realities of embodiment. The shift from one set of possibilities to another this entails is expressed through motor intentionality. Understanding how patients' and carers' time will need to be restructured to manage devices is a key task during discharge to ensure compliance with therapy. These matters may already be within the purview of healthcare providers and bear on their professional expertise. As such, identifying and understanding the material consequences of these matters may factor in the existing professional duties of healthcare professionals. Although I have not developed it here there is, I think, a case to be made for these matters deserving explicit clinical consideration and disclosure in informed consent protocols.

There are also other matters raised by phenomenological analysis which may be less clearly apprehensible in traditional clinical terms like material benefit and risk. The place of the heart as a

⁷ Oudshoorn, *Resilient Cyborgs: Living and Dying with Pacemakers and Defibrillators*, 79-80.

passage between interior and exterior is clearly phenomenologically significant but in a way which will be expressed and received in widely varied ways. An examination of motor intentionality shows that a patient's knowledge of their own body can change, but the finer points of epistemology are not a traditional topic of the clinical encounter. Temporal changes wrought at the very short, percept-level scale will not necessarily congeal into the kind of symptoms which motivate doctor-patient discussions. These and other phenomena are revealed by close examination of the meanings of the heart and the artificial heart to body-subjects. They may or may not be directly actionable nor provide normative guidance for healthcare. Yet they speak to the effects of artificial hearts on people in all their being, including but not limited to their being as a patient. They are meaningful, deserving of recognition and affirmation, and can and should motivate greater critical attention on the technologies which produce them and the lives they, in turn, produce.

This dissertation has sought to identify, articulate, and organise the phenomenology of the body-subject in light of an artificial heart. I cannot claim to have exhaustively catalogued the phenomenological products of artificial hearts. I do, however, hope to have indicated to a range of stakeholders that phenomenological issues can and should be discussed in the context of artificial heart therapy. I expect that each of the matters raised throughout this dissertation has or will be contemplated, implicitly or explicitly, by artificial heart patients. Patient and carer experiences with artificial hearts will differ from person to person, just as any illness or even general experience will vary according to their unique circumstances. Yet regardless of whether these issues would affect their clinical decision-making, whether consumers have consciously confronted or emotionally negotiated them, or whether they have even been uttered or confessed, the phenomena described in this dissertation condition living with an artificial heart and the life which is possible under these conditions. This dissertation seeks to acknowledge and affirm the experiences of these consumers, as well as to encourage and caution greater consideration of phenomenology by all stakeholders.

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