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Hobbes Studies 38/1 (2025), 1-11

Hobbes and the Cavendish Circle: Intellectual Networks in the Seventeenth Century

Introduction

Oberto Marrama | ORCID: 0000-0003-3700-5211

Department of Philosophy and Cultural Heritage, Ca' Foscari University of Venice, Venice, Italy

oberto.marrama@unive.it

Faculty of Humanities, University of Oulu, Oulu, Finland

oberto.marrama@oulu.fi

Pietro Daniel Omodeo | ORCID: 0000-0003-3561-1154

Department of Philosophy and Cultural Heritage, Ca' Foscari University of Venice, Venice Italy

pietrodaniel.omodeo@unive.it

Abstract

An introduction to the special issue on Hobbes and the Cavendish Circle: Intellectual Networks in the Seventeenth Century.

Keywords

Hobbes, Cavendish Circle, William Cavendish, Charles Cavendish, Margaret Cavendish, intellectual networks, history of philosophy, history of science

1. Background

This special issue of *Hobbes Studies* gathers selected contributions that investigate ways in which philosophical and scientific ideas were discussed and circulated within and through the so-called "Cavendish Circle" – the cosmopolitan network of European thinkers that revolved around William

Cavendish, 1st Earl, Marquess, and eventually Duke of Newcastle (1593-1676) and his family, via direct relationships of patronage and indirect learned exchanges.[1] More specifically, this collection aims to shed light on the role of Thomas Hobbes within this intellectual network and how aspects of his philosophy influenced, and were in turn influenced by, the system of knowledge circulation and knowledge production fostered by William and his brother, Sir Charles Cavendish (1591-1653).

A seminal collection of studies, which was among the first works that drew significant attention to the Cavendish Circle and the role of the Cavendish family as patrons of intellectuals, scientists and artists, is the special issue "The Cavendish Circle," edited by Timothy Raylor, which appeared in *The Seventeenth Century* in 1994.[2] Other important works followed, which contributed

[1] The Cavendish Circle is also referred to as the "Welbeck Academy" (from the name of Wiliam Cavendish's family mansion) and the "Newcastle Circle." Although these are all informal labels adopted by scholars, we opted for the first for two reasons: one the one hand, it involves no geographical reference, therefore emphasizing the cosmopolitan and international nature of the circle and the group of people involved in it; on the other hand, it does not refer to a title that only applies to William Cavendish, and which would implicitly obscure the roles of Sir Charles Cavendish and Margaret Cavendish in this network. For further considerations on the use of these terms, see Noel Malcolm, "A Summary Biography of Hobbes," in *The Cambridge Companion to Hobbes*, ed. Tom Sorell (Cambridge: Cambridge University Press, 1996), 13-44 (22-3); repr. in Noel Malcolm, *Aspects of Hobbes* (Oxford and New York: Oxford University Press, 2002), 1-26 (11).

[2] "The Cavendish Circle," ed. Timothy Raylor, special issue, *The Seventeenth Century* 9 (1994). Prior to this, articles which helped establish the relevance of the brothers William and Charles Cavendish as pivots for interactions between European philosophers and scientists are Helen Hervey's "Hobbes and Descartes in the Light of Some Unpublished Letters of the Correspondence between Sir Charles Cavendish and Dr. John Pell," *Osiris* 10 (1952): 67-90, and Jean Jacquot's two-

to understanding, analyzing and contextualizing the extent of the interactions among members of the circle, and their relevance for the development of philosophical and scientific thought.[3] The more the scholarship advanced in disentangling the net of intellectual relations in which the Cavendishes were involved, the more it became clear that the Cavendish Circle was not just the informal means through which learned personalities got in contact with one another, and through which ideas and information were passed around among philosophers and scientists; it was a true laboratory of ideas, enhancing the intellectual production of those involved in it and capable of promoting philosophical and scientific agendas.

It is with this in mind that, thirty years after the publication of "The Cavendish Circle," the editors of this *Hobbes Studies* issue organized the workshop "The Cavendish Circle: Philosophical Networks in the 17th Century" at Ca' Foscari University of Venice. The wide-ranging questions animating the event were the following: to what extent and how did Hobbes's philosophical production depend on his interactions with members of the Cavendish family? And what was, in turn,

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part article "Sir Charles Cavendish and His Learned Friends: A Contribution to the History of Scientific Relations Between England and the Continent in the Earlier Part of the 17th Century. I. Before the Civil War," *Annals of Science* 8 (1952): 13-27, and "Sir Charles Cavendish and His Learned Friends … II. The Years of Exile," *Annals of Science* 8 (1952): 175-91.

[3] A formidable example of this kind is Noel Malcolm and Jacqueline Stedall's *John Pell (1611-1685) and his Correspondence with Sir Charles Cavendish* (Oxford and New York: Oxford University Press, 2005). Justin Begley's "Margaret Cavendish, The Last Natural Philosopher" (PhD thesis, University of Oxford, 2016), depicts Margaret Cavendish as an active member of the circle, and shows how her works were discussed by her contemporaries and influenced by her interactions with learned intellectuals. For a recent collection of studies on the Cavendish family and their involvement in the cultural milieu of seventeenth-century Europe, see also Lisa Hopkins and Tom Rutter, eds., *A Companion to the Cavendishes* (Leeds: Arc Humanities Press, 2020).

the impact of Hobbes's philosophy within Cavendish's household and their intellectual entourage? This special issue is in large part the result of conversations held on that occasion: early versions of two papers included in this collection – namely those of Timothy Raylor and Stephen Clucas – were presented in the workshop, and discussions with all participants in the event greatly helped narrow down the topics to tackle in a prospective publication and the general methodological framework to adopt. Among other things, a special interest emerged in exploring the reception of Hobbes's philosophy by Margaret Cavendish (1623-1673) – an aspect covered here by Mary Jo MacDonald's and Marcus Adams's invited contributions to the issue. Margaret, the second wife of William and author of philosophical treatises, plays, novels and poems, has been the focus of extraordinary scholarly attention in the past few years.[4]

It also became apparent that the topic of the workshop, and of this special issue, represented an optimal case study for a methodological approach that has gained ground in studies in the history of science. This combines the investigation of the means of knowledge circulation with the analysis of the local contexts of knowledge production, in order to situate and understand the historical development of scientific theories. This approach can indeed be fruitfully used to shed light on the

[4] Turning points for a reconsideration of Margaret Cavendish's philosophy and intellectual output were Susan James's article "The Philosophical Innovations of Margaret Cavendish," *British Journal for the History of Philosophy* 7 (1999): 219-44, and Eileen O'Neill's influential edition of Cavendish's *Observations upon Experimental Philosophy* (Cambridge: Cambridge University Press, 2001 [1668]). Until then, a widespread opinion around Margaret Cavendish was, as exemplified in A. P. Martinich's terms, that she "was also a philosopher, although not a very good one" (A. P. Martinich, *Hobbes: A Biography* (Cambridge: Cambridge University Press, 1999), 317), although there were exceptions (for instance, Sarah Hutton, "In Dialogue with Thomas Hobbes: Margaret Cavendish's Natural Philosophy," *Women's Writing* 4 (1997): 421-32). This earlier negative assessment has been definitely dissipated by much recent scholarship.

two-way influence connecting Hobbes's philosophy with the context of the Cavendish household – a context which included, among other things, the Cavendishes' own philosophical and scientific interests, their system of personal relationships, their note-taking and correspondence practices, and the consequent requests and queries to members of their entourage.

2. Hobbes, the Cavendish Circle, and the Importance of Intellectual Networks in the Seventeenth Century

A decisive step towards establishing novel research lines concerning the centrality of intellectual networks for our understanding of the history of science was James A. Secord's lecture "Knowledge in Transit," delivered in 2004 at the fifth joint meeting of the "Three Societies" (the British Society for the History of Science, the Canadian Society for the History and Philosophy of Science/La Société Canadienne d'Histoire et de Philosophie des Sciences, and the History of Science Society). By stressing the epistemological relevance of the practical means that determine the circulation of knowledge, Secord turned the free-market zeitgeist of the early 2000s – when globalization was becoming the dominant social and economic model for much of the Western world – into a research program which, since then, has brought about important results.[5] Drawing on studies on networks reaching back to antiquity, new investigations have thus explored scientists' interactions, philosophical correspondences, and intertextual links, also by creating ad hoc databases which allow graphic representations of these interconnections.[6] Studies in the history of early modern science have

[5] The revised version of Secord's lecture was published in James A. Secord, "Knowledge in Transit," *Isis* 95 (2004): 654-72; repr. in *The History of Science in a World of Readers*, ed. Dagmar Schäfer and Angela N. H. Craeger (Berlin: Edition Open Access, 2019), 143-63.

[6] For instance, see Irad Malkin, *A Small Greek World: Networks in the Ancient Mediterranean* (New York: Oxford University Press, 2011); Matteo Valleriani et al., "The Emergence of Epistemic Communities in the *Sphaera* Corpus: Mechanisms of Knowledge Evolution," *Journal of Historical*

been significantly affected by this new wave. Inquiries into weak and strong ties within and between networks of learned correspondents and academic institutions have produced both broad overviews and nuanced micro-historical reconstructions.[7] A traditional field of inquiry that has been revived concerns the so-called *Respublica Litterarum*, the self-aware endeavour of Western intellectuals in the seventeenth and eighteenth centuries to establish a cosmopolitan, international community of learned people interacting with one another across long distances.[8] And although the Cavendish Circle, with its practices, connections, shared interests and "unofficial codes of conduct" can be rightfully included in the Republic of Letters,[9] its role and historical import in it has not been sufficiently acknowledged and investigated yet.

Network Research 3 (2019): 50-91; Roberto Lalli, Riaz Howey, and Dirk Wintergrün, "The Dynamics of Collaboration Networks and the History of General Relativity, 1925-1970," *Scientometrics* 122 (2020): 1129-70.

[7] See, for example, David S. Lux and Harold J. Cook, "Closed Circles or Open Networks?: Communicating at a Distance during the Scientific Revolution," *History of Science* 36 (1998): 179-211. Among the studies on early modern thought inspired by Lux and Cook's work, see Pietro Daniel Omodeo, "Asymmetries of Symbolic Capital in Seventeenth-Century Scientific Transactions: Placentinus's Cometary Correspondence with Hevelius and Lubieniecki," in *The Institutionalization of Science in Early Modern Europe*, ed. Giulia Giannini and Mordechai Feingold (Leiden: Brill, 2020), 52-79.

[8] See Dan Edelstein et al., "Historical Research in a Digital Age: Reflections from the Mapping the Republic of Letters Project," *The American Historical Review* 122 (2017): 400-24.

[9] Justin Begley, "Confessional Disputes in the Republic of Letters: Susan Du Verger and Margaret Cavendish," *The Seventeenth Century* 34 (2017): 181-207 (182). See also Malcolm and Stedall, *John Pell*, 108.

Mordechai Feingold's work deserves special mention, as far as understanding the construction of collective identities of learned communities in early modernity is concerned. In influential studies of university teaching practices in the early modern period, the foundation of scientific academies, and the irradiating power of informal intellectual circles, Feingold pictured the genesis of a European scientific community in terms of hubs and networks at the crossroads of interpersonal "confabulations" and institutionalization, and considered the peculiar emergence of universalistic aspirations in confessional settings.[10] Along similar lines, other studies analyzed the tensions between the simultaneous emergence of modern identities (national, religious, etc.) and cosmopolitan attitudes among European intellectuals.[11] To appreciate the complexity of such phenomena, Yehuda Elkana introduced the heuristic concept of "global contextualism."[12] In his recent book *Überreichweiten: Perspektiven einer globalen Ideengeschichte*, Martin Mulsow bridged the gap between micro-history

[10] To mention just a few, see Mordechai Feingold, *The Mathematicians' Apprenticeship: Science, Universities and Society in England 1560-1640* (Cambridge: Cambridge University Press, 1984); Mordechai Feingold, ed., *Jesuit Science and the Republic of Letters* (Cambridge, MA, and London: The MIT Press, 2003); and Mordechai Feingold, "Confabulatory Life," in *Duncan Liddel (1561–1613): Networks of Polymathy and the Northern European Renaissance*, ed. Pietro Daniel Omodeo and Karin Friedrich (Leiden: Brill, 2016), 22-34.

[11] For a case study on the combination of national identities, confessional belonging, and secular science in cosmopolitan contexts, see Pietro Daniel Omodeo, "Cesare Cremonini's Non-Theological Cosmology: A Contribution to Padua's Secular Culture in Times of Wars of Religion," *British Journal for the History of Science* (2023): 1-19, doi:10.1017/S0007087423000134.

[12] Yehuda Elkana, "The University of the 21st Century: An Aspect of Globalization," in *The Globalization of Knowledge in History*, ed. Jürgenn Renn (Berlin: Edition Open Access, 2012), 605-30 (610-2); see also Jürgenn Renn, "Survey: Knowledge as a Fellow Traveller," in *The Globalization of Knowledge in History*, ed. Jürgenn Renn, 205-43 (205).

and global history with an array of studies on the interplay of multiple historical and geographical perspectives. As he argues, early modern intellectual culture resulted from the composition of variable standpoints, through intense exchanges of letters, manufacts, ideas and curiosa across the globe.[13]

Still, although studies of networks and circulation of knowledge are fundamental in contemporary scholarship, special focus on these should not come to the detriment of other important dimensions of the history of ideas, such as material, practical, technological and ecological aspects. If the circulation model was assumed as the all-encompassing paradigm for intellectual history and cultural studies, it would indeed mirror a sort of "free market" ideology, as it were, according to which wealth can be reduced to, and entirely understood as, the product of the circulation of money and commodities. For a more complete historical picture, one must also look at the "workshops" where such commodities – both abstract and material, such as ideas, hypotheses, theories, experiments, notes, letters, and manuscripts – are produced. Such a need for integration also explains the development, parallel to network studies, of investigations of practical knowledge, in its implicit and embodied forms. Pamela O. Long, Pamela H. Smith, and Ursula Klein are among the most prominent scholars who closely scrutinized the manufacturing of knowledge in the modern era.[14] Their research

[13] Martin Mulsow, *Überreichweiten: Perspektiven einer globalen Ideengeschichte* (Berlin: Suhrkamp Verlag, 2022). See also Martin Mulsow, "A Reference Theory of Globalized Ideas," *Global Intellectual History* 2 (2017): 67-87.

[14] Pamela O. Long, *Artisan/Practitioners and the Rise of the New Science, 1400-1600* (Corvallis, OR: Oregon State University Press, 2011); Pamela H. Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago and London: The University of Chicago Press, 2004); Ursula Klein, *Nützliches Wissen: Die Erfindung der Technikwissenschaften* (Göttingen: Wallstein Verlag, 2016). See also Matteo Valleriani, ed., *The Structures of Practical Knowledge* (Cham: Springer, 2017).

advanced and rearticulated the legacy of earlier "externalist" scholarship in the history of science, initiated by Boris Hessen, Edgar Zilsel and Robert K. Merton in the 1930s and 1940s.[15]

Now, while a historicizing sociology of science has flourished in different forms, a full-fledged inquiry into the "sociological roots" (to use Zilsel's famous expression)[16] of early-modern philosophy has not yet been developed. Regarding Hobbes, the work that marked the shift from a historiography of science divided between "internalist" and "externalist" approaches to one looking at micro-historical specificities, thinkers' intentions and strategies, and relevant cultural frameworks is Steven Shapin and Simon Schaffer's *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. Hobbes's "political epistemology," as they called his incorporation of natural, gnoseological and political concerns, showcases their thesis that "solutions to the problem of knowledge are solutions to the problem of social order."[17] Independent of the various ways in which their book was received and the inevitable criticisms to which it has been exposed,[18] Shapin and

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[15] See, among others, Gideon Freudenthal and Peter McLaughlin, eds., *The Social and Economic Roots of the Scientific Revolution: Texts by Boris Hessen and Henryk Grossmann* (Dordrecht: Springer, 2009), and Gerardo Ienna, "The International and Interdisciplinary Circulation of Boris Hessen's Theses," in Boris Hessen, *Manuscripts and Documents on the History of Physics: A Historical Materialist Textbook*, ed. Pietro Daniel Omodeo and Sean Winkler (Venezia: Verum Factum, 2022), 75-129.

[16] Edgar Zilsel, "The Sociological Roots of Science," The American Journal of Sociology 47 (1942): 544-62; repr. in *Social Studies of Science* 30 (2000): 935-49.

[17] Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle and Experimental Life* (Princeton: Princeton University Press, 1985), 99 and 332.

[18] Noel Malcolm rejects Shapin and Schaffer's thesis that Hobbes turned to plenism in his *De corpore* for political reasons (Malcolm, *Aspects of Hobbes*, 190-1). See also Cees Leijenhorst, *The Mechanisation of Aristotelianism: The Late Aristotelian Setting of Thomas Hobbes' Natural*

Schaffer's work prompted a new approach to the history of science that focuses on local settings, political and intellectual, and which can be also fruitfully applied to philosophical topics. So, for instance, it has been argued that Hobbes's direct involvement, during the 1620s, in the affairs of the Virginia and Bermuda Companies, through his pupil, friend, and then patron William Cavendish, 2nd Earl of Devonshire (c. 1590-1628),[19] can make sense of much of his later political philosophy.[20] And, with specific reference to Newcastle's later patronage of Hobbes, Lisa T. Sarahson demonstrated the practical effects of this relationship on both Hobbes and his patron: how it helped fashion their respective statuses and careers, providing them with intellectual freedom and social recognition.[21]

Philosophy (Leiden: Brill, 2002), 127. For a survey of critical reviews of Shapin and Schaffer's *Leviathan and the Air-Pump*, see Steven Shapin and Simon Schaffer, "Introduction to the 2011 Edition: Up for Air: *Leviathan and the Air-Pump* a Generation On," in Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life*, 2nd edition (Princeton: Princeton University Press, 2011), xi-l (xxi-xxxvii).

[19] Not to be confused with William Cavendish, 1st Duke of Newcastle. For a useful breakdown of the many, often homonymous members of the two branches of the Cavendish family (the Newcastle and the Devonshire) who were important in Hobbes's life, see Martinich, *Hobbes: A Biography*, 24-5.

[20] On this, see the recent article by Sébastien Bauer, "Hobbes, Cavendish, and the Bermuda Company," *The Historical Journal* (2024): 1-20, doi:10.1017/S0018246X24000414, which contributes to a discussion initiated by Noel Malcolm's findings (see his "Hobbes, Sandys, and the Virginia Company," *The Historical Journal* 24 (1981): 297-321; repr. in Malcolm, *Aspects of Hobbes*, 53-79) and prosecuted by many influential Hobbes scholars. For a review of the scholarship debate, see Bauer, "Hobbes, Cavendish, and the Bermuda Company," 1-2.

[21] Lisa T. Sarasohn, "Thomas Hobbes and the Duke of Newcastle: A Study in the Mutuality of Patronage before the Establishment of the Royal Society," *Isis* 90 (1999): 715-37.

In general, it should be clear that studying the origin and meaning of Hobbes's philosophical ideas goes hand in hand with studying the context and conversations within which they developed, and vice versa. Since 1630, Hobbes's scientific and philosophical production becomes more and more entangled with his relationship with the Earl of Newcastle and his brother Charles. By the second half of the 1640s – during the "years of exile" of Hobbes and the Cavendishes[22] – the progress of Hobbes's work is almost inseparable from the dynamics of the Cavendish Circle, through which his intellectual production was nurtured, received, circulated, and sometimes prompted. These dynamics, in turn, were affected by the presence within the circle of a heavyweight thinker such as Hobbes, whose input was influential. Hence the topic of this issue, and the methodological considerations above.

On the one hand, Secord's claim that the understanding of the history of scientific ideas cannot be achieved without studying the history of the circulation of knowledge – and that therefore we need to "think … about the problem of the movement of local knowledge"[23] – applies perfectly to an investigation into the relevance of the Cavendish Circle for the history of philosophical ideas in seventeenth-century Europe, and for the development of Hobbes's ideas in particular. While nowadays we tend to distinguish between the history of philosophy and the history of science as different fields of inquiry, for Hobbes and other thinkers of his time philosophical and scientific speculations belonged to the same research agenda, and were inseparable from one another.[24] And the Cavendish Circle had an irreplaceable historical role in helping the circulation and advancement of philosophical and scientific knowledge across European countries – especially after the battle of

[22] Jacquot, "Sir Charles Cavendish and His Learned Friends. II. The Years of Exile," 175.

[23] Secord, "Knowledge in Transit," 660.

[24] Margaret Cavendish's philosophical masterpiece, the *Observations upon Experimental Philosophy*, bears in the title the connection between her philosophy and the new scientific practices that were promoted by scientists and *novatores* across Europe, including of course members of the recently founded Royal Society.

Marston Moor (1644), when William and Charles Cavendish moved from England to continental Europe, to reside in Hamburg, Paris, Rotterdam and Antwerp. They kept acting as influential patrons of intellectuals and artists, corresponded with learned thinkers and had books and manuscripts transmitted over long distances. With their actions they established a truly cosmopolitan, international network which disseminated knowledge and united prominent cultural figures throughout Europe.

On the other hand, as long as William and Charles Cavendish acted, through their curiosity, their requests and their queries, as communicators and instigators of new ideas and research in philosophy and the sciences, their intellectual network turned out to be not only the crossing point of shared knowledge originating from diverse sources: it was the "workshop," as it were, where new concepts and theories were forged (sometimes under direct request) and communally examined for collective validation. As contributions to this collection will show, in some cases the way in which philosophical and scientific ideas are discussed and circulated by and through the Cavendish Circle is *ipso facto* the way in which these ideas come into being in the first place.

3. Synopsis

The special issue is comprised of three research articles, one research note, and a book review.

In the first article, "The *Leviathan* Table of Sciences and Newcastle's Queries," Timothy Raylor analyzes the idiosyncratic presence of the folding "table of sciences" in Chapter 9 of Hobbes's *Leviathan*. Raylor argues that the table is probably a document originally prepared by Hobbes in response to a query raised by William Cavendish, Marquess of Newcastle, between 1644 and 1645. On the one hand, Hobbes's table of science would present what was a transitional phase in his thinking of the sciences and their categorization; on the other hand, it serves to show how Hobbes's written philosophical production could be conditioned by his patron's requests. The article includes a transcription of a document by Newcastle (preserved at the Library of the University of Nottingham, Portland Pw 1/666), which contains what is likely the Marquess' written reply to Hobbes's table of sciences.

William and Charles Cavendish's practice of promoting scientific and philosophical activity, also through written documents shared with members of their intellectual entourage, is further explored in the second article, "*Modus notandi*: Sir Charles Cavendish's notes on Thomas Hobbes and Walter Warner." In it, Stephen Clucas examines the social life of the manuscript notes that were written, collected and transmitted by Sir Charles Cavendish and other correspondents of the Cavendish Circle. By analyzing examples from Sir Charles Cavendish and John Pell's correspondence, Clucas demonstrates how extensive and far-reaching the shared use of notes was. Clucas then focuses on a precise set of notes by Cavendish, some of which refer to a lost treatise by Walter Warner (1557-1643) on the circulation of the blood, while others to a draft of Hobbes's *De corpore*. These documents reveal how Sir Charles Cavendish utilized notes to gather material from different sources working on similar topics, to then feed debates on works in progress by members of the circle.

The third article, "Acknowledging Sexual Equality: Hobbes's and Cavendish's Amazons" by Mary Jo MacDonald, focuses on the impact that Hobbes's philosophizing had on the member of the circle who was the closest to William Cavendish: namely, his wife Margaret. MacDonald argues that Margaret Cavendish's portrayal of the Amazon's army in her *Bell in Campo* (1662) is intended to criticize and rectify Hobbes's own description of the Amazons in his political writings. In his natural reconstruction of the myth of the Amazons, Hobbes presents them as non-threating subjects by omitting their violent origins. Cavendish's own depiction of the Amazons, by contrast, is more faithful to the original myth: they are valiant and victorious fighters, who rebel against men's rules and who achieve equality via their martial capacities and by being in the position to threaten their male counterparts with subjugation.

Margaret Cavendish's reception of Hobbes's philosophy is also the focus of Marcus Adams's research note, "Margaret Cavendish as Critic and Reviser of Hobbes on Matter and Motion." Adams argues that Margaret Cavendish shares Hobbes's view that it is impossible to abstract accidents from bodies. Cavendish's rejections of Hobbes's distinction between "place" and "magnitude," and her

consequent refusal of Hobbes's account of motion as locomotion – the relinquishing by a body of one place for another – would depend on this shared assumption, since for Cavendish one cannot distinguish body, place and magnitude. Cavendish's own account of matter as self-moving, and her conception of motion as mereological change, would then qualify as revisions of Hobbes's own accounts based on common grounds.

A book review by Sylvie Kleiman-Lafon concludes the issue. The book examined is an edition and translation into French, by Jauffrey Berthier and Nicolas Dubos, of two texts included in the anonymous manuscript *Horæ Subsecivæ. Observations and Discourses* (1620), attributed to Hobbes and William Cavendish, 2nd Earl of Devonshire.[25] As pointed out by Kleiman-Lafon, one of the main aims of the editors of the book is to demonstrate that the *Horæ Subsecivæ* were written by Hobbes and Cavendish under the direct supervision of Francis Bacon, and that they were meant to promote Bacon's theses. This juvenile work, Berthier and Dubois argue, is one that shapes the development of Hobbes's political philosophy.

Acknowledgments

We would like to thank all participants in the workshop "The Cavendish Circle: Philosophical Networks in the 17th Century," which took place on 30 April 2024, at Ca' Foscari University of Venice, and in particular the invited speakers: Julia Borcherding, Stephen Clucas, Antonia LoLordo, Karolina Hübner, and Timothy Raylor. We would also like to thank the editors of *Hobbes Studies*, for their careful assistance in putting the issue together.

The workshop and this publication are part of the of the MSCA PF project 101064483 MC-EuCon "Margaret Cavendish (1623-1673) in the history of European ideas of consciousness." Funded by the European Union. Views and opinions expressed are however those of the authors only

[25] Thomas Hobbes and William Cavendish, *Discours sur l'histoire*, ed. and tr. Jauffrey Berthier and Nicolas Dubos (Paris: Gallimard, 2024).

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ACCEPTED VERSION – Please quote published version
Hobbes Studies 38/1 (2025), 13-42

The *Leviathan* Table of Sciences and Newcastle's Queries

Timothy Raylor | ORCID: 0009-0002-9796-2101

Department of English, Carleton College, Northfield, MN, USA

traylor@carleton.edu

Abstract

Taking up Noel Malcolm's suggestion that, rather being than an integral part of the conception of the work, the table of sciences featured in Chapter 9 of Leviathan was included because Hobbes had it to hand, having perhaps prepared it for William Cavendish, Marquess of Newcastle, this article establishes the raising of queries for clients to settle as a standard practice within the Cavendish Circle, and argues that the table was likely Hobbes's response to enquiries about the status of different sciences following the 1644 publication of works on mixed mathematics by Mersenne. The table is more closely connected than we have realized with other works by Hobbes and appears to be a transitional schema, offering a looser and more expansive definition of philosophy, one better equipped to account for natural phenomena, than the narrowly logical definition established in The Elements of Law.

Keywords

Hobbes, Cavendish Circle, Newcastle, philosophy, sciences, tables

1 Introduction

The folding "Table" Hobbes incorporated into his chapter on "the Severall Subiects of Knowledge" (Chapter 9) of *Leviathan* is an eye-catching and perplexing feature of that famous work (Plate 1). <INSERT PLATE 1. CAPTION: Plate 1. Thomas Hobbes, *Leviathan*, Table of Sciences. p. 40+1. Private collection.> The table is eye-catching in that it is a striking instance of the visual representation of the divisions of knowledge by way of ramifying division—a common method of presenting the order of a work or the method of a discipline in the Renaissance, but one rarely employed by Hobbes.[1] And it is perplexing because its treatment of "the Severall Subjects of Knowledge" seems in several respects a poor fit with the understanding of those subjects developed by Hobbes elsewhere in *Leviathan* and, more amply, in other writings. In the most important discussion of the issue to date, Noel Malcolm suggests that the table is logically unaccountable: "The only possible explanation—inadequate though it is—for the inclusion of the anomalous table in Chapter 9 of the English *Leviathan* is that this was something Hobbes had to hand because he had prepared it for rather different reasons in a rather different context."[2] The purpose of this article is to develop our understanding of those reasons and that context by considering Hobbes's provision of responses to queries addressed to him by his patron, William Cavendish (1593-1676), Earl, Marquess, and, ultimately, Duke of Newcastle,

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[1] In "The Order," which prefaces *The Elements of Law*, Hobbes deploys a similar set of bifurcating divisions to show the rationale underlying the sequence of parts and chapters in that work. His Latin Digest and English *Briefe* of Aristotle's *Rhetoric* are similarly broken down into higher-level divisions and lower-level instances, though without the use of visual tables.
[2] Noel Malcolm, "Some Features of the English *Leviathan*," in *Leviathan*, ed. Noel Malcolm, 3 vols. (Oxford: Clarendon Press, 2012), vols. 3-5 of *The Clarendon Edition of the Works of Thomas Hobbes*, iii, 145 (hereafter "*HW* iii," "*HW* iv," etc.; references to the 1651 edition of *Leviathan* are given in square brackets following the reference to *HW* iv or *HW* v). See also, Tom Sorell, "Hobbes's Scheme of the Sciences," in *The Cambridge Companion to Hobbes,* ed. Tom Sorell (Cambridge: Cambridge University Press, 1996), 45-61 (49-51).

and suggesting the implications of this context for our understanding of the table in relation to other works on philosophy and the system of sciences on which Hobbes was concurrently engaged. The *Leviathan* table, I shall suggest, most likely represents a document drawn up for Newcastle's benefit, in the mid-1640s, and reflects a stage of Hobbes's thinking about philosophy that is intermediary between the account offered in *The Elements of Law* (1640) and the more complete and in several respects divergent account of philosophy and its divisions he would set out in *De corpore* (1655).

2 The Problem of the Table

Although the table has always attracted the attention of readers, it has until recently generated little notice among scholars. The most substantive treatment to date is Noel Malcolm's account of it in the General Introduction to his edition of *Leviathan* for The Clarendon Edition of the Works of Thomas Hobbes.[3] In that account, Dr Malcolm lucidly sets out the historical background to such tables in Porphyrian trees and Ramist textbooks and unpacks the problems raised by Hobbes's use of one to illustrate the status and derivations of a given number of particular "sciences" from a general definition of "Science" or "Philosophy." Prime among these problems for our understanding of Hobbes's thinking is the fact that the definition of philosophy in the table jars with the definition Hobbes offers elsewhere in his writings at around this time—jars, even, with the definition offered elsewhere in *Leviathan*. In Chapter 46, Hobbes defines philosophy very much as he would define it four years later in *De corpore*, as the knowledge of properties from known generations or causes or of possible generations or causes from observed properties: "BY PHILOSOPHY, is understood *the Knowledge acquired by Reasoning, from the*

[3] *HW* iii, 141-5.

Manner of the Generation of any thing, to the Properties; or from the Properties, to some possible Way of Generation of the same …"[4] This causal understanding is at odds with the strictly logical and propositional definition presented in Chapter 9: "*knowledge of the Consequence of one Affirmation to another*"—which definition is itself relaxed in the accompanying table, where it is reduced to mere "Knowledge of Consequences."[5]

Its handling of the definition of science or philosophy is not the only oddity about the table. In some striking instances, the placement or status of the special sciences listed therein seemingly clashes with the statements on such sciences Hobbes articulates in *De corpore*, his most complete and more or less definitive treatment of the nature of philosophy and the sciences. Thus, for instance, where "PHILOSOPHIA PRIMA" is situated in the table as the first part of natural philosophy, involving "Consequences from the Accidents common to all Bodies Naturall, which are *Quantity*, and *Motion*," and, specifically, those from quantity and motion "*indeterminate*," in *De corpore*, first philosophy appears rather to precede natural philosophy, as "The first Grounds of Philosophy" in general.[6] And where first philosophy is preceded in *De corpore* by the instrumental discipline of logic, logic appears in the *Leviathan* table as a branch of physics, concerned with consequences from speech (being one of the qualities of animals, specifically human beings) in reasoning.

A similar dissonance obtains between the location of cosmography in the table and its place in *De corpore*. The table places astronomy and geography directly after arithmetic and geometry, and treats them, like those pure mathematical sciences, exclusively in terms of motion

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[4] *HW* v, 1052 [*Leviathan*, 367]. For the differences, see below n. 71.
[5] *HW* iv, 124 [*Leviathan*, 40], 130-1 [*Leviathan*, 40+1].
[6] Hobbes, *Elements of Philosophy, the First Section, Concerning Body* (London, 1656) (hereafter "*Of Body*"), sig. *B4^{v} ("The Titles of the Chapters"); *Elementorum philosophiae sectio prima de corpore* (London, 1655) (hereafter "*De corpore*"), sig. A5^{v} ("Lemmata Capitum").

and quantity—"Consequences from the Motion, and Quantity of the great parts of the World, as the *Earth* and *Starres*." As such, cosmography differs from pure mathematics only by virtue of being concerned with bodies "in *speciall*," as opposed to determined bodies considered in general. In *De corpore*, by contrast, the earth and the stars are treated as phenomena of nature, as objects of sense, and knowledge of them is, in consequence, a part of physics.

Other discrepancies are found in certain of the special sciences in the table. Astrology appears as a special science dealing with "Consequences from the Qualities of the *Starres*." In *De corpore*, however, Hobbes explicitly banishes astrology from consideration as a science due to its lack of certainty: "whatsoever we know by Right ratiocination, can neither be false nor doubtfull" ("quae recta ratiocinatione cognoscuntur, ea falsa, aut dubia esse non possunt").[7] Astrology is here a species of divination, rather than a science.

And there is more. When Hobbes came to revise the chapter for the Latin edition of *Leviathan* of 1668, he dropped the table, recasting the chapter to adumbrate a summary account of its main distinctions and listing most of its particular sciences—but not all of them: neither astrology nor poetry is mentioned. Furthermore, although he retains the general definition of science as knowledge of consequences, he further relaxes this requirement in accounts of particular subjects which, rather than being the knowledge of consequences within their particular areas of competence, are now mostly treated as the products of mere "contemplation" ("contemplatio") of such effects. Thus, for instance, rather than being defined as, specifically, the product of the knowledge of consequences from the qualities of the speech of human beings, ethics is now a science arising "from the contemplation of man and of his faculties" ("Ex contemplatione denique Hominis & Facultatum ejus")—alongside logic, rhetoric, and civil

[7] *Of Body*, 8 (I.i.8); *De corpore*, 6-7 (I.i.8).

philosophy, which latter science had previously been derived directly from knowledge of the consequences of "*Politique* Bodies."[8]

3 Hobbes's Table; Newcastle's Paper

What are we to make of all this? Dr Malcolm suggests an extra-textual explanation, proposing that the table was "something Hobbes had to hand because he had prepared it for rather different reasons in a rather different context."[9] The strongest known context is, he points out, furnished by an undated, untitled document in the hand of William Cavendish, Marquess of Newcastle among the Portland Papers at Nottingham University Library (Pw 1/666: Plate 2, and Appendix). <INSERT PLATE 2. CAPTION: Plate 2. William Cavendish, Marquess of Newcastle. Paper on mathematics, natural philosophy, and the humanities. Portland Collection, University of Nottingham, Pw 1/666. By permission of University of Nottingham Manuscripts and Special Collections.> That document is a paper in which Newcastle works through most of the sciences listed in Hobbes's table, categorizing them according to different levels of certainty.

The congruence between the two lists is striking:

Hobbes's Table	**Newcastle's Paper**
Philosophia prima	—
Geometry	Geometry
Arithmetic	Arithmetic

[8] *HW* iv, 129, 130 [*Leviathan*, 40+1].
[9] *HW* iii, 145.

Astronomy	Astronomy
Geography	Geography
Science of Engineers	Statics
Architecture	Architecture
Navigation	Navigation
Meteorology	—
Sciography	Dialing
Astrology	[Astrology: "oughte nott to bee putt In[n]"]
Optics	Optics
Music	Music
Ethics	Ethics
Poetry	Poetry
Rhetoric	Rhetoric
Logic	Logic
The Science of Just and Unjust	—

Some link between the two documents is suggested by the close parallel between the order in which the sciences are listed in each. Newcastle begins with pure mathematics, discussing under it geometry and arithmetic. This parallels the opening of Hobbes's list of sciences—though with the exclusion of Hobbes's preliminary science of first philosophy. He then moves, under the general heading of "mixed mathematics," to a numbered list of eight sciences. Under cosmography, he places astronomy ("astroneye") and geography, paralleling Hobbes's presentation of the next two sciences in his list. Then, within the general science of

"weighing," he includes architecture, statics, and navigation, which differs from Hobbes's treatment of the next three sciences only in including statics instead of what Hobbes terms "*Science of* ENGINEERS." Unlike Hobbes, Newcastle makes no mention of meteorology. But the two lists resume their agreement when Newcastle turns to his next item: "gnomologia" or "dialing"—Hobbes's "sciography." Where Hobbes then places astrology, Newcastle inserts a comment to the effect that astrology "oughte nott to bee putt In[n]." Next in both lists appear optics and music—these marking, for Newcastle, the last of his mixed mathematical sciences. After a general assertion that all aspects of natural philosophy built on "vndisprouable" principles qualify as mixed mathematics, Newcastle moves into a concluding discussion of four sciences that we would think of as aspects of the humanities and which Hobbes classes as "Consequences from the Qualities of *Men in speciall*": ethics, logic, rhetoric, and poetry. Perhaps because he assumes that it is a part of ethics (as Hobbes sometimes defines it), Newcastle does not mention the last science in Hobbes's list, "The *Science* of JUST and UNJUST."[10]

The table and the paper are closely connected. But in what manner? Newcastle's exclusion of astrology at the point in his list where it appears in Hobbes's table implies that he is following Hobbes, rather than the other way around. But was he responding to the printed text of *Leviathan*, attempting to reconcile it with his own reading of the sciences; or does his paper show that he was involved with Hobbes in discussions of the sciences prior to the publication of

[10] This special science has a somewhat unstable place in Hobbes's thinking. In some places it is equated with ethics and politics, as in *De homine*, X.5 ("Praeterea Politica & Ethica, id est, scientia *Justi* & *Iniusti*") (Hobbes, *Elementorum philosophiae sectio secunda de homine* (London, 1658), 60 (hereafter "*De homine*")), at others with legal knowledge, as in *Behemoth* ("the Science of Justice and Equity") (*HW* x, 158-9); see, for discussion, Patricia Springborg, "*Behemoth* and Hobbes's 'science of just and unjust'," *Filozofski vestnik* 24 (2003): 267-89.

Leviathan—his paper responding to such discussions or to a draft version of Hobbes's table? Dr Malcolm scrupulously leaves the question in the balance.[11] But it seems to me that there are several reasons for thinking Newcastle's paper to have been the product of an engagement with Hobbes's thinking on the sciences prior to the publication of *Leviathan*.

Some of these reasons are textual. Where Hobbes refers in his table to the concerns of poetry, he lists two possibilities but gestures towards others which he does not enumerate: "In *Magnifying*, *Vilifying*, &c." It is possible that Hobbes is here gesturing in the direction of other possibilities that he did not currently have in mind. This is likely to have been the case in the only other place in the table at which he deploys an ampersand at the end of a sequence: in his discussion of the science, which he does not name, of mineralogy: "Consequences from the Qualities of *Minerals*, as *Stones*, *Metalls*, &c." This is a formulation Hobbes uses on other occasions—as, for example, in *Seven Philosophical Problems* ("stones, metals, and other kinds").[12] But Newcastle, in his discussion of poetry, includes additional details: "Magnefienge, Villefienge or representing with delectation the Actions of mans Life." It seems inherently improbable that Newcastle would have conjured up, unaided, the final alternative, the details of which do not inhere in the first two terms—magnifying and vilifying. Those first two terms are, in rhetorical theory, complete in themselves, registering both the positive and negative aspects of epideictic rhetoric: praising and blaming; they constitute a distinctive understanding of the purpose of poetry, aligning with the definition to which Hobbes had gestured in the opening chapter of his animadversions (*c*.1642-3) against Thomas White's *De mundo* (1642)—a work generally known today as the *Anti-White*—in which he suggested that the purpose of poetry is to

[11] *HW* iii, 145.
[12] Hobbes, *Seven Philosophical Problems* (London, 1682), 38.

glorify ("nobilitare") actions by celebrating them.[13] The notion of poetry as praise is thus no novelty in *Leviathan*. And Newcastle's account of the particular manner in which it goes about praising is strikingly close to phrasing used by Hobbes elsewhere. Newcastle writes of poetry "representinge with delectation the Actions of mans Life"; in his "Answer" to Sir William Davenant's *Preface to "Gondibert"* (1650)—a work written at the time he was working on *Leviathan*—Hobbes refers to poetry as an art of representation, which operates "by imitating humane life, in delightfull and measur'd lines."[14] It seems then that Newcastle's definition of poetry quotes from or paraphrases a more complete version of Hobbes's definition of poetry than the abbreviated version that appears in the printed version of the table.

Some features of Newcastle's comment about the need to exclude astrology are also pertinent to this point. The fact that Newcastle adopts the present tense ("oughte nott to bee putt In[n]") rather than some form of the past raises the possibility that he might not be commenting on an already published work (were he addressing the printed text of Leviathan he might rather have written "oughte not to have been …"). And the terms of his dismissal provide another instance of proximity to phrasing employed elsewhere by Hobbes. Newcastle offers as the reason for excluding astrology that "Itt is no Arte, but Iuglinge & Gipsye fortune telling & Cooseninge."[15] This is strikingly close to Hobbes's dismissive comment at the end of the chapter

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[13] Hobbes, *Thomas White's "De mundo" Examined*, ed. and tr. Harold Whitmore Jones (Bradford and London: Bradford University Press, 1976), 25 (I.2); Hobbes, *Critique du "De mundo" de Thomas White*, ed. Jean Jacquot and Harold Whitmore Jones (Paris: Vrin, 1973), 106 (I.2). See Timothy Raylor, "Hobbes on the Nature and Scope of Poetry," in *The Oxford Handbook of Hobbes*, ed. A.P. Martinich and Kinch Hoekstra (New York: Oxford University Press, 2016), 603-23 (608-9).
[14] William Davenant, *Sir William Davenant's "Gondibert,"* ed. David F. Gladish (Oxford: Clarendon Press, 1971), 45. Hobbes uses the term "delectation" in *Leviathan* (*HW* iv, 190 [*Leviathan*, 61]).
[15] See below, Appendix.

on astrology in his *Anti-White*. Here, having dismissed White's arguments that the influences of the stars can be calculated in order yield reliable predictions, Hobbes concluded by speculating that the *Tetrabiblios* (the foundational work of judicial astrology) could not really have been written by the learned Ptolemy: "I think its author was some gipsy of the band of those who wander through every nation and who, being beggars, even nowadays answer you when you question them about the life, ways, and fortunes, and death of men—if you give them a trifle" ("authorem quidem Aegyptium aliquem fuisse puto, ex eorum numero qui per omnes gentes vagantur, mendicantesque de vita, moribus, fortunis, exituque hominum, etiam nunc acceptâ stipe respondent interrogati").[16] In Hobbes's view, as in Newcastle's, astrology—at least as it is theorized in the *Tetrabiblios*—is no more than "gipsy fortune telling."

A further reason for thinking that Newcastle's paper is not simply a response to the printed text of *Leviathan* and may be the product of conversation with Hobbes (whether oral or written) is that in its quest to graduate sciences according to their respective levels of certainty, Newcastle deploys criteria that Hobbes had earlier elaborated in *The Elements of Law*, but which he does not develop—which, in fact, he barely mentions—in *Leviathan*.[17] In discriminating sciences based on "supotitions" from those resting on "Euedente" or, at least, "vndisprouable" principles (i.e. those that cannot be confuted), Newcastle draws on the discrimination of "suppositions" from "principles that are found indubitable by experience" which Hobbes had expounded in *The Elements of Law*.[18] It is possible simply that Newcastle has learned his

[16] Hobbes, *White's "De mundo" Examined*, 442 (XXXVI.10); Hobbes, *Critique du "De mundo*," 401 (XXXVI.10).
[17] There is a passing reference to supposition as subjunctive speech in ch. 6 of *Leviathan*.
[18] Hobbes, *The Elements of Law Natural and Politic*, ed. Ferdinand Tönnies (London: Simpkin, Marshall, 1889), 22 (I.v.12). See also *HW* vi, 33.

Hobbesian lessons well; but possible also that the persistence of these terms and principles results from renewed converse with Hobbes on the matters in question.

For these terms were expounded not just in *The Elements of Law*. The distinction of suppositions from evident principles, of probabilities from demonstrations, and the implications of such distinctions for the certainty of the sciences, were topics of discussion among Newcastle and members of his entourage in the 1630s. In his 1635 play, *Wit's Triumvirate*, one of Newcastle's characters, the witty physician, Clyster, averred that "there is little knowledge in this world, for the most part merely opinion, except in some parts of the mathematics, arithmetic and geometry. We have no demonstrations else, or very few. But commonly men take probabilities for demonstrations."[19] In arriving at such distinctions between demonstration, probability, and opinion, Newcastle was indebted to Hobbes, who in the mid-1630s had repeatedly schooled him on the distinction. Writing to Newcastle on 15/25 August 1635, for instance, Hobbes raised doubts about the philosopher Walter Warner's ability to provide viable demonstrations of his burning and multiplying glasses, gently insinuating that Newcastle's brother and chaplain had been perhaps a little too generous in giving him the benefit of the doubt:

> I vnderstand not how m^{r} Warner will demonstrate those inuentions of the multiplying glasse and burning glasse so infinite in vertue as he pretends; if he [> can] know the art already, a little time will serue to make y^{e} demonstration, especially to S^{r} Charles, and m^{r} Payne, who are not scrupulous to grant him any reasonable suppositions, and vnderstand as much as he in any thing demonstrable.[20]

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[19] [William Cavendish], *Wit's Triumvirate, or The Philosopher*, ed. Cathryn Anne Nelson, 2 vols., *Salzburg Studies in English Literature* 57-8 (Salzburg, 1975), i, 197.
[20] *HW* vi, 28.

In a letter sent to Newcastle the following summer, Hobbes would criticize both Warner and the mathematician Claude Mydorge for failing to distinguish true demonstrations from those involving supposition: "they do not well to call their writings demonstrations, for the grounds and suppositions they vse, so many of them as [are of *deleted*] concerne light, are vncertayne and many of them not true."[21] The problem, Hobbes explained, was that

> In thinges that are not demonstrable, of w^{ch} kind is the y^{e} greatest part of Naturall Philosophy, as depending vpon the motion of bodies so subtile as they are inuisible, such as are ayre and spirits, the most that can be atteyned vnto is to haue such opinions, as no certayne experience can confute, and from w^{ch} can be deduced by lawfull argumentation, no absurdity …[22]

Newcastle appears, in short, to be trying to fit his list of sciences into an explanatory framework that Hobbes had earlier expounded in writing and discussed in some detail with him.

But in framing the disciplines in his paper, Newcastle is not working exclusively with Hobbesian terms and concepts. He starts with the distinction between pure and mixed mathematics: pure mathematics encompassing those subjects in which the principles are evident, or certain—arithmetic and geometry, and mixed mathematics, those the principles of which are suppositious—as astronomy and the other seven sciences in his list, involving measurement of quantity. The distinction between pure and mixed mathematics was a standard one in early

[21] *HW* vi, 34.
[22] *HW* vi, 33.

modern thinking, and there is nothing inherently striking about Newcastle's use of it. But his engagement with it in relation to Hobbes's discussion of evident or certain versus suppositious principles is suggestive. This is because the most significant contemporary treatments of mixed mathematics were published in Paris shortly before Newcastle's arrival there, by Hobbes's associate, Marin Mersenne. In the summer of 1644 Mersenne published two collections of classical and modern works in geometry and applied mathematics, one under the title *Universae geometriae, mixtae mathematicae synopsis* (*Synopsis of Universal Geometry and Mixed Mathematics*) and a second under the title *Cogitata physico-mathematica* (*Physico-Mathematical Thoughts*). He sent copies of both titles to Sir Charles Cavendish, then in Hamburg.[23] Might this fresh and prominent discussion of mixed mathematics have caught Newcastle's attention and, perhaps immediately, or perhaps sometime later, following his arrival in Paris, have prompted him to reach out to Hobbes for clarification on how Mersenne's division of the sciences into species of mathematics, pure or mixed, could be ranged against or integrated with the distinctions between different kinds of knowledge which Hobbes was developing as a central aspect of his philosophical system?[24]

Many—though by no means all—of the special sciences treated by Hobbes and Newcastle appear in Mersenne's volumes: geometry, statics, and optics in the *Universae geometriae*; weighing, navigation, music, and mechanics in the *Cogitata*. And Hobbes, as Marcus Adams has demonstrated, was thinking about such sciences in terms of mixed

[23] Noel Malcolm and Jacqueline Stedall, *John Pell (1611-1685) and his Correspondence with Sir Charles Cavendish: The Mental World of an Early Modern Mathematician* (Oxford: Oxford University Press, 2005), 365-6, 371.
[24] On this process, see Timothy Raylor, *Philosophy, Rhetoric, and Thomas Hobbes* (Oxford: Oxford University Press, 2018), esp. 200-12.

mathematics at around this time.[25] He was also engaged with Mersenne in so doing. In the opening chapter of the *Anti-White* (*c.*1642-3)—a work written at Mersenne's behest—Hobbes insists that, were it not for "the temerity and the ignorance" of moral and natural philosophers, all sciences, as opposed only to geometry and arithmetic, might have been mathematical ("Debentque Geometria et Arithmetica temeritati et ignorantiae Physicorum et moralium scriptorium quod solae nunc sint Mathematicae"); among mathematical sciences he numbers astronomy, mechanics, optics, and music, while pointing to the possibility that other parts of philosophy, concerned with quantity and number in regard to actual bodies (their weights, movements, or effects) ought also to "be counted among the mathematical sciences" ("in numerum venire debent Mathematicarum").[26] In his account of the sciences in *De homine*, Hobbes would stipulate as aspects of "mixed" ("Mixta") as opposed to "pure" ("pura") mathematics astronomy, music, physics, "and parts of physics" ("& partes Physicae").[27] His evident sense of the potential breadth of mixed mathematics—including not only these sciences, but also "others, still untouched" ("aliae adhuc intactae")—is answered by Newcastle's comment, following his list of these special sciences, that the whole of natural philosophy, if built on true principles, is mixed mathematics ("Ethiques or Moralls, nott Mathematicks, yett may bee as serteyne as Mathematicks").

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[25] Marcus P. Adams, "Hobbes on natural philosophy as 'True Physics' and mixed mathematics," *Studies in History and Philosophy of Science* 56 (2016): 43-51 (esp. 45-6).
[26] Hobbes, *White's "De mundo" Examined*, 24-5 (I.1); Hobbes, *Critique du "De mundo,"* 106 (I.1).
[27] *De homine*, 60 (X.5).

4 Newcastle's Queries; Hobbes's Answers

Newcastle's raising of queries for members of his entourage to address was a standard practice within what we typically call the Newcastle, Welbeck, or Cavendish Circle.[28] This should be unsurprising, because the Cavendish Circle is really nothing more than Newcastle's household and extended patronage network looked at under the aspect of intellectual communication—a point that modern scholarship does not always register. This was no formally-constituted society, no disinterested scientific collective; a certain jostling for position among members of the circle can be detected behind Hobbes's dismissal, in his letter to Newcastle of 15/25 August 1635, of Warner's ability to demonstrate his burning glasses. Even more open in their competitiveness are his comments in the same letter about Robert Payne's efforts to offer, for Newcastle's benefit, and presumably at his request, a new account of the operation of the soul:

> For y^{e} Soule I know he has nothinge to giue yo^{r} Lo^{p} any satisfaction. I would he could giue [a *deleted*] good reasons for y^{e} facultyes & passions of y^{e} soule, such as may be expressed in playne English. [I do *deleted*] if he can, he is the first (that I euer heard [> of) could] speake sense in that subiect. if he can not I hope to be y^{e} first.[29]

Despite the controversy over its authorship, it is, I think, now generally agreed that the so-called "Short Tract on First Principles," first published by Ferdinand Tönnies as an appendix to his edition of *The Elements of Law*, should be seen as a response from within the circle to this

[28] See Stephen Clucas, "*Modus notandi*: Charles Cavendish's notes on Thomas Hobbes and Walter Warner," *Hobbes Studies* 38 (2025): 00-00.
[29] *HW* vi, 29.

request of Newcastle's for a clear, English-language account of the passions of the soul.[30] Similarly, a short essay in Payne's hand, "Considerations touching the facility or difficulty of the motions of a horse, on streight lines, & circular," was evidently written in the same period to bring to bear a mechanical analysis on Newcastle's passion for horsemanship—in particular, his technique of training horses to move in a circle around a pillar.[31]

While the provision of texts in response to Newcastle's interests has been noticed in prior discussions of the Cavendish Circle, the degree to which this practice impacted, and in fact shaped, the corpus of Thomas Hobbes's writings has not, I think, been fully registered. For while Hobbes's dedication of a number of works to Newcastle is well known, those works were in several cases not merely dedicated to Newcastle, but were also written at his request. *The Elements of Law*, for instance, was not simply the first iteration of Hobbes's philosophical system; it was a work ostensibly written at Newcastle's command to set out the fundamental principles of Hobbes's thinking about political philosophy: "Now (my Lord) the principles fit for such a foundation, are those which I have heretofore acquainted your Lordship withal in private discourse, and which by your command I have here put into method."[32] Hobbes's first overview of his philosophical system was thus, in a sense, premature—issued before that system was fully worked out—because Newcastle (no Latinist) wanted to see an English version of it.

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[30] See Noel Malcolm, "Robert Payne, the Hobbes Manuscripts, and the 'Short Tract'," in Noel Malcolm, *Aspects of Hobbes* (Oxford: Oxford University Press, 2002), 80-145 (134-9); Timothy Raylor, "Hobbes, Payne, and *A Short Tract on First Principles*," *Historical Journal* 44 (2001): 29-58 (54-6).
[31] Raylor, "Hobbes, Payne, and *A Short Tract*," 47. For the full text of this work, see S.A. Strong (comp.), *A Catalogue of Letters and Other Historical Documents Exhibited in the Library at Welbeck* (London: John Murray, 1903), 237-40.
[32] Hobbes, *The Elements of Law*, xv-xvi (Ep. Ded.).

We should, of course, be wary of taking Hobbes's account of Newcastle's command at face value. Hobbes had his own motive for furnishing Newcastle with a statement of his draft of his philosophy in short order: he believed it might help to resolve the political crisis of 1640. As he explained in his dedication (signed a mere four days after the dissolution of the Short Parliament), if only people held the views expounded in his book, there would be no crisis. Such public spiritedness should excuse any appearance of pushiness: "The ambition therefore of this book, in seeking by your Lordship's countenance to insinuate itself with those whom the matter it containeth most nearly concerneth, is to be excused."[33] Since Newcastle was by then a Privy Councillor, he was in a position to bring Hobbes's doctrine to the attention of those it most nearly concerned. And not only Hobbes's doctrine. The aura of personal ambitiousness from which Hobbes's rhetoric attempts to distract attention—the book alone might stand accused of "ambition"—raises the likelihood that Newcastle's "command" might not have arisen entirely unprompted by the author.

The arrival in Paris of Newcastle in the spring of 1645, following his catastrophic defeat at Marston Moor the previous summer, brought him again into close proximity with Hobbes, and furnished him, once more, with the opportunity for conversation and the raising of queries on topics of interest. Two substantial works composed by Hobbes at this time can be assigned directly to the impact of Newcastle's queries. One of these was *A Minute or First Draugt of the Optiques* (1646), in which Hobbes developed a thorough English account of his theory of the operation of light and vision, in advance of his planned Latin version of the same material, to satisfy Newcastle's curiosity: "All that I shall be euer able to adde to it, is polishing, for being the first draught, it could nott bee so perfect as I hope hereafter to make it in latine, Butt as it is,

[33] Hobbes, *The Elements of Law*, xvi (Ep. Ded.).

it will sufficiently giue your Lo[rdshi]pp satisfaction, in those quaeres you were pleased to make concerning this subject."[34] Once again, Newcastle's "quaeres" prompted Hobbes to diverge from the systematic exposition of his philosophical system for a learned audience and provide an English-language adaptation of it for a courtly reader. Much of the material presented in the *Minute* would later appear in the chapters devoted to optics in *De homine* (1658), the second part of his philosophical trilogy.

Another substantial work of this period written in response to one of Newcastle's requests is Hobbes's *Of Libertie and Necessitie* (1654). John Bramhall, Bishop of Derry, composed a manuscript discourse with that title, on the question of free-will versus determinism, to which Newcastle invited Hobbes to respond with criticisms of the bishop's views and a brief statement of his own position. Hobbes obliged in a manuscript essay addressed to Newcastle. Almost a decade later this appeared in print, though without Hobbes's authority.[35] Once more, a request by Newcastle had obliged Hobbes to change tack. For, as he notes in the opening of his essay, he had originally planned a different approach: first to answer Bramhall's objections to *De cive*, and only then to turn to his discourse of liberty and necessity:

> I [h]ad once resolved to answer my *Lord Bishops* Objections to my book *De* CIVE in the first place as that which concerns me most, and afterwards to examine his discourse of Liberty and Necessity, which (because I had never uttered my opinion of it) concerned me the less. But seeing it was your Lordships and my Lord Bishops desire that I should

[34] British Library, Harley MS 3360, fo. 3[v].
[35] Hobbes, *Of Libertie and Necessitie* (London, 1654). Some exemplars show the date "1652" corrected in manuscript to "1646" (e.g., Bodleian Library, pressmark Ashm. 1325); in others, the page has been entirely reset, showing the date "1646" and correcting "obliged" to "obliging" (e.g., Bodleian Library, pressmark Vet. A3 g.46).

> begin with the latter, I was contented to do so, and here I present and submit it to your Lordships judgement.[36]

Hobbes's response to Bramhall's critique of *De cive* was never written. And the unauthorized publication of his letter to Newcastle sparked off a ramifying series of animadversions and counter-animadversions which rumbled along for years.[37]

There are, in addition to these substantial and well-known works by Hobbes, two shorter and lesser-known essays which Hobbes prepared in response to queries from Newcastle during the same period. One of these is a little-known essay—only identified as a work by Hobbes at the beginning of this century—on swordsmanship.[38] In this short piece, which evidently dates from the late 1640s, Hobbes engages with the so-called "sword problem." This was a question from the pseudo-Aristotelian *Mechanical Problems* which Marin Mersenne had encountered in a work on that text by the Italian mathematician Bernadino Baldi.[39] The problem was this: where, on a given sword, does a blow exert the maximum force? Is it near the hilt? Near the middle? Or near the tip? Mersenne circulated queries about the problem to his correspondents during the early 1640s, receiving responses from, *inter alia*, Descartes.[40]

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[36] Hobbes, *Of Libertie and Necessitie*, 1.
[37] For the bibliographical details, see Hugh Macdonald and Mary Hargreaves, *Thomas Hobbes: A Bibliography* (London: Bibliographical Society, 1952), nos. 48-54.
[38] Timothy Raylor, "Thomas Hobbes and 'The Mathematical Demonstration of the Sword'," *The Seventeenth Century* 15 (2000): 175-98.
[39] Raylor, "Hobbes and 'The Mathematical Demonstration of the Sword'," 185-6; Marin Mersenne, *Tractatus mechanicus* (Paris, 1644), 84-90; Bernadino Baldi, *In mechanica Aristotelis problemata exercitationes* (Mainz, 1621), 131.
[40] Raylor, "Hobbes and 'The Mathematical Demonstration of the Sword'," 186-7; Marin Mersenne, *Correspondance*, ed. Cornélis de Waard, Armand Beaulieu, René Pintard, and Bernard Rochot, 17 vols. (Paris: Vrin, 1933-88), x, 105-6; xii, 166.

Hobbes's essay, "To compare the force of two swords that presse each other," picks up on this theoretical problem in mechanics and explores its implications for the practicing swordsman, analyzing the clash of blades in terms of weights and beams by drawing on the Galilean mechanics he was currently developing for *De corpore*. The essay was clearly written for Newcastle—a keen swordsman who was, in the late 1640s, writing up a voluminous work expounding his theory of "mathematical fencing."[41] Newcastle was so impressed by Hobbes's paper that he added to it, in his own distinctive hand, the grandiose super-title "The [> Mathematicall] Demonstration off the Sorde."[42] And he careted into the manuscript of his own treatise an instruction that Hobbes's paper was to be inserted there among its prefatory materials ("The next this must bee the Mathematical Demonstration of the Sword"), where it was to serve as a kind of methodological foundation for the work.[43] Noticeably absent from these instructions for insertion of the "Demonstration" is any mention of Hobbes's authorship of it.

One further instance of Hobbes preparing bespoke responses to Newcastle's queries during the period of exile may here be added. This is the brief essay, "Of Passions," and the accompanying answers to Newcastle's "quaeres" that appear among the papers of his brother, Sir Charles Cavendish, in the Harleian Collection at the British Library.[44] The essay in question appears in Sir Charles's hand on a leaf also containing a number of notes on and questions and responses in reference to particular aspects of the passions; these Sir Charles has endorsed "parte of M^{r}: Hobbes his answeare to my brothers quaeres." Among these "quaeres" are questions on

[41] Raylor, "Hobbes and 'The Mathematical Demonstration of the Sword'," 177-9.
[42] Raylor, "Hobbes and 'The Mathematical Demonstration of the Sword'," 192; British Library, Harley MS 5219, fo. 1^{v}.
[43] Raylor, "Hobbes and 'The Mathematical Demonstration of the Sword'," 176-7; British Library, Harley MS 4206, fo. 9^{r}.
[44] British Library, Harley MS 6083, fos. 177^{r}-78^{v}.

amatory and military topics—matters of peculiar concern to Newcastle: Why does love make men sick? Will blushing men fight?[45]

The immediate context for such queries appears to have been discussions within the Cavendish household of the new and competing theories of the passions offered by Descartes, Regius, and Hobbes. In addition to the short essay and responses to Newcastle, Sir Charles's notes contain extracts from Hobbes's *De cive* (1642), Descartes's *Discours de la Methode* (1637), his *Principia philosophiae* (1644), and Regius's *Fundamenta physices* (1646).[46] The household's interest in such theories was further stimulated by the appearance of Descartes's major study of the subject, *Passions de l'âme*, late in 1649. Notes by Sir Charles on this work appear on another leaf in the manuscript containing his transcription of Hobbes's essay and responses to Newcastle's queries.[47] Newcastle's wife, Margaret, also appears to have read the work—or at least part of it—around this time: she would later, in a rare admission of having studied a work of philosophy, concede that she had read "half of" it; she certainly drew on it in her *Poems and Fancies* of 1653.[48] Sir Charles's collation of varying views of the passions is

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[45] The text of Hobbes's essay and queries was first published by Anna Minerbi Belgrado in "Thomas Hobbes: 'Of Passions'," *Rivista di storia della filosofia* 4 (1988): 729-38.
[46] See Jean Jacquot, "Sir Charles Cavendish and his Learned Friends," *Annals of Science* 8 (1952): 175-91 (188-9).
[47] British Library, Harley MS 6083, fos. 166^{r-v}.
[48] Margaret Cavendish, *Philosophical and Physical Opinions* (1655), sig. B3^{v}; quoted in L.E. Semler, "Margaret Cavendish's Early Engagement with Descartes and Hobbes: Philosophical Revisitation and Poetic Selection," *Intellectual History Review* 22 (2012): 323-53 (336-8). Semler argues that Margaret Cavendish's knowledge of the English translation of Descartes's work informs several of the contributions in her *Poems and Fancies* (1653); the most convincing piece of evidence for this view is her reference in "The Animal Parliament" to the distinctively Cartesian view that "there are six primitive Passions." B.J. Sokol argues for Margaret's engagement with the mathematical speculations of Sir Charles Cavendish and Thomas Harriot in "Margaret Cavendish's *Poems and Fancies* and Thomas Harriot's Treatise on Infinity," in *A Princely Brave Woman: Essays on Margaret Cavendish, Duchess of Newcastle*, ed. Stephen Clucas (Aldershot: Ashgate, 2003), 156-70.

likely linked to his contemporaneous investigation of different philosophical approaches to the movement of the heart and the circulation of the blood, involving accounts by Warner, Harvey, Regius, Gassendi, and queries for Hobbes—an investigation discussed by Stephen Clucas elsewhere in this collection.[49]

In short, responding to queries by Newcastle and members of his household with bespoke, English versions of his ongoing philosophical works, was a practice with which Hobbes was, over many years as a client of the Cavendish family, regularly engaged. There is nothing implausible therefore in the suggestion that the *Leviathan* table of sciences may have begun life, not as contribution to *Leviathan*, but as an ad hoc work designed to satisfy the curiosity of the Marquess of Newcastle.

5 The *Leviathan* Table as Transitional Schema

Aristocratic curiosity and the obligations of clientage not infrequently led Hobbes into articulating philosophical positions before they were quite ready for general consideration. It is therefore reasonable to consider the possibility that the *Leviathan* table was a transitional document, prepared originally to satisfy Newcastle's curiosity about the implications of Mersenne's mixed mathematics for Hobbes's theory of knowledge, and reflecting positions with regard to philosophy and the sciences that Hobbes had not fully worked through in his move from what we might loosely term the nominalism of the 1640 *Elements of Law* to the phenomenalism of the 1655 *De corpore*. Looked at in terms of other writings from the period, the anomalies turn out to have points of contact with both *De corpore* and the ad hoc remarks on

[49] Clucas, "*Modus notandi*."

philosophy and the special sciences that appeared in Hobbes's responses to Thomas White's *De mundo* around 1642-3.

Not all the oddities in the table are quite so unprecedented as they initially appear. The status and location of first philosophy is one such instance. In the table, "PHILOSOPHIA PRIMA" appears (without a science of logic preceding it) as the first part of natural philosophy. As we have noted, this seems to be at odds with its position in *De corpore*, where it is located outside and prior to natural philosophy, furnishing general foundations for philosophy as a whole. On closer examination, however, the differences are not so clear cut. First, although "PHILOSOPHIA PRIMA" is included in the table within the realm of natural philosophy, it is there glossed in rather more general terms, as providing "the Principles, or first foundation of Philosophy"—which is to say, the principles of philosophy in general. Nor, when we turn to *De corpore*, is it clearly excluded from natural philosophy. *De corpore* in fact announces a division of philosophy into two parts, each concerned with a different kind of body: natural philosophy, concerned with natural bodies (furnished by *De corpore* and *De homine*), and civil philosophy, concerned with artificial bodies (furnished by *De cive*), exactly matching the initial division of the *Leviathan* table.[50] As its chapter headings make clear, the focus of "Philosophia prima," the second part of *De corpore*, is the nature of body—its place, motion, magnitude, and other accidents—considered at the most general level. Within the work itself it is the first section on logic, rather than the second on first philosophy, which is characterized as preliminary to the discussion of body: "In the first place," Hobbes writes in the opening chapter, "(after I have set downe such Premisses as appertaine to the nature of Philosophy in general) I will discourse of *Bodies*

[50] *Of Body*, 8 (I.i.9); *De corpore*, 7 (I.i9).

Naturall."[51] Those premises are evidently the discussion of names, propositions, syllogism, error, and method that make up the first part of the work, "Computatio, sive Logica," not the discussion of the fundamental principles of body in the second. In sum, the location of first philosophy in the *Leviathan* table is, on examination, not really anomalous, aligning quite precisely—even in its ambiguities—with its appearance in *De corpore*.

Another instance of an apparent anomaly in the *Leviathan* table turning out to be something we encounter elsewhere is the table's inclusion of astrology. As we have noted, in his introductory survey of the field of philosophy in *De corpore*, Hobbes explicitly excludes astrology from consideration on the basis that it is inadequately grounded.[52] His dismissal of it, however, is not absolute: "*Astrology*, as it is now held forth" ("Astrologia qualis hodiè ostentatur").[53] A little earlier in the same chapter, he includes it in a list of the arts that benefit human life: "Now the greatest commodities of mankind are the Arts, namely of measuring Matter and Motion; of moving ponderous Bodies; of Architecture; of Navigation; of making instruments for all uses; of calculating the Coelestiall Motions; the Aspects of the Stars, and the parts of Time; of Geography &c." ("Commoda autem humani generis maxima sunt Artes, nimirum Mensurandi tam corpora quam eorum motus; Movendi gravissima pondera; Aedificandi; Navigandi; instrumenta ad omnem usum Fabricandi; motus coelestes, syderum aspectus, temporis momenta, Calculandi; orbis terrarium faciem Depingendi").[54] The reference here to "the Aspects of the Stars" ("syderum aspectus") points to astrology rather than astronomy

[51] *Of Body*, 8 (I.i.9); *De corpore*, 7 (I.i.9).
[52] See above, §2.
[53] *Of Body*, 8 (I.i.8); *De corpore*, 6 (I.i.8).
[54] *Of Body*, 5-6 (I.i.7); *De corpore*, 4-5 (I.i.7).

(which is treated in the prior item—"calculating the Coelestiall Motions"), since the term "aspects" denotes planetary conjunctions and their influences.[55]

While the appearance of astrology as a science in *De corpore* is notable, its framing in the *Leviathan* table as the science of stellar influences aligns closely with Hobbes's discussion of it in the *Anti-White*. There, Hobbes takes issue with White's arguments in favour of astrology on the grounds that although the stars exert influences (by way of movement communicated to earth through the medium of air, ether, or some sort of interstellar liquid), these are undetectable by the senses, and the causes of any given event are too manifold to be calculable—"if any effect whatever is brought about, the influences of all the stars combine to produce it."[56] Thus, although limitations in our data collection currently render astrology incapable of producing certain knowledge, it is, in principle, a viable science.

There is another point of contact between the table and the *Anti-White* involving the science of astrology. Immediately adjoining astrology in the table—below, but not conjoined with it—is an unnamed science concerning consequences of "the Qualities of *Liquid* Bodies that fill the space between the Starres, such as are the *Ayre*, or substance aetheriall." The tabular account and location of this unnamed science aligns with Hobbes's consideration, in his *Anti-White* account of astrology, of the manner in which celestial influences are propagated through a medium: "Again either the space intervening between the stars serves to propagate their influences, each upon each, or if there are corpuscles in that ether or liquid medium, of their nature such that they operate on a distant object, these are nothing but astral particles, e.g. vapours and exhalation" ("Et quoniam medium inter astra spatium aut inservit ad influentias

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[55] *Oxford English Dictionary* (hereafter "*OED*"), s.v. "aspect" (*n.*), II.4.
[56] Hobbes, *White's "De mundo" Examined*, 437 (XXXVI.2-3); Hobbes, *Critique du "De mundo,"* 397-8 (XXXVI.2-3).

astrorum aliorum ad alia propagandas, aut, si quae sunt in illo aethere, sive liquido medio corpuscula, suâ naturâ talia ut operentur ad distans, ea nihil aliud sunt quam astrorum particulae, ut vapores & exhalationes").[57] The "*Liquid* Bodies" filling the spaces between the stars, such as air or ether, which convey celestial influences are clearly the corpuscles in the ether or liquid medium of the *Anti-White*. Here, then, is another instance of close alignment of the table with the *Anti-White*.

A further respect in which the *Leviathan* table registers proximity to *Anti-White* is in its treatment of cosmography. In *De corpore*, as we have noted, knowledge of the world and the stars is treated as deriving from sensory qualities. The *De corpore* chapter "*Of the* World*, and of the* Starres" appears within the fourth part of the work, that dealing with "Physiques, or the *Phaenomena* of Nature." In the table, however, these sciences are located prior to physics, adjoining pure mathematical sciences of arithmetic and geometry as involving consequences from determined motion and quantity, differing from geometry and arithmetic only in dealing with "Bodies in *speciall*"—particularly "the great parts of the World, as the *Earth* and *Starres*." This placement aligns with the introductory remarks about the mixed mathematical sciences in the *Anti-White*, wherein Hobbes locates astronomy, along with other sciences that deal with quantity not just in the abstract but with reference to the real motion of bodies in the world, among the mathematics.[58] Like the *Leviathan* table, the *Anti-White* treats astronomy as a kind of mixed mathematics, rather than locating it within physics.

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[57] Hobbes, *White's "De mundo" Examined*, 437 (XXXVI.4); Hobbes, *Critique du "De mundo,"* 398 (XXXVI.4).
[58] Hobbes, *White's "De mundo" Examined*, 24-5 (I.1); Hobbes, *Critique du "De mundo,"* 106 (I.1). See §3, above.

Such points of contact between the *Leviathan* table and the *Anti-White* permit the suggestion that the table reflects Hobbes's thinking on the nature of philosophy and the status of its several divisions and special sciences around the middle of the 1640s: thinking that underwent change and development over the decade prior to the publication of *De corpore* in 1655. This suggestion would, of course, align with the contention that the construction of the table was sparked by Newcastle's queries about the relative levels of certainty of different fields of knowledge prompted by Mersenne's works on mixed mathematics of 1644.

That contention is further supported by two structural features of the table. The first is the absence of logic as a preliminary science, foundational and prior to philosophy itself. This is where logic appears in *De corpore*, and in the draft of *De corpore* on which Sir Charles Cavendish took notes in 1645-6. But it is not how the work that became *De corpor*e originally appears to have opened. A manuscript in the National Library of Wales (MS 5297), typically known today as "De principiis," preserves the opening leaves of what is generally agreed to be the earliest version of any part of *De corpore*; it contains material on the metaphysics of body that was later deployed in the opening chapters of "Philosophia prima" (i.e., in chapters VII, VIII, XI, and XII of *De corpore*), but that material is here distributed into twelve chapters numbered 1-12.[59] That manuscript is most authoritatively dated to *c*. 1643-4, suggesting that prior to a revision which had taken place by 1645, after which the work departed from the new causal definition of philosophy and opened with a preliminary section on logic, the work began, like the *Leviathan* table, with first philosophy.[60] This, in fact, appears to have been the condition in which Sir Charles first encountered it in the spring of 1645, on his arrival in Paris. Writing to

[59] For a text of this manuscript, see Hobbes, *Critique du "De mundo,"* 448-60.
[60] For the dating of this manuscript, see Malcolm, *Aspects of Hobbes*, 17-18.

the Hamburg schoolmaster Joachim Jungius on [1/] 11 May 1645, Sir Charles referred to the material he had seen on a visit to Hobbes not as a large work concerning body, or natural philosophy, but as "some small leaves of his concerning first philosophy" ("Schedulas quasdam eius de Philosophia prima").[61]

The second respect in which the structure of sciences in the table squares with the view of the table as a transitional schema, reflecting Hobbes's thinking about the status of the sciences prior to his final consideration of such matters in the completed *De corpore*, is his location of cosmography along with mathematics and mechanics as sciences involving consequences from the motion and quantity of bodies. As we have noted, in *De corpore*, cosmography would be located within physics, as a science "concerning the Motions and Magnitudes of the Bodies which are parts of the World, reall and existent"—or, in the terms used in the table, a science of qualities (since such bodies can only be apprehended by way of the senses), rather than quantities.[62] Since the fourth and final part of *De corpore* appears to have been the last to have been written—the transcripts made by Sir Charles Cavendish and Robert Payne in 1645-6 break off in the middle of the third part, on Hobbes's expansive version of geometry ("Of the Proportions of Motions and Magnitudes")—it seems possible to see the Chapter 9 location of cosmography as indicative of an early and generous view of the breadth of the mathematical sciences before he had begun to think systematically through the implications of the fundamental distinction between sciences of quantity and sciences of quality.

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[61] Staats- und Universitätsbibliothek, Hamburg, MS Sup. ep. 97, no. 85^{r-v}. The text was first published in Cay von Brockdorff, *Des Sir Charles Cavnedish Bericht für Joachim Jungius über die Grundzüge der Hobbes'schen Naturphilosophie*, Veröffentlichungen der Hobbes-Gesellschaft, iii (Kiel, 1934), 2-4 (2).
[62] *Of Body*, 288 (III.xxiv.9); *De corpore*, 222 (III.xxiv.9).

The same explanation of the table as a transitional schema may, finally, help us to make sense of the most significant oddity about Chapter 9 of *Leviathan*: its strange definition—or rather definitions—of philosophy, as an attempt to unify two somewhat different understandings of that crucial topic—an older one, first articulated in *The Elements of Law* (1640), which was fundamentally logical and linguistic, and a newer, phenomenalist approach that would not become fully focused until the 1645-6 revision of *De corpore*.

The definition of philosophy offered in *The Elements of Law* distinguishes between "two sorts of knowledge": one, the product of mere sense impressions—things we have noticed or recall noticing, amounting to bare registers of fact; the other, the product of the correct use of words, which yields "science or knowledge of the truth of propositions, and how things are called."[63] Registers of fact are histories; science is the result of firmly-grounded and properly-integrated propositions.[64] This is an extremely restrictive view of science or philosophy, excluding most of what we consider knowledge, and ill suited for dealing with phenomena that are not wholly susceptible to logical and linguistic definition.[65]

Hobbes attempted to address this problem in the *Anti-White*, expanding his definition of philosophy to allow it to take on a wider range of material, including the natural philosophical questions with which much of White's book, *De mundo*, is concerned: "Now, philosophy is the science of general theorems, or of all the universals (the truth of which can be demonstrated by natural reason) to do with material of any kind" ("Philosophia autem Scientia est Theorematum

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[63] Hobbes, *The Elements of Law*, 24-5 (I.vi.1).
[64] Hobbes, *The Elements of Law*, I.vi.4.
[65] On the difficulties presented by this narrow definition, see Douglas Jesseph, "*Scientia* in Hobbes," in *"Scientia" in Early Modern Philosophy: Seventeenth-Century Thinkers on Demonstrative Knowledge from First Principles*, ed. Tom Sorell, G.A.J. Rogers, and Jill Kraye, (Dordrecht: Springer, 2010), 117-27.

generalium, sive universalium omnium in materia quacumque quorum veritas ratione naturali demonstrari potest").[66] In this rendition, philosophy falls into two parts: "philosophia prima," concerned with being in general, and "physics or natural philosophy" ("physica, sive Philosophia naturalis"), concerned with "beings, distinctly and separately from one another." In the terms offered by *Elements of Law*, this knowledge of distinct and separate bodies looks more like history than science. Hobbes attempts to accommodate it to his conception of science by asserting that it provides "reasons" for the particular effects it examines: "it demonstrates the reasons for natural effects in natural bodies taken individually" ("in qua demonstrantur rationes effectuum naturalium per singula corpora naturalia").[67] But he does not make clear the precise demonstrative import of the key term "reasons" ("rationes") or explain how "reasons for natural effects in natural bodies taken individually" might yield the "general theorems," the universals of true science.

In his next attempt, Hobbes would solve this problem by sharpening "reasons" into explanatory "causes," while loosening the demand for certainty about such causes in the realm of natural philosophy, wherein certainty is (as he had noted in his 1636 letter to Newcastle) unattainable. This is the definition articulated in its full and mature form in *De corpore* (1655): "PHILOSOPHY *is such knowledge of Effects or Appearances, as we acquire by true Ratiocination from the knowledge we have first of their Causes or Generation: And again, of such causes or Generations as may be from knowing first their Effects*" ("*Philosophia est Effectuum sive phaenomenωn ex conceptis eorum Causis seu Generationibus, et rursus Generationum quae esse*

[66] Hobbes, *White's "De mundo" Examined*, 23 (I.1); Hobbes, *Critique du "De mundo,"* 105 (I.1).
[67] Hobbes, *White's "De mundo" Examined*, 24 (I.1); Hobbes, *Critique du "De mundo,"* 105 (I.1).

possunt, ex cognitis effectibus per rectam ratiocinationem acquisita cognitio").[68] Philosophy or science is now no longer, as in *The Elements of Law*, exclusively linguistic and propositional. The second part of the new definition expands its scope to include natural philosophy by allowing to stand as a kind of knowledge an understanding of the *possible* causes or generations of the phenomena or effects we perceive through the senses.[69] And, it may be added, the linguistic, logical, propositional concerns of the earlier definition are displaced in the work itself into a substantial prolegomenon on logic (part one of *De corpore*) in which names, propositions, syllogisms, and method provide the foundations for philosophy, rather than a definition of it.

Although Hobbes did not complete and publish *De corpore* until several years after writing *Leviathan*, manuscript evidence shows that he had come to this position a decade earlier.[70] The notes on his work in progress taken by Sir Charles Cavendish in 1645-6 open with what is essentially the same definition of philosophy: "Philosophia est corporum proprietatum ex conceptis eorum generationibus, et rursus generationum quae esse possunt, ex cognitis proprietatibus per rectam ratiocinationem acquisita cognitio."[71] This is, as we have seen above, the definition Hobbes offers in Chapter 46 of *Leviathan*.[72]

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[68] *Of Body*, 2 (I.i.2); *De corpore*, 2 (I.i.2); see also *Of Body*, I.vi.1; *De corpore*, I.vi.1.
[69] On this definition and its implications, see Doug Jesseph, "Hobbesian Mechanics," in *Oxford Studies in Early Modern Philosophy*, vol. iii, ed. Daniel Garber and Steven Nadler (Oxford: Clarendon Press, 2006), 119-52 (120-9, 137-9); Douglas Jesseph, "Hobbes and the method of natural science," in *Cambridge Companion to Hobbes*, ed. Tom Sorell (Cambridge: Cambridge University Press, 1996), 86-107 (88-92); Frank Horstmann, "Hobbes on Hypotheses in Natural Philosophy," *The Monist* 84 (2001): 487-501.
[70] See Malcolm, "Some Features of the English *Leviathan*," *HW* iii, 143-4; also Noel Malcolm, "Hobbes's Science of Politics and his Theory of Science," in *Hobbes oggi*, ed. Andrea Napoli (Milan: Franco Angeli, 1990), 145-57 (155); repr. Malcolm, *Aspects of Hobbes*, 146-55 (154).
[71] British Library, Harley MS 6083, fo. 198^{r}. The most significant difference is the focus of the later version on "effects or appearances" rather than "properties of bodies"; but these properties ("proprietates" = "qualities") of bodies are their effects or appearances.
[72] See §2, above.

But it is not the definition he offers in Chapter 9. In that chapter, he offers two rather different definitions of philosophy. In the text itself, he adopts the *Elements of Law* account of science as logical and propositional, rehearsing his distinction between two kinds of knowledge. But while this account of history is unaltered, that of science takes on a different aspect:

> one is *knowledge of Fact*: the other *knowledge of the Consequence of one Affirmation to another.* The former is nothing else, but Sense and Memory, and is *Absolute Knowledge*; as when we see a Fact doing, or remember it done … The later is called *Science*; and is *Conditionall*; as when we know, that, *If the figure showne be a Circle, then any straight line through the Center shall divide it into two equall parts*.[73]

As in *The Elements of Law*, this is a linguistic definition, the term "consequence" denoting (as it does in subsequent accounts of philosophy of the early 1640s) logical sequence or necessity.[74] In the example given, for instance, the consequence is necessary because it is contained in the premise—equal division by a line through its centre being part of the definition of a circle.[75] But this definition does not match that offered in the table.

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[73] *HW* iv, 124 [*Leviathan*, 40].
[74] *OED*, s.v. "consequence" (*n*.), 3.a. In *Anti-White*, for instance, Hobbes notes that students of philosophy "seek to know the necessity of consequences and the truth of universal propositions" ("scire necessitatem consequentiarum veritatemque propositionum universalium") (Hobbes, *White's "De mundo" Examined*, 26 (I.3); Hobbes, *Critique du "De mundo,"* 107 (I.3)); see also *De cive*, XIV.16 (*HW* ii, 213).
[75] See, for instance, Hobbes's translation of Euclid, *Elements*, I. Def. 15, in *Six Lessons, To the Professors of the Mathematiques, one of Geometry, the other of Astronomy* (London, [1656]): "*a plain Figure comprehended by one line which is called the Circumference, to which Circumference all the straight lines drawn from one of the points within the Figure, are equall to one another*" (7).

The table drops from its definition of philosophy the phrase "*of one Affirmation to another*"—drops, in fact, any reference to affirmation or the linguistic and logical context of the *Elements of Law* definition. Philosophy is now simply "Knowledge of Consequences."[76] By shrinking the predicate, the table articulates a new definition of philosophy, which encompasses not just propositional meaning and logical sequence, but now, also, the entire range of physical phenomena and effects in the world—things that are in no logical sense necessary: "Consequences from the Qualities of *Vegetables*," for example. The term "consequence" here denotes not logical sequence, or even necessary succession, but the effect of an antecedent cause—as, when discussing natural as opposed to necessary "signs" in *De corpore*, Hobbes writes: "we seldom see Clouds without the Consequence of Rain."[77] The table thus gestures in the direction of, without quite articulating in precise logical terms, the causal definition of *De corpore* and *Leviathan*, Chapter 46.

Although it offers the illusion of gathering two different approaches to philosophy under a single definition, Hobbes's use of the term "consequence" in Chapter 9 of *Leviathan* is equivocal. In the chapter itself it denotes logical necessity; in the table, natural cause and effect. Such equivocation rests upon a fundamental ambiguity in Hobbes's new treatment of the concept of causation—an ambiguity that, as Noel Malcolm has pointed out, first became visible in the 1645-6 version of *De corpore*. In that version, Hobbes admitted the consideration of natural phenomena to philosophy by arguing that philosophy is concerned with knowledge of "generations," rather than with definitions and propositions; while philosophy thus understood might still possess the certainty of causal reasoning, as long as the causes of the phenomena are

[76] *HW* iv, 130-1 [*Leviathan*, 40+1].
[77] *Of Body*, 11 (I.ii.2); *De corpore*, 9 (I.ii.2); *OED*, s.v. "consequence" (*n*.), 1.b, citing this instance.

certainly known, it may also be hypothetical, proceeding by firm reasoning from observed phenomena to "possible generations" thereof.[78] Malcolm suggests that the shift was prompted by Hobbes's encounter, in the Paris of the early- to mid-1640s ("1643-5"), with the conception of geometry pursued by Gilles Personne de Roberval and others within the Mersenne circle. In Roberval's approach, the figures of geometry were to be understood as products of the motions which generated them—a circle, for instance, being generated by the movement of one point around another. Such a concept of "generation" furnished for Hobbes the vision of a "unified theory of science," uniting the various understandings of philosophy with which he had been wrestling; but, as Malcolm notes, this was an illusion, resting on "an equivocal use of the word 'cause'": "The motion of a pair of compasses certainly causes a mark on a page; but what 'causes' that mark to be a circle is the equidistance of the resulting line from the central point, and this was a sort of causation which Hobbes had already denied to involve causes properly speaking."[79] The timing and implications of this Hobbes's adoption of this equivocal use of "generation" aligns with those of his equivocal use of the term "consequence" in Chapter 9 of *Leviathan* and its accompanying table.

It is perhaps not redundant to point out also that such equivocal use of a key term entails exactly the kind of rhetorical kind of sleight of hand against which Hobbes inveighed in his criticisms of prior philosophical work and to prevent which his own philosophical procedure, founded upon "Perspicuous Words, but by exact definitions first snuffed, and purged from ambiguity," was developed.[80] It stands as evidence against any assumption that Hobbes's

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[78] Malcolm, "Hobbes's Science of Politics," 155-6; repr. Malcolm, *Aspects of Hobbes*, 154-5.
[79] Malcolm, "Hobbes's Science of Politics," 155-6; repr. Malcolm, *Aspects of Hobbes*, 154-5.
[80] *HW* iv, 74 [*Leviathan*, 22]. For a full account of these objections and the process of refoundation, see Quentin Skinner, *Reason and Rhetoric in the Philosophy of Hobbes*

theoretical account of philosophy can be taken to provide an unproblematic account of his philosophical practice.

6 Conclusion

Although the table of sciences in Chapter 9 of *Leviathan* appears anomalous, textual evidence connects it with other works by Hobbes of the early and mid-1640s, and contextual evidence offers both a possible reason for its composition (Newcastle's queries in response to Mersenne's publications of 1644) and a likely period during which it was written (*c*.1644-5: after the *Anti-White* of 1642-3 but prior to the revision and expansion of *De corpore* in 1645-6). When we weave together those strands of evidence, a case emerges for the table as a transitional document, offering a glimpse of Hobbes attempting to find a way forward from the narrowly logical understanding of philosophy he had articulated in *The Elements of Law*, and toward the causal definition of *De corpore*, as he turned his attention away from the artificial constructs of civil philosophy and toward the realm of natural philosophy, the multifarious and uncertain phenomena of which called for a more relaxed and expansive understanding of the philosophic enterprise.

Acknowledgements

I am most grateful to the Warden and Fellows of All Souls College, Oxford for electing me to a Visiting Fellowship, during the tenure of which I wrote this paper. Oberto Marrama and Pietro Daniel Omodeo organized the conference, "The Cavendish Circle: Philosophical Networks in the

(Cambridge: Cambridge University Press, 1996), 250-326, and Raylor, *Philosophy, Rhetoric, and Thomas Hobbes*.

17th Century," at Ca' Foscari University of Venice at which, on 30 April 2024, a version of it was delivered; to them and to my fellow participants for comments and suggestions, my thanks. Special thanks to Stephen Clucas, Noel Malcolm, and an anonymous referee for comments on an earlier version, and to Kathy Quirk-Syvertsen for photographing the table.

Appendix: Newcastle's Paper on the Sciences

William Cavendish, Earl, Marquess, and Duke of Newcastle (1592-1676), Paper on mathematics, natural philosophy, and the humanities. Autograph. Undated. University of Nottingham, Portland MS Pw 1/666.

In my transcription, I have followed Newcastle's eccentric orthography, leaving in place his distinctive punctuation (consisting largely of commas and dashes) and spelling. Newcastle frequently uses a standard form of abbreviation: a tilde over "m" and "n" to register the doubling of a nasal consonant—typically at the end of a word. Such abbreviations I have filled out in square brackets. Newcastle makes a number of running corrections to his text. I have not recorded corrections of individual letters (e.g., the alteration of "rasiocination" to "ratiocination"), but have registered the insertion of complete words by enclosing them in square brackets, using a "greater than" sign for Newcastle's carets [> thus]. A single deletion is enclosed in square brackets, with a comment in italic script, thus "[good *deleted*]."

> Pewre Mathematicks Is thatt [> naturall] sience Wherin[n] nott onlye [> the] ratiocination[n] butt alsoe the Principles are Euedente as In[n] Geometrye & Arethemetick. —

Mixte Mathematicks are those sienses Wherin[n] though the ratiocination[n] bee firme & Euedente, thatt Is to saye trewe Yett the Principells are butt supotitions

1 As Astroneye,— Wher the Motions are supposed, butt the Inferenses frome them[m] are Euedente

Cosmogrefye
2 Geogrefye
3 Architecture
wayenge: 4 Staticks.
5 Nauigation[n].
gnomologia 6 Dialinge
7 Opticks
8 Musick

Astrologie oughte nott to bee putt In[n] because Itt is no Arte, but Iuglinge & Gipsye fortune tellinge & Cooseninge,— so farr frome Truth/.

Whatsoeuer In[n] Naturall Philosophye, Is bulte on[n] [good *deleted*] principles [> vndisprouable] & trewe resoninge, Is Mixte Mathematicks,—

Ethiques or Moralls, nott Mathematicks, yett may bee as serteyne as Mathematicks, because the resoninge In[n] them[m] Maye bee good, & the principles taken frome the knoledge of his owne passions — — —

Soe alsoe maye Logick, & Retorick bee demonstrated, & therfore bee as Infalible as the Mathematicks, for a man[n] may chuse wether hee will reson[n] falslye or nott & the principles In Logick are definitions off wordes, & In[n] Retorick suposinge the Passions vnderstoode, theye are the Principles off Retorick. ——

Poetrye

Consistes In Magnefienge, Villefienge or representinge with delectation[n] the Actions of mans Life.— Ande Is nott Mathematicks, yett the rules theroff are Demonstrable In[n] theyr owne natture though ther wante Iudgmente to doe Itt.[81] for to Ciense belonges to Iudge of Poetrye, to Phanseye the Makinge off The Poem[m].

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[81] A long dash followed by a slash ("/") after the full stop indicates that the text originally ended here. The sentence beginning "for to Ciense" was then added.

ACCEPTED VERSION – Please quote published version
Hobbes Studies 38/1 (2025), 43-63

Modus notandi: Sir Charles Cavendish's notes on Thomas Hobbes and Walter Warner

Stephen Clucas | ORCID: 0000-0001-9336-0475

Emeritus Professor, Department of English and Humanities, Birkbeck,

University of London, London, UK

s.clucas@bbk.ac.uk

Abstract

This paper seeks to make a contribution to the history of early modern note-taking by examining the note-taking practices of Sir Charles Cavendish (1591-1653). Rather than viewing the notes as records and memoranda for strictly personal use, Cavendish's notes are seen as a repository of information which he shared with other scholars. Note-taking and the recording of "quaeres" are shown to be socially extensive, involving exchanges via correspondence or in-person encounters, and sometimes involved more than two people. A close examination of manuscript notes on Walter Warner's theories concerning the circulation of the blood and notes on Thomas Hobbes's draft of *De corpore* reveal that Cavendish often gathered extracts from different sources on the same topic on the same manuscript page and was actively engaged in questioning the sources he was perusing and engaging others in those questions.

Keywords

History of note-taking, queries, circulation of the blood, passions, Thomas Hobbes, Walter Warner, Sir Charles Cavendish.

1 Introduction

In her contribution to a special issue of *Intellectual History Review* on early modern note-taking in 2010, Ann Blair reminded her readers that "The history of note-taking has only begun to be written."[1] This paper aims to make a small contribution to that history by examining the note-taking practices of Sir Charles Cavendish (1591-1653) and their relationship to his participation in a community or network of like-minded scholars, which has often been referred to as "the Cavendish circle" (or the "Welbeck Academy" or "Newcastle Circle").[2] In her article, Blair emphasised the importance of moving beyond the study of individual note-taking practices into a wider milieu in which those note-taking practices functioned. It was important she said,

> to analyse note-taking not on the scale of the individual, but as a practice that was broadly shared within a context variously defined by profession or occupation, time and place or other cultural factors …[3]

The Cavendish network provides precisely such a context. Geographically extensive, it covered various locations in Britain and European cities including Paris, Hamburg,

[1] Ann Blair, "The Rise of Note-Taking in Early Modern Europe," *Intellectual History Review* 20 (2010): 303-16 (316). See also Ann M. Blair, "Note-taking as Information Management," in Ann M. Blair, *Too Much to Know: Managing Scholarly Information before the Modern Age* (New Haven, CT, and London: Yale University Press, 2010), 62-116.

[2] For a critical reconsideration of the usefulness of these terms for the group see Noel Malcolm, *Aspects of Hobbes* (Oxford: Clarendon Press, 2002), 10-1.

[3] Blair, "The Rise of Note-Taking," 305.

Amsterdam, Breda, and Antwerp. What bound this network was a set of shared interests in the most recent developments in mathematics, natural philosophy, and the world of learning more generally. What I hope to show here is that the note-taking practices of Sir Charles Cavendish were socially extensive, rather than the product of individual study for private consumption. As Richard Yeo – the co-editor of the special issue on early modern note-taking – has argued: "During the early-modern period there are some constant themes, such as the function of notes both as memory prompts and as permanent records, [together with] the tension between private notes and those intended for public use."[4] Early modern notes frequently have a private and a public dimension so that the historian is obliged to "specify and classify the[ir] cognitive and social functions."[5] As Blair suggests, early modern scholars increasingly promoted an "ideal of stockpiling notes from one's reading and experience, even if one did not have an immediate use to which to put them, in order to make them available for future use by oneself or by others."[6] In the Cavendish circle we find ample evidence of this ideal at work. We find a circuit or reciprocal relationship between private acts of study –

[4] Richard Yeo, "Introduction," *Intellectual History Review* 20 (2010): 301-2 (302). For more on early modern note-taking, with particular reference to science (or natural philosophy) see Richard Yeo, *Notebooks, English virtuosi, and Early Modern Science* (Chicago: Chicago University Press, 2014); Elaine Leong, "Read. Do. Observe. Take note!" *Centaurus* 60 (2018): 87-103; and Angus Vine, "Note-Taking and the Organization of Knowledge," in *Encyclopedia of Early Modern Philosophy and the Sciences*, ed. Dana Jalobeanu and Charles T. Wolfe (Cham: Springer, 2022), 1559-64.

[5] Yeo, "Introduction," 302.

[6] Blair, "The Rise of Note-Taking," 303.

reading and note-taking – and the sharing of these private acts via correspondence often across more than two individuals.

In what follows I will approach the question of note-taking in the Cavendish circle in two ways. Firstly, I will draw out relevant passages of the correspondence between the mathematician John Pell (1611-1685) and Sir Charles Cavendish – a series of 115 surviving letters written between June 1641 and October 1651.[7] Secondly, I will closely analyse two examples of Cavendish's note-taking – his notes on Walter Warner's manuscript writings on the circulation of the blood, and his notes on a draft of Thomas Hobbes's *De corpore,* to see what they have to tell us about his scholarly practices.

2 Cavendish-Pell correspondence, scholarly networks and the circulation of notes

In a letter of March 1646 Sir Charles Cavendish wrote to his friend John Pell urging him not to be dissuaded from publication: "I conceiue not," he said,

> but that the greatest witts & most learned doe much benefit on an other by publishing & communicating theyr choice thoughts one to an other, & that euen meaner witts & Clerkes gleane something from them too.[8]

[7] All references to this correspondence refer to the edition of Noel Malcolm and Jacqueline Stedall, *John Pell (1611-1685) and his correspondence with Sir Charles Cavendish: the mental world of an early modern mathematician* (Oxford: Oxford University Press, 2005). The correspondence can be found in Part III, "The Pell-Cavendish correspondence," 329-586.

[8] Malcolm and Stedall, *John Pell*, 473 (Letter 56, 21/31 March 1646).

Although print publication is the immediate context of this remark, it is clear that Cavendish here is voicing a more general ideal of scholarly communication, and his correspondence with his younger contemporary is full of examples of "communicating … choice thoughts." This consists of a number of things: sharing information about newly published books, reporting on current reading (which thus becomes a shared and not a solitary activity), and the transmission of manuscripts or notes on manuscripts.[9] As Noel Malcolm has noted, "Pell's … correspondence with Cavendish had … the character of a dialogue between two participants in the Republic of Letters, as they exchanged news and opinions about recent publications, current research, and their encounters with learned men."[10] While there is clearly a patron-client relationship between the two men, in which Cavendish rewards Pell for "fauores," it is telling that Cavendish requests that Pell refer to him as "a friend & Scholler" in a print publication.[11] Whilst the two men are separated by social rank, and the obligations which come with it, Cavendish routinely defers to Pell in matters of mathematical expertise, and refers to him in salutations as his "very worthie friend" or even his "assured friend to serue." Information flowed freely back and forth between the two men. They shared a desire to be informed of the latest scholarship, thus Pell writes to Cavendish in Hamburg in October 1644 and asks him "how the learned world goes there,"[12] while Cavendish writes to Pell in

[9] On sharing notes and "collective" note-taking see Yeo, *Notebooks*, 219-52.

[10] Malcolm and Stedall, *John Pell*, 108.

[11] See Malcolm and Stedall, *John Pell*, 461 (Letter 52, 6/16 February 1646). On Cavendish's financial patronage see Malcolm and Stedall, *John Pell,* 555 (Letter 96, 15/25 May 1650), where Cavendish sends 16 Ducatoons as an "acknowledgement of your fauores."

[12] Malcolm and Stedall, *John Pell*, 379 (Letter 21, 2/12 October 1644).

Amsterdam in July 1644, asking him to inform him about "what new inuentions are extant in the Mathematicks lately."[13]

These kinds of queries could be answered in various ways. Sometimes it involves the enclosure of manuscripts in letters. In January 1642, for example, Cavendish sends a letter to Pell in London, enclosing a manuscript of a "french demonstration" concerning the trisection of an angle, which Marin Mersenne had recently sent him. He asks Pell if he would "doe me the fauoure to write it oute & send it me for I confess his hand is an Arabicke character to me." Pell translates Mersenne's French text and sends it to him, retaining the original as Cavendish had suggested.[14] In April 1646, writing from Paris to Pell in Amsterdam, Cavendish mentions "transcribing" a "Tract of M^{r} Fermat's" to send to Pell. This was Fermat's "Ad locos planos et solidos isagoge" (c. 1636), which can still be found amongst Cavendish's notes in British Library, Harleian MS 6083 (fols. 113-4).

In August 1648, Cavendish writes to Pell telling him "I send you heer inclosed a proposition of Roberualls." This proposition – which concerns the calculation of the area of spherical triangles – can be found in Cavendish's notes (Harleian MS 6002, fol. 32^{r}), where it is attributed both to Gilles Personne de Roberval and to the English mathematician Thomas Harriot.[15] Notes were not only transmitted by letter, however, and the Pell-Cavendish

[13] Malcolm and Stedall, *John Pell*, 354 (Letter 12, 26 July/5 August 1644).

[14] Malcolm and Stedall, *John Pell*, 348-9 (Letter 8, 8/18 January 1642, and Letter 9, 17/27 January 1642). Malcolm and Stedall note that "Mersenne's handwriting was tiny, cramped, and irregular" (Malcolm and Stedall, *John Pell*, 348, fn. 3). I am inclined to agree with their verdict.

[15] Malcolm and Stedall, *John Pell*, 514 (Letter 76, 9/19 August 1648). Pell's reply to this letter ascribes the proposition to Harriot, citing the testimony of Henry Briggs published in

correspondence offers us valuable evidence concerning collections of notes as mediators of social interactions. Thus, in a letter dated May 1646, Pell writes "I do not yet wholly despaire once againe to see your Honour & those collections which you make among these nimble & able witts of France: such as that you speak of De Locis [i.e., Cavendish's manuscript copy of Pierre Fermat's treatise]."[16] Pell clearly envisages consulting Cavendish's collections of notes when he is visiting him.[17] In the same letter Pell describes how an unnamed friend of his from Brussels showed a copy of Pell's refutation of the Danish mathematician Christian Severinus Longomontanus' attempted quadrature of the circle to Gerard van Gutschoven, Professor of mathematics at Louvain, who "transcribed [it], saying, that it was ingenious."[18] Here we can see how a social visit and intellectual exchange results in an act of note-taking, which is then relayed to Pell, and by Pell to Cavendish. Thus, far from being a private and solitary activity note-taking is socially extensive.

Another way in which the personal act of note-taking could travel between individuals was in the sharing of annotations (or adversaria), which we could see as a sub-set of notes

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George Hakewill's *An Apologie or Declaration of the Power and Providence of God* (Oxford, 1630), 264. See Malcolm and Stedall, *John Pell*, 517 (Letter 78, 25 October/4 November 1648) and 518, fn. 12.

[16] Malcolm and Stedall, *John Pell*, 480 (Letter 60, 11/21 May 1646).

[17] In other letters Cavendish mentions that Pell has some books and papers that belonged to him, but encourages Pell to "vse" them before returning them to him. See Malcolm and Stedall, *John Pell*, 540 (Letter 90, [25 September/] 5 October 1649) and fn. 5; Malcolm and Stedall, *John Pell*, 546 (Letter 92, [22 January/] 1 February 1650).

[18] Malcolm and Stedall, *John Pell*, 481 (Letter 60, 11/21 May 1646).

more generally.[19] Malcolm and Stedall note, for example, that quotations from Grégoire de Saint Vincent's *Opus geometricum* included in a letter to Cavendish in August 1648 can be found underlined in Pell's surviving copy of the book (now in the Busby Library at Westminster School).[20] An even better example of annotations as a transmissible form of note can be found in Pell's annotations and corrections in a manuscript treatise on Descartes' geometry by Florimond de Beaune, which Pell borrows from Cavendish and then returns to him. The notes here are clearly for Cavendish's benefit rather than Pell's.[21] In another letter Pell tells Cavendish that he has made some corrections in his own copy of a book by Frans van Schooten, and then sends a list of his corrections to Cavendish so that he can enter them into his own copy of the book.[22] More intriguing still – in that it involves a transmission between three individuals – is Cavendish's personal copy of François Viète's *De aequationum recognitione*, which Cavendish had loaned to the English mathematician William Oughtred

[19] On defining the "annotation" and its relationship to "notes" see William H. Sherman, *Used Books: Marking Readers in Renaissance England* (Philadelphia: University of Pennsylvania Press, 2008), 7 and 18-24. Sherman observes that with the rise of relatively inexpensive paper came a drift away from marginalia to free-standing notes.

[20] Malcolm and Stedall, *John Pell*. 511-2 (Letter 75, 9/19 August 1648) and fn. 7.

[21] Malcolm and Stedall, *John Pell*, 548 (Letter 93, 19 February/1 March 1650), fn. 2. Cavendish's manuscript of de Beaune's treatise is in British Library, Harl. MS 6796, fols. 267-90.

[22] Malcolm and Stedall, *John Pell*, 552 (Letter 95, 7/17 May 1650).

who annotated it. Cavendish evidently lent this book to Pell who copied these annotations out in his own notes.[23]

A particularly significant set of notes in Cavendish's possession were those which he made of Hobbes's work in progress *De corpore*. Shortly after Cavendish had arrived in Paris in May 1645, he had access to a working draft of Hobbes's work (which was eventually published in 1655), which I shall examine more closely in the second half of the paper. Cavendish refers to *De corpore* as Hobbes's "intended worck," which he tells Pell he has been reading – '"as farre as I haue reade," he says, "I like verie well." Cavendish does more than report on his reading, however, for he sends Pell a demonstration which includes a proposition which can be found among his notes on Hobbes's draft (Harleian MS 6083, fol. 203^{r}).[24] It is clear from these two examples that Cavendish's notes – like those of others in his network – are not merely personal memoranda and records, but shareable assets, mobile information to be transmitted to others as part of a regular exchange of information.[25]

Another example of this is Cavendish's letter to the Hamburg logician and natural philosopher Joachim Jungius (1587-1657) in May 1645. Cavendish writes to Pell in Amsterdam asking him to forward a letter to Jungius which contains a summary of Hobbes's theories of local motion in response to a query from the Hamburg philosopher. Cavendish's

[23] Malcolm and Stedall, *John Pell*, 562 (Letter 101, 27 August/6 September 1650) and fn. 7. Pell's transcription of Oughtred's annotations is in British Library, Add. MS 4423, fols.146-9.

[24] Malcolm and Stedall, *John Pell*, 412 (Letter 1/11 May 1645) and fn. 4.

[25] On the transmissibility of early-modern notes see Ann Blair, "Note Taking as an Art of Transmission," *Critical Inquiry* 31 (2004): 85-107. On collaborative note-taking, see also Blair, *Too much to know*, 102-112.

summary is clearly drawn from his notes on Hobbes's *De Corpore*.[26] This kind of access to manuscripts of works in progress and exchanges of information about them was a characteristic feature of the Cavendish and Mersenne circles. Thus, in October 1644 Cavendish told Pell that Hobbes had read Gassendi's *Animadversiones* (which was not published until 1649) while it was in manuscript: "Mr Hobbes writes, Gassendes his philosophie is not yet printed, but that he hath reade it, & that it is as big as Aristotle's philosophie but much truer, & excellent Latin." Hobbes also told Cavendish that he had not seen Descartes' recently published *Principia Philosophiae*, but "had read some sheets of it in manuscript."[27]

Another way in which information was exchanged was excerpting extracts from one's reading and incorporating them in a letter. Thus, in August 1644 Pell informed Cavendish of the recent publication of Mersenne's *Cogitata Physico-Mathematica* and cites extracts from it on Gassendi's philosophy and the best authors to read on the subject of algebra.[28] Pell thus transmits his own notes or underlined passages on subjects which he knew would be of interest to his friend, giving him an executive summary of a book he thinks he might want to own. Pell sent more notes from the *Cogitata* – from the section on ballistics – in a later letter, in which he criticises Gassendi's theory of the displacement of the pendulum, introducing the quotations with the phrase "let us heare Mersennus."[29]

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[26] Malcolm and Stedall, *John Pell*, 413 (Letter 34, 1/11 May 1645) and fn. 7. For Cavendish's letter see Hamburg, Staats- und Universitätsbibliothek, MS Sup. ep. 97, fol. 85^{r-v}.

[27] Malcolm and Stedall, *John Pell*, 382 (Letter 22, 10/20 October 1644).

[28] Malcolm and Stedall, *John Pell*, 366-7 (Letter 16, 14/24 August 1644).

[29] Malcolm and Stedall, *John Pell*, 374-5 (Letter 19, 7/17 September 1644).

3 Cavendish and Jungius

A useful case study for the socially extensive nature of note-taking and its embeddedness in social interactions is offered by Cavendish's dealings with Joachim Jungius in Hamburg. In August 1644, Pell – who was familiar with Jungius and his colleague Johannes Adolfus Tassius via the network of the intelligencer Samuel Hartlib – urged Cavendish to make contact with them while he was in the city. Pell had a very high opinion of Jungius, whom he describes as his "Idol."[30] Pell encourages him to seek out Jungius' printed works while he is there, but also suggests that he might look for manuscripts. Jungius' students he says might be able to provide him with "divers dictates & theses in manuscript."[31] Cavendish follows Pell's suggestion, and meets Jungius, although at first it does not go well as he isn't able to speak Latin fluently "which hindred me of divers quaeres."[32] Cavendish reports that Jungius had showed him various works in manuscript (including "treatises … de locis planis, de motu locali, staticks, Hydrostaticks, & some obseruations of Insects") although he seemed to be disinclined to print any of them. However, Cavendish "despairs not" that Jungius will transmit some of his works to him in manuscript form.[33] Cavendish clearly overcame his

[30] Malcolm and Stedall, *John Pell*, 363-4 (Letter 16, 14/24 August 1644). For his part, Cavendish later told Pell that he considered Jungius to be one of the best living philosophers (on a par with Gassendi and Hobbes). See Malcolm and Stedall, *John Pell*, 501 (Letter 71, 6/16 August 1647).

[31] Malcolm and Stedall, *John Pell*, 363-4 (Letter 16, 14/24 August 1644).

[32] Malcolm and Stedall, *John Pell*, 378 (Letter 20, 13/23 September 1644).

[33] Malcolm and Stedall, *John Pell*, 402 (Letter 29, 10/20 January 1645). According to Ann Blair, Jungius was an abundant note-taker: "Jungius … amassed perhaps the largest collection

initial shyness about speaking Latin as a few months later he reports to Pell that he was visiting Jungius twice a week and that the philosopher was "pleased to imparte to me some of his conceptions de motu locali." These conceptions were not published in Jungius' lifetime, but formed part of a collection of Johann Adolf Tassius' posthumous writings edited by Heinrich Sivers in 1691 under the title *Chronologiae compendium*. The work was given the title *Phoranomica, id est, De motu locali*.[34] Jungius was obviously imparting these doctrines *viva voce*, as Cavendish reports that "we are yet but in the definitions."[35]

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of notes of all, estimated at some 150,000 pages, of which 45,000 are extant" (Blair, "The Rise of Note-Taking," 305-6).

[34] Joachim Jungius, *Phoranomica, id est, De motu locali*, in *Joannis Adolfi Tassii Olim Philosophi summi, & in Gymnasio, quod Hamburgi est, Mathematum Professoris Clarissimi Chronologiae compendium, Descriptum ex recensione Henrici Siveri, Hamb. Mathes. Prof. P. cujus sciagraphiae opusculi accessit* (Hamburg: Sumtibus Editoris, Typis Rebenlinianis, 1691). The work has a separate pagination, 1-47. The British Library copy (shelf-mark 580.e.8), which lacks a title page is erroneously assigned a tentative date of "1650?" in the British Library Catalogue. This copy, which forms part of a *sammelband*, is actually extracted from the 1691 edition, or an identical 1699 reprint edited by Balthasar Mentzer, *Johannis Adolfi Tassii Philosophi Summi & Mathematici celeberrimi Opuscula Mathematica Quorum elenchum pagina versa exhibet, Ex recensione Siveri, primum proposita, postea figuris aeneis affabre instructa & â Balthasare Mentzero, Profes. Math. Publ. de novo revisa & emendata* (Hamburg: Gottfried Liebezeit, 1699), 1-47 (separately paginated).

[35] Malcolm and Stedall, *John Pell*, 403 (Letter 31, 21/31 January 1645). On Cavendish's friendship with Jungius see Jean Jacquot, "Sir Charles Cavendish and his learned friends: A contribution to the history of scientific relations between England and the Continent in the

In August 1645, Pell – who had offered to convey letters from Jungius to Cavendish – hears from Jungius that he will respond to Cavendish as soon as he has had an opportunity to think more about his theory of local motion because he "did not wish to send him something unsubstantial."[36] A scribal copy of this work survives among Cavendish's notes (Harleian 6083, fols. 236-71) so Cavendish's confidence that Jungius would share some of his work with him was ultimately justified. What this letter tells us is that the scribal copy must have been sent to Cavendish at some point between August 1645 and before Cavendish's death in 1654. As we shall see shortly, Jungius' doctrines on local motion were to be redeployed among Cavendish's notes. What is worth observing here is that the notes themselves are an end-product of a series of social interactions, which involved a correspondence communication, weekly in-person visits in Hamburg in 1645 during which Jungius talked Cavendish through his definitions and axioms, and then the presentation of a manuscript copy (presumably sent by Jungius to Pell in Amsterdam, and from Pell to Cavendish in Paris).

4 Cavendish's note-taking practices: Warner and Hobbes

This then is the broader context, the intellectual milieu in which Cavendish's note-taking practices are to be situated, a context in which notes become exchangeable assets, a recognised form of currency in an intellectual community which read together, made notes together, and annotated together. Having considered the social function of notes in the Cavendish network, I would now like to turn to two case studies of Cavendish's note-taking

earlier part of the 17th century. II. The Years of Exile," *Annals of Science* 8 (1952): 175-91 (176).

[36] Malcolm and Stedall, *John Pell*, 423 (Letter 38, 2/12 August 1645).

to see what they have to tell us about the cognitive function of his notes, and whether this may be connected to their social function.

4.1 *Walter Warner and the circulation of blood*

The first of these concerns Cavendish's notes on the circulation of the blood. My focus will be on a "quaere" regarding a theory put forward by Pell and Cavendish's older contemporary Walter Warner (1557-1643). As we shall see, this framing of the material is something of an artefact of historical attention. I have chosen to use this particular frame because of the longevity of a rumour started by John Aubrey and others in the mid-seventeenth century, that William Harvey had taken the idea of the circulation of the blood from Warner. This rumour has persisted, although for the most part Warner's claim has been discredited.[37] Even as recently as 2012, we find a popular history of William Harvey, revisiting the issue.[38] Whilst I think that the story recounted by John Aubrey (which he had received from Warner's friend and associate John Pell) that Warner claimed that Harvey had gained access to Warner's theory via his associate John Protheroe is not totally implausible,[39] I want to consider Cavendish's notes on Warner setting aside the Harvey question, and instead think about how and why Warner appears in Cavendish's notes on this topic. This approach has the benefit of

[37] See Jan Prins, "Walter Warner (ca. 1557-1643) and his Notes on Animal Organisms," PhD dissertation (University of Utrecht, 1992), 2 and fn. 5. For a comprehensive account of the evidence available from the seventeenth century see Prins, "Walter Warner," 31-41.

[38] Thomas Wright, *Circulation: William Harvey's Revolutionary Idea* (London: Chatto & Windus, 2012), 193-4.

[39] See Prins, "Walter Warner," 31.

revealing Cavendish's approach to note-taking, and also sheds some new light on theories of the circulation of the blood in the mid-seventeenth century.

The notes dealing with Warner's theory, consist of a diagram on fol. 104^{r} [Fig.1] which illustrates the "perfect hydraulik" of the heart referred to by Aubrey in his account of Warner's theory of circulation, together with Cavendish's comment upon it on fol. 104^{v}. I also believe – on the grounds of the use of characteristically Warnerian vocabulary – that the passage beginning "so that the circulation is made, by one of the 4 wayes" and other passages on fol. 104^{r} bear witness to Warner's lost treatise on the circulation of the blood.[40] While Warner's theory of circulation has often been glossed (negatively) as "alchemical," it seems clear from these pages that Warner saw the diastolic and systolic action of the heart as a matter of the opening and closing of valves (hence Cavendish's note under the diagram ("When *n p* open then *o q* shut. & when *o q* open, *n p* shut").[41] These arbitrarily assigned letters (quite close to the labels found in Andreas Vesalius' depiction of the structure of the heart in *De humani corporis fabrica*) represent the major arteries of the heart. Warner identifies *o q* with blood going to the chest and *n p* with blood going to the rest of the body (for some reason he labels the left and right ventricles with the numbers "2" and "5"). This three-phase model is consistent with Pell's statement to Aubrey that Warner had "rationated

[40] A survey of Warner's surviving notes on the circulation of the blood in British Library, Add. MS 4394, contains no passages which correspond to those recorded by Cavendish.

[41] Warner refers to it numerous times in his notes on the circulation of the blood as a "pnevmato-hydraulik motion" (see, e.g., British Library, Add. MS 4394, fols. 135^{r-v}, 137^{v}, 139^{r-v}, 140^{r}, 142^{r}, etc.).

demonstratively by Beates of the Pulses that there must be a Circulation of the Blood."[42] Cavendish's comment takes the form of a "quaere" [Fig. 2]:

> Quaere of Mr Warners waie in the 1 & 3 fig: whye the heart is not still held in that posture; it seems the motion of the bloode is stronger the contrarie waie to come in, but quaere how.// <in the ventricle> where the bloode goes out the nether pipe is shut the value opening inwarde. & in the ventricle where the bloode comes in I conceiue the bloode can not goe out at the vpper pipe of the same ventricle (though the valu[e *page edge*] open outwarde,) because the bloode reaches not to fill that ventricle so highe as the vpper pipe whylest it comes in at the lower pipe of the same ventricle; but when the septum moues the other waie it squeezes the bloode out at the vpper pipe, the nether pipe being shut as was sayed formerlie./[43]

<insert figure 1 here, followed by caption>

<insert figure 2 here, followed by caption>

While Cavendish's personal questioning of the hydraulic logic of Warner's theory is paramount here, I would suggest that evidence from the Pell-Cavendish correspondence

[42] John Aubrey, *Aubrey's Brief Lives*, ed. Oliver Lawson Dick (London: Secker and Warburg, 1949), 315. For another diagrammatic representation of the heart's pulsations see Walter Warner, "A schematisme or a literall designation of the harts reciprocall motion," British Library, Add. MS 4396, fol. 29^{v}.

[43] British Library, Harl. MS 6083, fol. 104^{v}.

suggests that the mechanism of the "quaere" does not begin and end in the mind of the person who makes the note, but is rather the beginning of a process of inquiry which involves an exchange with others. In the correspondence we see Cavendish posing a variety of "quaeres" to Pell, asking him for "resolution," "explication" or "satisfaction."[44] This is not just a habit peculiar to Cavendish, however, as we also see Mersenne sending "quaeres" to Pell via Cavendish.[45] Thus the "quaere" of the note-taker is only the beginning of a process of exchange rather than a private criticism – the "quaere" is a meaningful unit of intellectual exchange.

The second feature which I think is worth drawing attention to here is that the Warner passage and Cavendish's "quaere" is embedded amongst an array of other works on the circulation of the blood by Pierre Gassendi, René Descartes, Henricus Regius (Hendrik de Roy, 1598-1679), and Johannes Walaeus (Jan de Wale 1604–1649).

There are a number of passages which briefly summarise ideas which Cavendish had found in an appendix to Pierre Gassendi's *Animadversiones* entitled "Of the pulse, and respiration of animals, in which is discussed, among other things, the circulation of the blood" ("De pulsu, et respiratione animalium; in qua inter caetera disseritur De sanguine circulatione"). Cavendish had been keenly anticipating the publication of the *Animadversiones* ever since Hobbes gave such a glowing testimonial of it in 1644. He mentions it several times in his correspondence with Pell, who tells him that it is available to purchase in Amsterdam in May 1650,[46] and sends him a copy of it on 8 June.[47] Cavendish

[44] See Malcolm and Stedall, *John Pell*, 482, 310, 522, 530, 540, 542.

[45] Malcolm and Stedall, *John Pell*, 429 (Letter 40, 27 September/7 October 1645).

[46] Malcolm and Stedall, *John Pell*, 556 (Letter 97, 16/26 May 1650).

[47] Malcolm and Stedall, *John Pell*, 558 (Letter 98, 29 May, 8 June 1650).

acknowledges receipt on 10 June 1650.[48] The *Animadversiones* is over a thousand pages long, so it is small wonder that in September 1650 he confesses to Pell that: "I haue rather turned ouer the leaues & onelie read the sum of Epicurus his philosophie than anie other wise."[49] If we take Cavendish at his word here, it would seem that his notes on the appendices of Gassendi may have postdated this letter. The notes themselves are very concise, selecting particular details out of longer passages:

> Mot[ion] of Hearte Braine & Lungs (or diaphragm) inbred or of thems[elues]. & indep[endent] one of <another>. Mr Gassendes. Apend: pag: 95.[50]

> Manie pulsat[ions] for the uenting of one ventricle full of bloode; for the eares of the hart receauing most of i[t *page edge*] returnes it back in to the same ventricle; onelie so mu[ch *page edge*] as is spent for nourishment goes on. Gassend[es]. Apend[dix] de pulsu <70 : 78>.[51]

[48] Malcolm and Stedall, *John Pell*, 559 (Letter 99, [31 May/] 10 June 1650).

[49] Malcolm and Stedall, *John Pell*, 562 (Letter 101. 27 August/6 September 1650).

[50] British Library, Harl. MS 6083, fol. 106^{r}. Cf. Pierre Gassendi, "De pulsu, et respiratione animalium; in qua inter caetera disseritur De sanguine circulatione," in Pierre Gassendi, *Animadversiones in Decimum Librum Diogenis Laertii, qui est De Vita, Moribus, Placitisque Epicuri* (Lyons: Apud Guillelmum Barbier, 1649), separately paginated in Roman numerals, xcv.

[51] British Library, Harl. MS 6083, fol. 106^{v}. Cf. Gassendi, "De pulsu," lxx, lxxvii.

> Motion of Br[ain] I:R but [*blot*] P. Gassend[es] Apend. de pulsu etc pag 94. Mot[ion] of Br[ain] & H[eart] allmost [*equal*] by Gassend. Pag: 94).[52]

A particular concern in these extracts appears to be the connection between pulsations in the heart and in the brain (a theme which he picks out in other sources).

Cavendish also includes an English summary of a passage in Descartes' *Passions of the Soul* (*Les Passions de l'Ame*) which was published in 1649, where Descartes deals with the passage of chyle from the liver to the heart and the connection between these physiological processes and the passion of hate:

> Veines in the liuer, large enough, by which the chylus may pass from the gate veyne into the hollowe vyene, & from thence in to the hearte, without stayeing at all in the liuer; but that there is an infinitie of other lesser where it may staye & which conteine always bloode of reserue, as the spleene also does./ Monsr des Cartes <page> 138 of the passions.[53]

[52] British Library, Harl. MS 6083, fol. 106v. Cf. Gassendi, "De pulsu," xciiij.

[53] British Library, Harl. MS 6083, fol. 106[r]. Cf. René Descartes, *Les Passions de l'Ame* (Paris: Henry Le Gras, 1649), 138: "toutes les ouvertures par où il a coustume d'y couler; & elle les conduit aussi tellement vers les petits nerfs de la rate, & de la partie inferieure du foye, où est le receptacle de la bile, que les parties du sang qui ont coustume d'estre rejetées vers ces endroits là, en sortent, & coulent, avec celuy qui est dans les rameaux de la vene cave, verse la Coeur. Ce qui cause beaucoup d'inégalitez en sa chaleur; d'autant que le sang qui vient de la rate ne s'échauffe & se rarefie qu'à peine, & qu'au contraire celuy qui vient de la partie inferieure du foye, où est tousjours le fiel, s'embrase & se dilate fort promptement."

There are also a number of passages attributed by Cavendish to "Regius" (or "Rhegius"). This is Henricus Regius, the Dutch Cartesian, physician and Professor of medicine at the University of Utrecht. The page number provided with one of these passages allows us to identify them as summaries of passages from Regius' 1646 work *Fundamenta physices*.[54] In a set of numbered points headed "The circu[lation] of the bloode" Cavendish summarises a series of passages from a section of book X of Regius' work entitled "The main reasons for the circulation of the blood" ("Sanguinis circulationis praecipuae rationes.") on pp. 189-91:

> 1. From the quantitie of bloode, which goes from the heart if but a scr[uple] euerie pulse; in 2 houres 20 pound./ more etc.[55]

[54] Henricus Regius, *Fundamenta physices* (Amsterdam: Apud Ludovicum Elzevirium, 1649). On Regius' *Fundamenta physices*, see Theo Verbeek, "Regius's *Fundamenta Physices*," *Journal of the History of Ideas* 55 (1994): 533-51. On Regius and the circulation of the blood see Vlad Alexandrescu, "Regius and Gassendi on the Human Soul," *Intellectual History Review* 23 (2013): 433-52.

[55] Regius, *Fundamenta physices*, 189: "Sanguinis circulationem indubitatam facit ingens illa sanguinis copia, quae ex corde in arterias perpetuo effunditur. Cum enim è cordis canis non valde magni, ubi arteria magna prope cor ipsi vivo est recisa, interdums emuncia, saepe dragmae tres, nonnunquam duae, interdum un auno pulsu subsiultim egrediatur; non est dubitandum, quin è corde hominis sani & validi … si non plus, saltem tantundem singulis cordis pulsibus in arterias suppeditare. Unde sequitur, cum, in homine mediae aetatis & temperamenti moderatioris, una hora fiant pulsus plus minus ter mille, unius horae spatio

2. from the values in the ueines which etc:[56]

3. from the swelling of the ueines being tied, in the parts fardest from the heart.[57]

These are typical of one style of Cavendish's note-taking: they are abbreviated, compressed and translate the original source into English, they are closer to paraphrase than translation. Elsewhere Cavendish takes fuller notes, and seems to wish to remain far closer to the target text, apart from occasional truncations indicated by an "etc." That Cavendish was conscious of these different modes of notation can be seen in one of his transcriptions from the mathematician Thomas Harriot, whose papers were loaned to him for that purpose by Sir

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decem, & duabus horis vigniti libras sanguinis seu 5760 scrupulos ad minimum è corde in arterias propelli."

[56] Regius, *Fundamenta physices*, 189-90: "Eadem patet ex valvulis A, B, quae nunc unae, quales A, nunc geminae, quales B in venis artuum jugularibus, mesaraïcis, emulgentibus, venâ azygo, pectoralibus, ductu splenico & multis aliis existentes, talem situm habent, ut sanguini, à partibus ad cor facilem; nullum verò à corde ad partes tendenti transitum praebeant."

[57] Regius, *Fundamenta physices*, 190-1: "Eandem firmissime etiam probat intumescentia, quae in venis jugularibus, cruralibus, mesaraïcis, spermaticis, omenti, ventriculi, venâ portâ, venâ cavâ, aliisque innumeris, in vivo animali ligatis, ac ultra ligaturam, in parte à corde remotiore, intumescentibus, & cis ligaturam in parte cordi viciniore detumescentibus, conspicitur."

Thomas Aylesbury.[58] Cavendish adds a comment after his transcriptions from some of Harriot's work on centres of gravity which distinguishes between verbatim and non-verbatim transcription when he writes: "From Mr Hariot but not verbatim these 2 cases," suggesting that he allowed himself more transcriptional liberty towards the end of his copying session.[59]

For confirmation that Cavendish was familiar with Regius' work we also have the independent testimony of Pell who writes to Cavendish in July 1647 saying that he is aware that Cavendish has "seene" the *Fundamenta Physices*, and recommends the recently published *Fundamenta Medica*.[60] In another note, Cavendish summarises a passage about the relative size of the inspiratory and expiratory nerves in the brain from a section of chapter X of Regius' *Fundamenta Physices* devoted to the cause of spontaneous respiration ("Ratio spontaneae respirationis").[61]

Another source on the circulation of the blood mentioned by Cavendish is "Wallaeus" who is referred to in two separate notes. This is clearly Johannes Walaeus, Professor of Medicine at the University of Leiden. Although little known today, Walaeus made significant contributions to the understanding of the circulation of the blood in his own day and was an

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[58] See British Library, Harl. MS 6002, fol. 21^{v}: "Mr Hariot's Letter to my Lo: Northumberland: annexed to his treatise of Refractions : lent me to transcribe by S[i]r Th[omas] Alesburie."

[59] British Library, Harl. MS 6002, fol. 53^{v}. The notes (which are on fols. 48^{r}-53^{v}) concern the centre of gravity of a trapezium and the frustrum of a parabola.

[60] Malcolm and Stedall, *John Pell*, 499 (Letter 70, 1/11 July 1647).

[61] Regius, *Fundamenta physices*, 235-7. See especially: "Hinc enim spiritus animales, e ventriculis cerebri in utrumque nervum per valvulas C, D primum fluentes, feruntur copiosius & forties in nervum inspiratiorium CGA, utpote latiorem & magis patentem …" (236).

early promoter of William Harvey.[62] Although one of the references was too brief for positive identification, I have located the source for the other – Walaeus' "Epistolae duae de motu chyli et sanguinis ad Thomam Bartholinum".[63]

> The milkei veynes <some> into the mesenteriall branch, others to the porte veine <immediatelie,> others to the [*space*] liuer, a fewe in to th[e *page edge*] hollowe veyne neere the emulgent veynes./ Wallaeus.[64]

> Per has venas lacteas chylus sursum vergit, quo id modo, res non satis expedita est. Id nobis videtur maxime verosimile, quod in magnis macilentisque canibus venaticis

[62] J. Schouten, "Johannes Walaeus (1604–1649) and His Experiments on the Circulation of the Blood," *Journal of the History of Medicine and Allied Sciences* 29 (1974): 259–79.

[63] The original version was published as part of Caspar Bartholin's *Institutiones anatomicae, Novis Recentiorum opinionibus & observationibus, quarum innumerae hactenus editae non sunt, figurisque auctae ab Auctoris Filio Thoma Bartholino* (Leiden: Apud Franciscum Hackium, 1641), 385-408, which Walaeus was editing together with Bartholin's son Thomas. It is also possible that Cavendish could have been working from one of two more recent imprints. The first is in a 1645 revised edition of Bartholin's *Institutiones* (*Institutiones anatomicae … figurisque Secundo auctae ab Auctoris Filio Thoma Bartholino* (Leiden: Apud Franciscum Hackium, 1645), 441-88); the second is another 1645 reprint, which appeared as an appendix to Tome II of Adrianus Spigelius' *Opera quae extant omnia* (Amsterdam: Apud Iohannem Blaeu, 1645), lxv-lxxxvi. Without a specific page reference it is impossible to establish the precise source, but I have quoted the text from Spigelius' *Opera omnia* II.

[64] British Library, Harl. MS 6083, fol. 106^{v}.

> animadvertimus, venarum lactearum quasdam ab intestinis uno & continuato ductu in ramum mesentericum, quasdam, paucissimas quandoque in venam cavam prope emulgentes desinere.[65]

Once again, Cavendish slightly condenses his source (neglecting to mention that Walaeus is referring to the motion of chyle, the passage from the intestines) and a space has clearly been left for something he has omitted (or failed to translate). Both the Walaeus passages summarized deal with the inter-connections of the venous system. One topic which seemed particularly prominent to Cavendish was the connection between motions in brain and heart (a theme he identifies in both Gassendi and Regius, and which Jan Prins has speculated might have been a topic handled in some of Warner's lost manuscripts).[66]

A little further on in the manuscript (fol. 159^{v}) we find another reference to the circulation of the blood, which appears to be derived from his reflections on Sir Kenelm Digby's *Two Treatises*:

> The circul[ation] of the bloode is like a pumpe or Hydraulick <expulsion>./ The motion of the chylus by the messari[ck] vaines to the porte vaine etc is likelie to be by

[65] Spigelius, *Opera omnia* II, lxviii [sig. Ii2, verso].

[66] Prins, "Walter Warner," 63. Some confirmation of this can be found in the following passage in Warner's surviving notes on the circulation of the blood: "the brayne being no les pulsatory then the hart … [it is] questioned among many of the anatomists to w[hi]ch of them the principiu[m] of that motion ought to be attributed" (British Library, Add. MS 4394, fol. 136^{v}).

> attraction one of those waie[s *page edge*]. Sr Kenelm Digbye in his <last> booke describes the vrin to be attracted by the kidneies; which is probable to be so too./[67]

Although Digby does not explicitly refer to the heart as a "pumpe" or "hydraulick" in the *Two Treatises*, he does discuss Harvey's (and Descartes') theory of the circulation of the blood, and refers to the "valves" ("valuulas") of the heart.[68] The constellation in which these notes on Digby are embedded is suggestive, however, of a wider question to which Cavendish was addressing himself – the nature of the passions.[69] The Digby notes are followed by French notes on *L'usage des passions* by the French Augustinian Jean-François Senault (e.g., "Amour est la premiere impression que le bien sensible faict dans le Coeur de l'homme").[70] The Digby notes are preceded (on the recto of the same folio) by notes on "Mr de Cartes" on the passions together with a quote from Aristotle on the "right ordering & gouerning of the appetites & passions." There is also a very brief note from "Mr Hobbes" on the five senses which appear to derive from chapter VI of the *Leviathan* ("Of the interior beginnings of voluntary motion, commonly called the Passions"). Cavendish's "quaere" on this folio

[67] British Library, Harl. MS 6083, fol. 159v.

[68] Kenelm Digby, *Two Treatises, in the one of which, The Nature of Bodies, in the other, The Nature of Soule, is looked into: in way of Discovery of the Immortality of Reasonable Soules* (Paris: Gilles Blazot, 1644), 233-239.

[69] On Cavendish's interest in the question of the passions and its connection to the circulation of the blood see, in this collection, Timothy Raylor's "The *Leviathan* Table of Sciences and Newcastle's Queries," *Hobbes Studies* 38 (2025): xx-yy (zz).

[70] Jean-François Senault, *L'vsage des passions. Par le R.P. I. François Senault, Prestre de l'Oratoire a Paris* (Paris: Chez la veuue Iean Camusat, 1641), 216.

suggests that what holds together his notes on physiology and those on the passions is the dependence of the one on the other: "What nerues proceed from the heart & stomack to the brayne, & how they <& the animall spirits> are moued in seuerall appetits & passions."[71]

One thing we might conclude from these notes is that the question of the blood's circulation did not end with William Harvey's *De Motu Cordis et Sanguinis* in 1628, but was a topic which continued to exercise natural philosophers and physicians in Europe into the 1640s and 50s. Cavendish's survey of the sources available to him in Paris and Antwerp at that time shows that the question kept evolving, and subtended other pressing questions of that time, like the nature of the passions and their connection to human physiology. As a record of reception notes have the potential to be a vital source for historians of science and suggests that the history of note-taking and the history of science should be in closer dialogue with each other.[72]

What this consideration of Cavendish's notes on the circulation of the blood has to tell us about Cavendish's note-taking is that he had a tendency to begin with a particular question – such as the relationship between physiology and the passions – and then aggregate summary notes, or short quotations from a range of sources designed to illuminate the topic, and also generated "quaeres" which he intended to discuss with others.

4.2 *Notes on Thomas Hobbes's* De corpore

In the notes on Warner we have just considered, we found Cavendish grouping them together with other notes on the same topic. A similar pattern can be identified in Cavendish's notes on

[71] It is worth remembering that Digby also discusses how spirits are carried by nerves between the brain and heart in affective states. See Digby, *Two Treatises*, 292-4.

[72] For an example of this dialogue in action, see Yeo, *Notebooks*.

the draft of Thomas Hobbes's *De corpore*.[73] Although previous scholarship on these notes have tended to foreground their witness to an early draft of Hobbes's work, Timothy Raylor and I found, when editing them, for our edition of *De corpore* and its related manuscripts, that the manuscript was rather more complex than had previously been suggested.[74]

Some of the passages which have been treated as simple evidence of Hobbes's draft are constellated alongside extracts from other writers on similar subjects in whom Cavendish was interested. Let us begin with fol. 197^{v} which, conveniently, Cavendish has dated: "April 29 1645" [Fig. 3]. Before looking at the content it is worth pausing to consider the complex *mise en page*. Cavendish's notes are highly compressed, and he seeks to maximise the available space.[75] He divides passages with vertical and horizontal lines, creating discrete boxed areas. This sometimes makes it difficult to ascertain the logical order of the information presented. He also deploys insertion symbols, such as the "trefoil," to indicate extra material which he omitted at the first pass. This could indicate repeated readings of the copy text in the light of

[73] On these notes see Jean Jacquot, "Un document inédit, les notes de Sir Charles Cavendish sur la premiere Version du *De corpore* de Hobbes," *Thales* 8 (1952): 33-86; Arrigo Pacchi, *Convenzione e ipotesi nella formazione della filosofia naturale di Thomas Hobbes* (Florence: La Nuova Italia, 1965), 18-23; Thomas Hobbes, *Critique du "De mundo" de Thomas White*, ed. Jean Jacquot and Howard Whitmore Jones (Paris: Vrin, 1973), 83-8.

[74] My analysis of Cavendish's notes on Hobbes's *De corpore* in this section rely heavily on our joint editorial work on Harl. MS 6083.

[75] A similar compression and economy can be found in Cavendish's notes from the papers of Thomas Harriot in British Library, Harl. MS 6001 and 6002. See for example his notes on Harriot's "De grauitatis mathematico, Eclogae" (British Library, Harl. 6001, fols. 25^{r}-28^{v}), which crams Harriot's demonstrations into far less space than the source manuscripts.

his notes, or a revisitation of the material copied immediately after the notes have been taken, to make good on omitted phrases or details.

The division into boxes also indicates a shift between different copy texts. At the top of the page we find a summary of Hobbes's analysis of time, number and swiftness from chapters 12 and 13 of *De corpore*, partly translated into English and highly compressed. Immediately below this we find notes from another author, Joachim Jungius. As Cavendish had sat with Jungius whilst he explained his doctrines of local motion to him, it is fitting that here we find Cavendish enumerating the seven kinds of local motion which were appended to chapter 2 of Cavendish's manuscript copy of a draft of Jungius' *Phoranomica*, which was sent to him by the author.[76] Cavendish appears here to be placing alongside of each other two mathematical treatments of local motion – that of Hobbes and that of Jungius – in order to compare them.

To the right of the Jungius definitions we find Cavendish's own algebraic equations relating to Hobbes's exposition of the rate of numbers. It is worth noting that Cavendish's enthusiasm, for algebra was not shared by Hobbes, but formed the core of Cavendish's intellectual exchange with Pell in the course of this decade, when they often worked together on a range of algebraic problems.

<insert figure 3 here, followed by caption>

[76] Joachim Jungius, "Definitiones Geometricae inseruientes Phoranomicae," British Library, Harl. MS 6083, fols. 235^{r}-264^{v}, esp. "Definitiones Phoranomicae ad Cap. 2," fols. 248^{r}-249^{v}. For the printed versions of these definitions see Joachim Jungius, *Phoranomica*, in Sivers, *Chronologiae compendium*, cap. III, "De Motu Simplici & composito," 16-8 and 20-1.

Folio 196^{v} is another constellation of sources – the top of the page contains notes on the five universal predicables of scholastic logic via Descartes' discussion of triangles and rectangles in the *Principia philosophiae* (1644), a work which Cavendish viewed very favourably.[77] Immediately below this is a lengthy summary of the predicaments or categories drawn from Jungius' *Logica Hamburgensis* (published in 1639). The last few notes present Hobbes's definition of a true proposition from *De corpore* V.10, immediately followed by notes on the reduction of propositions and copulative negatives from Honoré Fabri's *Logicae artificialis libri duodecim* published in his *Philosophiae tomus primus* of 1646.[78] Like the notes on Warner then, these notes on Hobbes are grouped together with notes on other authors working on the same topics as those dealt with in the *De corpore*, such as logic and local motion.

Whilst later in Harleian MS 6083 we find more extensive, and less disjointed testimony to Hobbes's draft (in Cavendish's "verbatim" style), it is clear that Cavendish was no mere passive scribe but mobilized the works he was writing notes on. A good example of this mobilization, which relates to my characterization of the socially extensive nature of note-taking above, is fol. 196^{r}. At the top of the page we find extracts from the opening chapters of

[77] See Malcolm and Stedall, *John Pell*, 377 (Letter 20, c.13/23 September 1644): "I am extreamlie taken with Des Cartes his newe booke."

[78] See *Logicae artificialis libri duodecim: quibus totium artificium logicum, hoc est humani ratiocinij in terminis abstractis comprehenditur, explicatur, demonstratur*, in Honoré Fabri, *Philosophiae tomus primus: qui complectitur scientiarum Methodum sex Libris explicatam Logicam analyticam, duodecim Libris demonstratam, et aliquot Controversias logicas, breviter disputatas* (Lyons: Sumptibus Ioannis Champion, in foro Cambij, 1646), 151-383. On the reduction of syllogisms see 214-32, and on copulative negatives see 303.

the "Philosophia prima" section of *De Corpore* (VII-VIII), including definitions of his concepts of motion, place, space, time and body. Some of the ideas in this passage found their way into Cavendish's letter to Joachim Jungius, dated May 1645. So, it was only a matter of weeks after making these notes that Cavendish has redeployed them in an intellectual exchange with his esteemed acquaintance from Hamburg.

5 Conclusion

This is a fitting place to conclude, I think: on a clear piece of evidence which suggests that while notes might resemble a fixed set of personal records of acts of reading – private memoranda for individual use (which in one way, of course, they are) they might be better considered as a stockpile of reusable information. Early modern scholars clearly used their collections of notes as mobile repositories of information which could be transmitted to others within a social network. This mobilization of the note-taking activity can be seen not only in the Cavendish circle, but also in the contiguous and overlapping networks of Marin Mersenne and Samuel Hartlib, and later in Henry Oldenberg's activities in the early Royal Society. Reports on newly published material, evaluations of recently read books, the sharing of annotations and notes with others were all vital elements of early modern intellectual exchange. A closer consideration of early modern note-taking thus has a great deal to offer to historians of science, historians of philosophy, and the history of scholarship. A fuller understanding of the various ways in which notes were taken and transmitted, circulated and re-used will give us a better understanding of the dynamics of early modern intellectual communities.

Acknowledgements

I would like to thank Oberto Marrama and Pietro Daniel Omodeo the organizers of the conference, "The Cavendish Circle: Philosophical Networks of the 17th Century," at Ca' Foscari University of Venice 30 April 2024, which resulted in this article. I would particularly like to thank Timothy Raylor, who provided me with digitized images of a microfilm of Harleian MS 6083 at a time when neither the original manuscript nor the digital version were available to me at the British Library (without which I would have been unable to write this paper). I would also like to thank him for reading a draft of this paper and making helpful suggestions.

ACCEPTED VERSION – Please quote published version
Hobbes Studies 38/1 (2025), 64-87

Acknowledging Sexual Equality: Hobbes's and Cavendish's Amazons

Mary Jo MacDonald | ORCID: 0000-0001-7769-5814
University of Jyväskylä, Jyväskylä, Finland
mary.j.macdonald@jyu.fi

Abstract

This paper reads Margaret Cavendish's play *Bell in Campo* (1662) as an implicit critique of Hobbes's own depiction of the Amazons. In the play, Cavendish adopts a Hobbesian conception of equality and, like Hobbes, uses the Amazons as evidence of this natural equality. She departs from Hobbes, however, in setting her Amazon tale in a modern civil war. For Cavendish, Hobbes's Amazons are insufficiently threatening, as he neglects to show their origins in a rebellion of wives against their husbands. By retelling the Amazon tale in the context of civil war, she reminds Hobbes of the importance of extending the ninth law of nature—that we acknowledge each other's equality—to both sexes.

Keywords

equality, history of feminist thought, Thomas Hobbes, Margaret Cavendish, Amazons

1 Introduction

Hobbes's discussions of the Amazons are often invoked as evidence in ongoing debates about his views on women and sexual equality. Far from settling the debate about the status of women in Hobbes's thought, however, the Amazons only seem to polarize it further. The Amazons were a common trope in Early Modern literature, yet they could be represented in diverse ways. On the one hand, feminist authors from Christine de Pisan (1405) onwards portrayed the Amazons positively. They were portrayed as heroines who exemplify female virtue and their capacity to rule.[1] On the other, misogynist authors depicted the Amazons as monstrous, perhaps best exemplified by John Knox's *Trumpet Against the Monstrous Regiment of Women* (1588).[2] Misogynists saw matriarchal societies, like

[1] Christine de Pisan, *The Book of the City of Ladies and Other Writings*, ed. Sophie Bourgault and Rebecca Kingston (Indianapolis: Hackett Publishing, 2018). This use of the Amazons is not idiosyncratic but repeated throughout the *querelle des femmes*. For examples, see discussions of Amazons in Marie le Jars de Gournay in "The Equality of Men and Women (1641)," in *Apology for the Woman Writing and Other Works,* tr. Richard Hillman and Colette Quesnel (Chicago: University of Chicago Press, 2002), 69-95 (88, 92); Lucrezia Marinella, *The Nobility and Excellence of Women*, tr. Anne Dunhill (Chicago: University of Chicago Press, 1999 [1599]), 170.

[2] John Knox wrote this screed to discredit the rule of Catholic Queen Mary (while inadvertently discrediting the rule of protestant Elizabeth I as well). The idea that the Amazons were monstrous is not just a hyperbole for Knox but has a basis in the ancient myths. Various iterations of the Amazon myth treated them like monsters

the Amazons, as aberrations from the proper order. Like most monsters, these societies were found at the borders of the civilized world arousing the reader's horror. The secondary literature on Hobbes is torn about where his Amazons fall in this dichotomy. For those who read Hobbes as an egalitarian, his Amazons inspire admiration in his readers;[3] whereas those who see him as a patriarchalist argue that his Amazons are horrifying.[4]

Since this debate is partly about the rhetorical use that Hobbes makes of the Amazons, this paper examines Hobbes's readers to understand better the emotional effects his Amazons would have produced. To that end, this paper turns to Hobbes's interlocutor, Margaret Cavendish (1623-73). While in exile in France, she married William Cavendish, Duke of Newcastle, making her a member of the same Cavendish family who served as Hobbes's patrons.[5] Cavendish was a prolific writer, publishing two volumes of plays, five volumes of natural philosophy, numerous poems, essays, novels, and a biography of her husband. Scholars now agree that Hobbes's work significantly influenced her thought.[6] In this article, I turn to Cavendish's play *Bell in Campo* (1662). This play offers Cavendish's own retelling of the Amazon tale, one which, I argue, serves as an implicit critique of Hobbes's.

Cavendish's play follows a group of women who take up arms during a civil war and plan a rebellion against their husbands. Examining Cavendish's depiction of the Amazons reveals a third way

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that were found outside the borders of the known world: "Wherever the Amazons are located," Peter Walcot tells us "whether it is somewhere along the Black Sea in the distant north-east, or in Libya in the furthest south, it is always beyond the confines of the civilized world. The Amazons exist outside the normal range of human experience" ("Greek Attitudes towards Women: The Mythological Evidence," *Greece and Rome* 31 (1984): 37-47 (42)).

[3] Versions of this line of argument are developed by Nancy J. Hirschmann and Joanne H. Wright, "Hobbes, History, Politics, and Gender: A Conversation with Carole Pateman and Quentin Skinner," in *Feminist Interpretations of Thomas Hobbes*, ed. Nancy J. Hirschmann and Joanne H. Wright (University Park, PA: Penn State University Press 2012), 18-44; S. A. Lloyd, "Power and Sexual Subordination in Hobbes's Political Theory," in *Feminist Interpretations of Thomas Hobbes*, ed. Nancy J. Hirschmann and Joanne H. Wright, 47–62; Susanne Sreedhar, "The Curious Case of Hobbes's Amazons," *Journal of the History of Philosophy* 57 (2019): 621-46.

[4] For versions of this line of argument, see Karen Green, "Hobbes, Amazons and Sabine Women," in Karen Green, *The Woman of Reason: Feminism, Humanism and Political Thought* (New York: Polity Press, 1995), 44-64; Mary Nyquist, *Arbitrary Rule: Slavery, Tyranny, and the Power of Life and Death* (Oxford: Oxford University Press 2013), 285. Joanne Wright ultimately concludes that Hobbes views have feminist potential, but her reading of his Amazon story hints at the Amazons being fearsome (*Origin Stories in Political Thought* (Toronto: Toronto University Press, 2004), 92-120).

[5] For more on Cavendish's biography, see Katie Whitaker, *Mad Madge: The Life of Margaret, Duchess of Newcastle* (New York: Basic Books, 2001).

[6] For examples of the influence of Hobbes's political thought on Cavendish see Victoria Kahn, "Gender," in Victoria Kahn, *Wayward Contracts: The Crisis of Political Obligation in England, 1640-1674* (Princeton: Princeton University Press, 2004), 171-96; Karen Detlefsen, "Margaret Cavendish and Thomas Hobbes on Freedom, Education and Women," in *Feminist Interpretations of Thomas Hobbes,* ed. Nancy J. Hirschmann and Joanne H. Wright, 149-68.

in which the Amazons were represented in the Early Modern period: namely, as the product of civil war. While Hobbes and Cavendish were in exile in France, the Amazons were not treated as straightforwardly positive depictions of female virtue, nor were they negative depictions of a primitive association. Most depictions of the Amazons in this period treated them as a rebellion against patriarchal inequities during civil war. By comparing Hobbes's Amazons with Cavendish's, we see that Hobbes obscures these violent origins of the Amazon matriarchies. It is this sanitizing of the Amazon story with which Cavendish takes issue. In her own play, Cavendish returns the Amazons to a civil war context and, in doing so, underscores the importance of extending Hobbes's ninth law of nature—that we *acknowledge each other's equality*—to both sexes. The secondary literature today, then, errs by assuming that horrifying depictions of the Amazons limited their feminist potential. For Hobbes, it is precisely because equals are dangerous that we must acknowledge each other's equality in civil society. The problem with Hobbes's Amazons, from Cavendish's perspective, is not that he treats them as horrifying, but that he defangs them.

This paper will proceed as follows. In the second section, I will briefly outline the paradox of sexual equality in Hobbes's thought and show how the Amazons relate to this paradox. In the third section, I survey the secondary literature on the Amazons. Commentary on the Amazons is divided about whether Hobbes depicts the Amazons as horrifying or admirable, but I argue that this debate rests on a mistaken assumption about the emotional reactions equals should inspire. Depicting women as frightening does not undermine their equality. Rather, depicting women as frightening would encourage Hobbesian individuals to acknowledge their equality. In the fourth section, I turn to Margaret Cavendish, and depictions of the Amazons in France in the 1640s, to highlight the peculiarity of Hobbes's Amazon story. Rather than depict the Amazons as horrifying, I argue that Hobbes offers a revisionist history that erases the most threatening aspects of the Amazon story. In the fifth section, I show how Cavendish uses her play about the Amazons to develop a critique of Hobbes. By showing the Amazons origins in a civil war rebellion, she stresses the importance of acknowledging women's equality in civil society. I conclude with some reflections on the relationship between fear and equality.

2 Hobbes's Amazons and the Paradox of Sexual Equality

The status of women in Hobbes's thought is often portrayed as paradoxical or contradictory.[7] The basic problem is that Hobbes describes the sexes as naturally equal—in the state of nature, men do not naturally have power over women. Yet, Hobbes frequently reverts to patriarchal assumptions about how gender relations will be organized in civil society. He describes fathers as ruling in the household

[7] The paradox was developed most famously by Carole Pateman in *The Sexual Contract* (Cambridge: Polity Press, 1988), 43-50, but the question continues to orient feminist readings of Hobbes, as explained by Alexandra Chadwick and Eva Helene Odzuck, in "Introduction, Feminist Perspectives on Hobbes," *Hobbes Studies* 33 (2020): 1-4.

and having privileged positions in the Commonwealth. Some scholars have turned to Hobbes's account of the Amazons to gain traction on this puzzle. Before turning to that secondary literature, I will briefly outline the context and function of the Amazons in Hobbes's political thought.

The Amazons are present in every version of Hobbes's political theory, serving the same basic argument in *De cive, Elements of Law,* and *Leviathan.* In each of these works, Hobbes invokes the Amazons in his discussions of paternal power. Hobbes specifically uses the Amazons to prove that patriarchal power—that is, the power of fathers over their families—is not natural.[8] There are at least three ways in which the Amazons are used to denaturalize patriarchal power.

First, Hobbes uses the Amazons to show that women are naturally men's equals. Hobbes famously offers an idiosyncratic account of natural equality. Hobbes argues that the state of nature is a state of equality, without permanent or predictable relations of authority or subjection, because of our equal capacities to kill.[9] Despite differences in strength and intelligence between individuals, Hobbes insisted that "the weakest has strength enough to kill the strongest."[10] This equality obtains even between men and women: "the inequality of their naturall forces is not so great, that the *man* could get the Dominion over the *woman* without warre ... for *women*, namely *Amazons*, have in former times waged war against their adversaries."[11] For Hobbes, the Amazons prove, through their capacities to kill, that men and women are natural equals.

The Amazons also serve to prove that fathers do not naturally have authority over their children. In "the state of meer Nature; where there are supposed no lawes of Matrimony," Hobbes argues that dominion over children naturally falls to the mother. Establishing patrimony depends on the testimony of the mother, so Hobbes argues that the original right is maternal since it "dependeth on her will."[12] In

[8] For more discussion of Hobbes's relationship to natural patriarchalism, see Gordon Schochet, *Patriarchalism in Political Thought* (New York: Basic Books, 1975) 225-44; Johann Sommerville, *Hobbes Ideas in Historical Context* (New York: St. Martin's Press, 1992), 71-74; Hirschmann and Wright, "Hobbes, History, Politics, and Gender," 18-44; and Sreedhar, "Curious Case," 627-30.

[9] There is an on-going debate about whether Hobbes genuinely believes human beings are perfectly equal with respect to this capacity to kill. Kinch Hoekstra argues that Hobbes is not seriously committed to the idea that human beings are equal with respect to any human capacity, see "Hobbesian Equality," in *Hobbes Today: Insights for the 21st Century*, ed. S. A. Lloyd (Cambridge: Cambridge University Press, 2012), 76-112. For an alternative perspective, see Elenor Curran, "Hobbes on Equality: Context, Rhetoric, Argument," *Hobbes Studies* 25 (2012): 166-87 (169–74).

[10] Thomas Hobbes, *Leviathan,* ed. Noel Malcolm (Oxford: Clarendon Press, 2012), ch. 13, p. 188 [60].

[11] Thomas Hobbes, *De cive,* ed. Howard Warrender (Oxford: Clarendon Press, 1983), ch. 9, §3, p. 122.

[12] Hobbes, *Leviathan*, ch. 20, pp. 308-10 [103]; see also *De cive*, ch. 9, §§1-3, pp. 121-3. Here, Hobbes disputes the idea that power derives from generation. If a generation granted one authority over another, then children would be subject to two masters—mother and father—which is a conceptual impossibility for Hobbes.

this case, the child "oweth its life to the Mother; and is therefore obliged to obey her."[13] Fatherly power over children, therefore, is not natural, but originally falls to the mother.

It is in this context of original maternal power that Hobbes goes on to discuss the Amazons more explicitly. Hobbes argues that fathers can only gain power over children through contract or conquest. The Amazons are used as evidence of the former:

> We find in History that the *Amazons* Contracted with the Men of the neighboring Countries, to whom they had recourse for issue, that the issue Male should be sent back, but the Female remain with themselves: so that the dominion of the Females was in the Mother.[14]

In the state of nature, Hobbes argues that fathers can only get power over children through conquest over the mother or, as the Amazons demonstrate, by entering into reproductive contracts with them. In short, Hobbes's Amazons denaturalize the patriarchal family by proving that women are not naturally subject to men, that children are not originally subject to fathers, and that fathers only gain power over families through contract or conquest.

Despite this rebuttal of natural patriarchalism, scholars have noted that Hobbes frequently reverts to patriarchal assumptions about women's capacities and how the family will be organized in civil society. Although Hobbes acknowledges the Amazons' military prowess, he elsewhere refers to women's "naturall timorousnesse" which prevents them from participating in the "dangerous duty" of war.[15] Despite asserting the original dominion of mothers, Hobbes says that children should be "taught, that originally the Father of every man was also his Soveraign Lord."[16] Hence the puzzle: Hobbes uses the Amazons to show that men do not naturally have power over women and children, and yet he also assumes that in civil society children will submit to fathers and wives to husbands. As Carole Pateman and Teresa Brennan memorably put it, "the lady vanishes."[17]

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[13] Hobbes, *Leviathan*, ch. 20, p. 310 [103]. The nature of the child's duty to obey is somewhat obscure. It could be variously constructed as a form of consent or gratitude, or a form of conquest by the mother. For overview, see Meghan Robinson, "Mother Lords: Original Maternal Dominion and the Practice of Preservation in Hobbes," *Hypatia* 38 (2023): 65-85.
[14] Hobbes, *Leviathan*, ch. 20, p. 308 [103].
[15] Hobbes, *Leviathan*, ch. 21, p. 338 [112].
[16] Hobbes, *Leviathan*, ch. 30, p. 528 [178].
[17] Teresa Brennan and Carole Pateman, "'Mere Auxiliaries to the Commonwealth': Women and the Origins of Liberalism," in *Political Studies* 27 (1979), 183-200 (191).

3 The Secondary Literature

The most extensive scholarly examination of Hobbes's Amazons is offered by Susanne Sreedhar in her 2019 article "The Curious Case of Hobbes's Amazons." Sreedhar turns to the existing feminist scholarship and excavates different interpretations of Hobbes's Amazons. Those who see Hobbes as fundamentally egalitarian, and even protofeminist, argue that his Amazons are positive representations of female rule. Those who view Hobbes as a patriarchalist contend that Hobbes's Amazons were represented in a negative light, inspiring horror in his readers at the idea of matriarchy. In this section, I will review some of this literature. I argue that it rests on a misunderstanding of the implications that negative emotions, like fear and horror, would have for Hobbes's views on sexual equality.

3.1 The Protofeminist Reading of Hobbes

Several scholars, such as Joanne Wright and S. A. Lloyd, argue that Hobbes's position can be characterized as fundamentally egalitarian or protofeminist. For these authors, Hobbes's extension of natural equality to both sexes, as well as his suggestion that the original power over families belongs to mothers, "opens a space in which gender relations could be dramatically ... reconceived."[18] For these authors, Hobbes patriarchal remarks about the subordination of women are mere blind spots in an otherwise liberatory theory. Wright argues that Hobbes was inconsistent on the woman-question because "he used gender instrumentally."[19] If he had studied the "family for its own sake," he would not have lapsed into these assumptions about women's subordination in civil society.[20] Similarly, Lloyd argues that if Hobbes had followed the logic of his own principles to their full conclusion, he would not have made those comments about women's subordination since "nothing in Hobbes's theory necessitates the subjection of women."[21] For these thinkers, then, Hobbes's theory is, at its core, feminist. His discussions of the Amazons, then, are assumed to have positive connotations and perhaps even inspire admiration in his readers for the matriarchy. The Amazons are construed as a product of original maternal dominion and are evidence of women's natural equality with men. Hobbes, for these scholars, is a fundamentally egalitarian, but inconsistent, thinker.

Sreedhar aligns with aspects of this reading—recognizing the feminist potential in Hobbes's rebuttal of natural patriarchy—yet she also significantly moderates this praise of Hobbes. Sreedhar points out that Hobbes's patriarchal assumptions can be reconciled with his views about natural sexual equality. While Hobbes critiques the idea that sexual hierarchies are natural, he also concedes that most commonwealths have patriarchal laws for governing the family since "for the most part,

[18] Wright, *Origin Stories*, 77.
[19] Wright, *Origin Stories*, 78.
[20] Wright, *Origin Stories*, 78.
[21] S. A Lloyd, "Power and Sexual Subordination," 58.

Commonwealths have been erected by the Fathers."[22] This concession does not indicate an inconsistency. While Hobbes believes the sexes are naturally equal, that does not mean they are entitled to equal treatment in civil society. After all, every human being is naturally equal, and this belief is compatible with various kinds of hierarchies in the commonwealth. It is entirely up to the discretion of the sovereign how gender relations will be organized. Hobbes's arguments for natural equality do not entitle any subject, man or woman, to equal treatment. In other words, Hobbes is fundamentally anti-essentialist about the relations between the sexes. But recognizing that patriarchy is constructed does not mean that patriarchy is wrong.[23] Thus the "logic of Hobbes's argument does not provide any determinate grounds for a protofeminist reading of his work."[24] The Amazons should not be read as straightforwardly feminist—they are not meant to provoke admiration for female rule. Rather, they are portrayed neutrally: the Amazons represent an alternative way of organizing gender relations, even if it is not an arrangement that Hobbes himself would endorse.

I am unconvinced by this argument that Hobbes's views on gender equality are entirely consistent or justifiable. Hobbes's endorsement of patriarchal arrangements is a problem because they violate *his own account of the laws of nature*. While hierarchies will be created through the social contract, Hobbes still suggests that natural equality has important consequences for how we should treat each other. Since we are all naturally equal, Hobbes argues that we are all bound by the ninth law of nature to "*acknowledge other for his Equall by Nature*."[25] Acknowledging equality, for Hobbes, is partly gestural—it involves communicating with each other in a way that acknowledges that hierarchies are conventional.[26] Acknowledging equality, however, is not just about how we communicate, it also requires substantially equal treatment.[27] The eleventh to fourteenth laws of nature are all preoccupied with equity; that is, "the habit by which we allow equality of nature."[28] Hobbes goes to some pains to show how the distribution of goods, honors, and arbitration should be done in a way that acknowledges individuals' natural equality and does not allow anyone preferential treatment.

Hobbes's patriarchal arrangements fail to acknowledge—both symbolically and materially—women's natural equality. Recent work by Teresa Bejan explores the gestural politics involved in

[22] Hobbes, *Leviathan*, ch. 20, p. 308 [102-3].
[23] The idea that we might interpret Hobbes as a gender constructivist is also made in Susanne Sreedhar, "Hobbes on the Woman Question," *Philosophy Compass* 7 (2012): 772-81 (775).
[24] Sreedhar, "Curious Case," 635. See also Sreedhar, "Hobbes on the Woman Question," 777.
[25] Hobbes, *Leviathan*, ch. 15, p. 234 [77].
[26] Teresa Bejan, "Hobbes and Hats," *American Political Science Review* 117 (2023): 1188-201.
[27] See Hoekstra, "Hobbesian Equality," 111.
[28] In *Leviathan*, Hobbes discusses equity as being a law of nature, but he does offer an explicit definition. This definition comes from Thomas Hobbes, *Elements of Law: Natural and Politic,* ed. Ferdinand Tönnies (London: Simpkin, Marshall, 1889), 73 (I.xvii.14).

acknowledging natural equality.[29] Noticing that the men on the frontispiece of *Leviathan* are all wearing their hats, Bejan suggests that Hobbes is endorsing the leveller practice—namely, the refusal to doff one's hat towards a superior—as a means of acknowledging our natural equality. Interestingly, Bejan also notes that these gestures of equality are not extended to women. The women on the frontispiece are all wearing bonnets—a sign, according to St. Paul, of their natural subordination to men.[30] Similarly, Hobbes argues that children should be taught that in the state of nature that "the Father of every man was also his Soveraign Lord" and that fathers "never … lose the honour due unto them."[31] Hobbes never recommends gestures or symbols that acknowledge women's natural equality, or honors that would recognize women's natural maternal dominion.

Hobbes's further proposes distributions of power and property which fail to acknowledge women's natural equality. Throughout his works, Hobbes consistently seeks to explain why primogeniture—a practice that distributes power and property to the first-born—is equitable. For Hobbes, this practice acknowledges equality since it is a kind of natural lottery: "Now because the *Sonnes* are equall, and the power cannot be divided, the eldest shall *succeed* … *primogeniture* is a naturall lot, and by this the eldest is already prefer'd."[32] Yet Hobbes's primogeniture is not gender-neutral. He makes it explicit that power should be allocated to "brothers, sooner than his sisters" without justifying how this could be equitable.[33] The paradox of sexual equality, then, is not simply that there are hierarchies between men and women in civil society. The problem is that these hierarchies systematically exclude women from the allocation of property, power, and honor. In doing so, this system fails to acknowledge women's natural equality.

3.2 The Misogynist Reading of Hobbes

For many commentators, the only way to reconcile this apparent inconsistency in Hobbes is on the side of patriarchalism. This reading, first offered by Carole Pateman, suggests that we can make sense of Hobbes's comments on women if we understand that they are part of a conjectural history, one that explains how women are inevitably defeated by men prior to the social contract.[34] On this account, women are equal to men in the state of nature, but this state is defeated by patriarchalism prior to the

[29] Bejan, "Hobbes and Hats," 1189.
[30] Bejan, "Hobbes and Hats," 1189; St. Paul, 1 Corinthians 11.
[31] Hobbes, *Leviathan*, ch. 30, p. 528 [178].
[32] Hobbes, *De cive*, ch. 9, §17, p. 128.
[33] Hobbes, *De cive*, ch. 9, §18, p. 128.
[34] Pateman, *The Sexual Contract*, 43-50.

social contract. Thus, Hobbes offers an account of the Amazons only to show how they come to be subjected to men.[35]

Hobbes does not specify the precise mechanism by which we transition from original maternal right to patriarchy, and there is some speculation in the secondary literature to account for women's defeat to men.[36] Pateman, and subsequent feminist commentators, argue that it is due to women's increased vulnerability: women are conquered by men due to pregnancy, infant rearing, or simply being less physically capable of resisting. Nancy Hirschmann, however, offers a different reading. Rather than a disability, she suggests that original maternal dominion is an advantage for women.[37] By forming a confederacy with their children, women can compensate for any physical weakness they have relative to men. This confederacy between mothers and children, she argues, explains men's *motivation* to defeat women in the state of nature. Because women can, through maternal power, raise up armies and form matriarchies, they excite men's fear and envy, leading men to conquer them.[38]

This interpretation hints at an alternative reading of Hobbes's Amazons. The Amazons, on this account, do not inspire admiration, but are rather potential sources of fear in Hobbes's male readers. This suggestion is fully developed by Mary Nyquist in her book *Arbitrary Rule*. Nyquist argues that Hobbes's references to the Amazons would have inspired fear because of the association of Amazons with the primitive matriarchies reported to be found in the New World. [39] As Susanne Sreedhar notes, the intriguing evidence for Nyquist's cases comes not from the textual evidence, but from the frontispiece of *De cive*:

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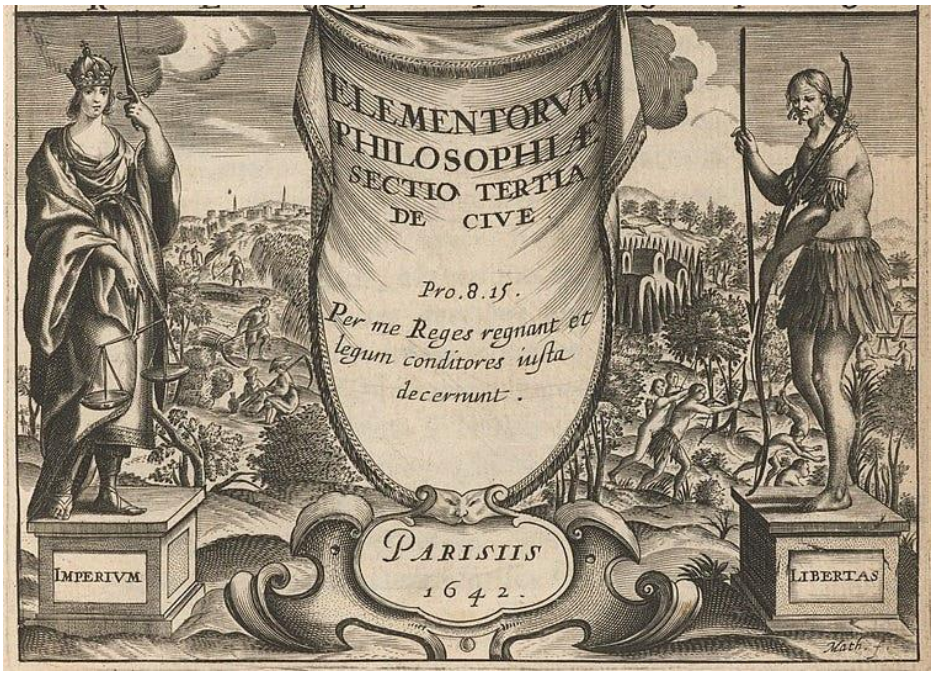
[35] Sreedhar also includes Green's *The Woman of Reason* in this camp. Green reminds readers that one use of the Amazons is as part of a 'defeat of woman' story. In the ancient myth, the Amazons are eventually defeated by the heroic Hercules and in Early Modern literature there was still some tendency to depict the Amazons as a matriarchy which is inevitably defeated by patriarchal rule, see Sreedhar, "Curious Case," 52.

[36] For different accounts of why women become subject to men, see Pateman, *The Sexual Contract*, 49; Christine Di Stefano, "Masculinity as Ideology in Political Theory: Hobbesian Man Reconsidered," *Women's Studies International Forum* 6 (1983): 634-44; Nancy Stanlick, "Lords and Mothers: silent Subjects in Hobbes's Political Theory," *International Journal of Politics and Ethics* 1 (2001): 171-82. Gianni Paganini argues that the transition happens, not out of weakness, but because women are less vainglorious and more disposed to moderation ("How far Can a 'Radical' Philosopher Go? Thomas Hobbes's Paradox of Gender Relations, and One Possible Solution," *Hobbes Studies* 33 (2020): 29-53).

[37] Nancy J. Hirschmann, *Gender, Class, and Freedom in Modern Political Thought* (Princeton: Princeton University Press, 2008), 53.

[38] Hirschman, *Gender, Class, and Freedom*, 56. It is important to note that this only explains men's motivations for conquering women. It does not explain how (on Hobbes's account) they come to have power over them given the roughly equal capacities.

[39] Nyquist, *Arbitrary Rule*, 279-93.



In this image, Nyquist argues that we see the state of nature, or *Libertas,* represented by a figure that is both an Amerindigene and an Amazon. The strap across the right breast and the bow are classic signifiers of the Amazons, who famously (and apocryphally) seared their right breasts to better handle their bows. The New World savagery is signified by the scenes behind the female figure. Behind Libertas, we see warring tribes, jungles without industry, and even cannibalism—as suggested by the image of a human limb roasting on a spit. Hobbes's discussion of the Amazons, according to Nyquist, is intended to invoke fear in his readers because of their association with the New World. Matriarchal rule is a marker of backwardness and barbarity that follows from defiance of the sexual roles of the civilized world. Hobbes introduces the Amazons, not to legitimize female rule, but to depict its horrors and the civilizing effects of a patriarchal social contract.

Sreedhar offers a comprehensive rebuttal of this position, and I will not rehearse all her objections here.[40] Most importantly, she highlights that there is a discrepancy between Nyquist's analysis of the frontispiece and the descriptions of the Amazons found in Hobbes's texts. While the frontispiece may depict a primitive, violent society that resonates with contemporary descriptions of the New World, Hobbes's descriptions of the Amazons in his texts are remarkably sanitized. He makes no references to the Americas when discussing the Amazon, and even ignores the more barbaric parts of the ancient myths: there is no repetition of common stories of Amazons' self-mutilations, their sexual promiscuity, or their fearsome conduct in battle. He speaks of the Amazons' military feats and sexual relations in a

[40] Sreedhar, "The Curious Case," 637-44. Her main critique, I take it, is that Hobbes's rebuttal of natural patriarchalism fails if we accept Nyquist's interpretation. If women do inevitably become subject to men, through a process of "civilization" as Nyquist maintains, then Hobbes's criticism of the natural chauvinism of Filmer and Aristotle fails to get off the ground.

rather matter-of-fact tone. Nyquist anticipates this objection and argues that this "scientifically neutral language" was an intentional rhetorical choice by Hobbes, one which "merely intensifies" the horror his readers already feel towards the Amazons.[41] This is unpersuasive. As Sreedhar points out, Nyquist's reading presupposes that Amazons had overwhelmingly negative connotations among Hobbes's readers and were ubiquitously associated with the primitive societies of the Americas—an assumption that, as will become apparent in the subsequent sections, is far from warranted.[42]

I would also add that Hobbes frequently intends to inspire fear in his readers, but he does not typically do so by using "neutral" language. In fact, Hobbes is quite willing to graphically depict horror to elicit his reader's fear. Chapter thirteen of *Leviathan* is memorable because of the vivid descriptions of life in the state of nature as "solitary, poore, nasty, brutish, and short."[43] If Hobbes wanted his readers to feel fear towards the Amazons—to see matriarchy as one of the major deficiencies of the state of nature—it is odd that he would leave the most horrifying parts of their story out of his retelling. Using this indirect, neutral language to evoke horror would be something of a departure from his usual rhetorical strategy.

I agree with Sreedhar that Hobbes's Amazons were not intended to inspire fear in his readers. That said, in the remainder of this paper I want to challenge an assumption that underpins this exchange between Nyquist and Sreedhar—namely, that if the Amazons were depicted as horrifying it would undermine their feminist potential. For Hobbes, natural equality simply *is* horrifying. As described above, Hobbesian equality is based on our capacity to (and vulnerability to being) killed. The state of nature is a state of war because of the equality that exists there. And it is because of these dangers equals pose that the ninth law of nature—that we acknowledge each other's equality—is so important. In the subsequent sections, I will instead develop the idea that perhaps Hobbes's inconsistent comments on women can be explained, not with reference to his horrifying Amazons, but to his defanged ones. That is, it is perhaps because Hobbes defangs the Amazons that he can paper over the importance of acknowledging women's equality in civil society. Indeed, I argue that this is precisely the feature that Cavendish takes issue with: by making the Amazons less threatening and fearsome, Hobbes also diminishes the importance of extending the ninth law of nature to both sexes.

4 The Amazons and Civil War

In this section, I want to turn to Hobbes's historical context, and to his readers to gain traction on these questions about how the Amazons are represented. If we want to understand the rhetorical effects of Hobbes's Amazons, what kinds of emotions they inspired in his readers, it is worth looking

[41] Nyquist, *Arbitrary Rule,* 297.
[42] Sreedhar, "The Curious Case," 642.
[43] Hobbes, *Leviathan*, ch. 13, p. 192 [62].

at how his readers responded to them. In the remainder of this paper, I turn to Margaret Cavendish whose play, *Bell in Campo*, can be read as a response to Hobbes's depiction of the Amazons.[44] By comparing the two accounts, we see that Hobbes's Amazons did not inspire fear, but sanitized the Amazon story. Through a revision of the Amazon history, and particularly the erasure of their civil war setting, Hobbes portrays them as distant phenomena that pose little threat to modern patriarchal commonwealths. This perhaps offers some explanation as to why Hobbes fails to extend the ninth law of nature to practices between the sexes.

Margaret Cavendish of Newcastle was a seventeenth-century philosopher, poet, and playwright who gained a kind of celebrity (or notoriety) that was usually reserved only for Royalty.[45] As a member of Henrietta Maria's court, Cavendish, like Hobbes, spent the 1640s in exile in France. In 1645, when she married William Cavendish, she married into a family at the center of European intellectual life as Charles and William Cavendish were at the center of the network now known as the "Cavendish Circle," a circle which included Descartes, Gassendi, and of course Hobbes. Indeed, the Cavendish family served as Hobbes's patrons. When the Cavendish family returned to England, Margaret published prolifically across various genres: political orations, philosophical treatises, plays, biographies, and fiction. Despite a mixed reputation, her intellectual achievements were recognized and in 1667 she was invited to the Royal Society, making her the first woman ever to visit.[46]

Cavendish was in the minority of seventeenth-century philosophers who shared many of Hobbes's fundamental doctrines—both were materialists concerning the natural world, and royalists concerning the political one. Despite these similarities, Cavendish was keen to differentiate her views from Hobbes. In her preface to *Philosophical Letters* (1664), she denied any meaningful correspondence with Hobbes claiming that she had barely spoke twenty words to him, even though he was a frequent dinner guest. Yet, Cavendish was very familiar with Hobbes's ideas citing him at length, and often critically, throughout her corpus. There is a growing body of scholarship that puts Cavendish and Hobbes in dialogue, showing how she engaged with various aspects of his thought from natural philosophy to contract theory.[47] While most scholarship has focused on Cavendish's explicitly

[44] In this paper, I focus largely on Hobbes's influence on Cavendish, but an anonymous reviewer has helpfully suggested that the influence could go both ways. This is an interesting suggestion, but it is beyond the scope of this paper to fully investigate Cavendish's impact on Hobbes's thought. By the time Cavendish sent Hobbes her plays, the *Leviathan* had been long completed. We can only speculate about any influence her conversation may have had on him. For more on their relationship, see Susan James, "Introduction," in *Margaret Cavendish: Political Writings*, ed. Susan James (Cambridge: Cambridge University Press, 2003), ix-xxix (x-xvii).
[45] Whitaker, *Mad Madge*, 288-302.
[46] Whitaker, *Mad Madge*, 298.
[47] For comparisons of their political doctrines, see Karen Detlefsen, "Margaret Cavendish and Thomas Hobbes"; Victoria Kahn, *Wayward Contracts,* 171-177. For discussions of their natural philosophy see, Sarah Hutton, "In dialogue with Thomas Hobbes: Margaret Cavendish's Natural Philosophy," *Women's Writing* 4

philosophical treatises, there is little scholarship which explores the influence that Hobbes might have had on her *Playes* (1662). This is particularly odd, given the only known written correspondence between the two authors occurred when Cavendish sent Hobbes a volume of her plays in 1662. In these plays we find several depictions of warrior women, including a depiction of the Amazons in the play *Bell in Campo.*

Strong warrior women were a consistent motif throughout Cavendish's literary output and even present in her sartorial choices. Cavendish revealed that she preferred to dress as an Amazon when making public appearances or when discussing philosophical matters—a costume that involved either wearing breeches or, more provocatively, exposing her red-painted breasts as a tasteful nod to the Amazonian mastectomy.[48] In her play, *Bell in Campo*, she offers her most sustained (written) representation of the Amazons. The play follows a group of wives from the "Kingdom of Reformation" who accompany their husbands to battle against the "Kingdom of Faction." In the play, the wives create a female army and successfully defeat the Kingdom of Faction, which allows them to reunite the two sides, restoring peace to the Kingdom. It is typically remarked in the secondary literature on this play, that Cavendish is writing an allegory for the English Civil Wars.[49] It is also, and perhaps primarily, of the modern retelling of the Amazon tale. Indeed, throughout the play—especially in the stage notes—Cavendish describes the women in the army as Amazons or Amazonia.

Although Cavendish does not cite Hobbes, she is clearly engaged with his ideas of equality and the Amazons. Her ideas of natural equality take some inspiration from Hobbes. Like Hobbes, Cavendish insists that natural equality is a state that obtains when there is no authority: "Where no single authority is suffered ... all continue equal."[50] Also like Hobbes, Cavendish bases this equality on human beings roughly equal capacities to kill and conquer each other. When there is no sovereign to hold them in check, the equals "have strength enough to kill the strongest." Indeed, she explicitly applies this equality to women, with her female protagonist claiming that "by our actions of war, we have proved

(1997): 421-32; Lisa Sarasohn, *The Natural Philosophy of Margaret Cavendish: Reason and Fancy during the Scientific Revolution* (Baltimore: John Hopkins University Press, 2010).

[48] Whitaker, *Mad Madge,* 294. Her dress was a matter of much public discussion, and Whitaker notes that Samuel Pepys' preoccupation with her costumes was a characteristic response. He observed in his diary that "her dress so antic and her deportment so unordinary, that I do not like her at all" (Whitaker, *Mad Madge*, 300).

[49] For example, see Alexandra Bennett, "Margaret Cavendish and the Theatre of War," *In-between: Essays and Studies in Literary Criticism* 9 (2000): 263-73; Oddvar Holmesland, "Fighting the Kingdom of Faction in *Bell in Campo*," *Early Modern Literary Studies* 14 (2004): 1-12; Vimala C. Pasupathi, "New Model Armies: Re-Contextualizing The Camp in Margaret Cavendish's *Bell in Campo*," *ELH* 78 (2011): 657-85.

[50] Cavendish, "Orations of Divers Sorts," in *Margaret Cavendish: Political Writings*, ed. Susan James*,* 111-292 (268).

ourselves to be every way equal with men."[51] We see, then, that Cavendish adopts a Hobbesian conception of equality—that our equality is based on our capacities to kill—and, like Hobbes, uses the Amazons as evidence of this natural equality. Thus, I think it is fair to read this play—one of the only written texts she ever sent to Hobbes—as engaging with his ideas about natural equality and the Amazons.

Despite these similarities, there is a remarkable difference in their accounts of the Amazonian origins. As we saw in the previous sections, Hobbes's Amazon story comes after a description of original maternal dominion. He suggests that mothers, in a pre-political state, have power over their children; and then introduces the Amazons as an example in which that power is maintained through contract with men in neighboring societies. Cavendish's play tells a very different story about the Amazonian origins. The Amazons do not derive from some kind of original maternal power but instead are produced by a rebellion of women against their husbands during a civil war. In the play, the protagonist, Lady Victoria, persuades her husband, a general, to allow the wives to accompany the men into war. When commanded by their husbands to remain in the safety of the Towns while they go to battle, the women conspire to start their own army, rebel against their husbands' commands, and break the chains of their "female slavery."[52] When they hear of the (near) defeat of their husband's army, the women's motivations to fight are heightened by the desire to avenge their defeated husbands, and they proceed to conquer the Kingdom of Faction. Thus, for Cavendish, the Amazonian matriarchy is not derived from the "originall Dominion" of mothers over children,[53] but rather is a product of civil war, and a response to patriarchal inequity.

Cavendish is not unique in tracing the Amazonian origins to a violent uprising during a civil war. Rather, her narrative aligns with the accounts of the Amazons that were relayed by the ancient historians. There were a variety of Amazonian legends—myths about reproductive contracts, battles, and the searing of breasts— which found their basis in the historical writings of antiquity from Plutarch, Justin, Curtius, Diodorus, and Strabo, to name just a few.[54] Regarding the Amazons origins, Strabo, Diodorus, and Justin all argue that this matriarchal society was produced by civil war in Scythia, the Eurasian territory bordering Greece.[55] Diodorus argues that matriarchal rule occurred after a series of

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[51] Cavendish, "Bell in Campo," in *Bell in Campo and The Sociable Companions*, ed. Alexandra G. Bennett (Peterborough, ON: Broadview Literary Press, 2002), 23-120 (Part 2, Scene 8, p. 94 [617]).

[52] Cavendish refers to women as enslaved several times throughout "Bell in Campo." See, part 1, scene 9, p. 48 [587]; part 2, scene 3, p. 81 [609]; see also part 2, scene 8, p. 93-4 [617]. She first mentions that women are treated as slaves to motivate the women to form an army and repeats the claims when they have defeated the Kingdom of Faction.

[53] Hobbes, *De cive*, ch. 9, §3, p. 123.

[54] See Adrienne Mayor, *The Amazons: Lives and Legends of Warrior Women across the Ancient World* (Princeton: Princeton University Press, 2014), 45-47.

[55] Mayor, *The Amazons*, 45-47.

"revolutions" in Scythia which led to the rule of strong, military women. The story of their origins is elaborated more vividly in the writings of Justin.[56] According to Justin, the Amazons came to power when a faction of Scythian men, led by Plynus and Skolopitus, began warring and pillaging another group of Scythians. The widows of this Plynus and Skolopitus's faction grouped together to avenge their husbands. After successfully defeating their enemies, the women refused to marry with any men from the remaining factions claiming that "it would be *slavery*, not matrimony."[57] The women proceeded to kill of any remaining men in their community and formed their own matriarchal society.

Cavendish's narrative is in many ways inspired by Justin's account (although I will highlight several importance differences in the subsequent sections). Her narrative suggests that the Amazons were a group of women whose husbands faced defeat in a civil war. These women, like the Amazons, took up arms against their enemies. At the conclusion of the play, Cavendish's Amazons, like Justin's, reject "female slavery." While it is unlikely that Cavendish read Justin directly—she understood no languages other than English—she would certainly have known about this historical narrative. This account of the Amazonian origins was widely repeated in the Renaissance and Early Modern period. Boccaccio's text *Concerning Famous Women* (1362) was one of the first texts to popularize the legends of the Amazons in the Renaissance, and Boccacio clearly based his account on Justin's history. Like Justin, Boccaccio argues that the Amazons were the product of factionalism caused by "princes of Scythia, Plinos and Scholopythus."[58] Boccaccio even repeats Justin's claim that the widows refused to remarry because "if they married men of other nations they would be slaves rather than wives."[59]

Boccaccio's *Concerning Famous Women* would mark the start of a genre of writing—des femmes fortes—which became particularly popular in France while Cavendish and Hobbes were in exile there in the 1640s. Jacques du Bosc's *La femme heroïque* (1645) and Pierre le Moyne's *La galleries de femmes fortes* (1647) were both significantly influenced by Boccaccio's *Concerning Famous Women* and offered their own lists of historical "heroic" women.[60] These books, which were both translated into

[56] Mayor, *The Amazons*, 47.

[57] Mayor, *The Amazons,* 47. For an English translation of Justin's account of the Amazons, see "Justin's History of the World," in *Justin, Cornelius Nepos, and Eutropius*, tr. John Selby Watson (London: Henry G. Bohn, 1853), 1-304 (20-23).

[58] Giovanni Boccaccio, *Concerning Famous Women*, tr. Guido A. Guarino (New Brunswick, NJ: Rutgers University Press, 1963), 23.

[59] Boccaccio, *Concerning Famous Women*, 23.

[60] For discussion of the tradition of "femmes fortes," particularly in France between 1630 and 1650, see Ian MacLean, *Woman Triumphant: Feminism in French Literature, 1610-1652* (Oxford: Clarendon Press, 1977), 64-98. Mihoko Suzuki also discusses how French civil conflicts influenced women writers in "Women Write the Fronde: Motteville, Montpensier, Longueville, Nemours," in Mihoko Suzuki, *Antigone's Example: Early Modern Women's Political Writing in Times of Civil War from Christine de Pizan to Helen Maria Williams* (Cham: Palgrave Macmillan, 2022), 163-240. For the influence of the tradition of "femme fortes" on

English, offer violent and graphic descriptions of women who take up arms in times of civil war. Their popularity was due in part to the experience of civil war and religious strife in France. If civil war turned the world upside down, then it was also understood to afford unique opportunities for women's participation. In short, associations of Amazons and matriarchy with civil war became a prominent part of the popular cultural imagination in France, while both Cavendish and Hobbes were in exile.

Against this backdrop of the association of Amazons and civil war, we can begin to appreciate the peculiarity of Hobbes's own account of the Amazon. In each of his political works, Hobbes introduces the Amazons in the context of original, pre-political maternal rights. While the secondary literature debates whether Hobbes's Amazons represent a pre-political society or legitimate commonwealth, I think it is at least clear that Hobbes is implying that the ancient Amazonian commonwealth *developed* from this original pre-political maternal right. This is a significant departure from the standard history of the Amazons. The Amazons did not gradually develop from natural maternal rights, but rather were a rupture—a *response* to established patriarchal family arrangements. To suggest that the Amazons develop from the original power of mothers over their children erases and sanitizes what was widely regarded as the real origins of the Amazons: a rebellion against "female slavery" during a civil war.

Recognizing this revisionist history Hobbes offers helps us perhaps resolve, or at least attenuate, the paradox about the status of women in Hobbes's thought. As discussed above, Hobbes's ninth law of nature—that we acknowledge natural equality— is required "for peace sake."[61] Since equals are prone to disobey when they are not treated equitably, to "disturb and hinder the peace of one another," Hobbes argues that it is necessary that "every man acknowledge other for his equal."[62] Hobbes's failure to extend the ninth law of nature to women suggests that he believed that it was not necessary to secure peace. While men and women may naturally be equal, women may become socialized into hierarchies, eliminating their desire, or capacity, to rebel. While female Amazons "in former times waged war against their adversaries," Hobbes doubts that women in his own society have this capacity.[63] By eliminating their violent origins, Hobbes's revision suggests that matriarchies are the product of a kind of path dependency: Amazons can develop from original maternal right, but if a society began developing patriarchally, there is no going back. The customs of their society have socialized women into inequality

Cavendish, see Claire Gheeraert-Graffeuille, "Margaret Cavendish's *Femmes Fortes*: The Paradoxes of Female Heroism in *Bell in Campo* (1662)," *XVII-XVIII* 73 (2016), 243-265.

[61] Hobbes, *Elements of Law*, 68-69 (I.xvii.1).

[62] Hobbes, *Elements of Law*, 68-69 (I.xvii.1). See also *Leviathan*, ch. 15, p. 234 [77], and *De cive*, ch. 13, §10, pp. 161-2.

[63] Hobbes, *De cive*, ch. 9, §3, p. 122.

and rendered them incapable of resisting.[64] Thus, it is unnecessary, and perhaps even counterproductive, to acknowledge their equality.

As shown above, the secondary literature on Hobbes is deeply divided about whether he represents the Amazons as an admirable example of female rule, or a horrifying example of the dangers of this kind of primitive society. This debate, in many ways, ignores the most common representation of the Amazons in Hobbes's context: that they were considered a product of civil war. In revising the origins of the Amazons, from a story of rebellion to one of maternal dominion, Hobbes reduces the threat posed by the Amazons to modern patriarchal commonwealths. It is perhaps for this reason that Hobbes fails to extend his ninth law of nature to women.

5 Cavendish's response to the paradox of sexual equality

Cavendish is indebted to Hobbes's view of natural equality as being based on our equal capacities to kill. She also uses the Amazons to prove that women are naturally equal. In stark contrast to Hobbes's Amazons, Cavendish's *Bell in Campo* brings the Amazons closer to home, retelling the Amazon narrative in a modern civil war setting. In this section, I will argue that Cavendish's retelling of the Amazon story in a civil war context is intended to offer a critique of Hobbes. Her play offers two main critiques. First, it allows her to show that the Amazons are produced as a response to patriarchal inequities. Second, it allows her to show the fragility of customs which are meant to socialize women into sexual hierarchies. These two points allow Cavendish to demonstrate the importance of extending the ninth law of nature—that we acknowledge each other's equality—to both sexes.

Cavendish's story stresses that Amazons are the product of a rebellion, not the development of original maternal power. She subtly ridicules the idea that maternal power could be the basis of Amazonian power throughout the play, with her protagonist, Lady Victoria, claiming that "though we increase the commonwealth by our breed, we also encumber it by our weakness, as they think."[65] Rather, the Amazons are created as a response to slights made by men. Departing from Justin's narrative—which suggests that the Amazons formed an army in order to avenge their defeated husbands—Cavendish's Amazons are motivated partly by a desire to overcome patriarchal inequities. When their husbands go to battle, they leave their wives in a nearby Garrison town where Lady Victoria, the protagonist, convinces the other women that their husbands are not treating the women as equals. "The masculine

[64] This reading is perhaps indirectly supported by some of Sreedhar's arguments in "Hobbes on the Woman Question," 777. Here, she argues that we can make sense of Hobbes's claim about women's deficiencies—that they weep excessively, that they are unfit for action and labor—by realizing he thinks these gender differences are constructed. Women and men are naturally similar, but these differences are produced by convention. I agree, but I think it is also likely that Hobbes believes these constructed characteristics are very durable. If so, it would explain why he does not see women as an imminent threat.

[65] Cavendish, "Bell in Campo," part 1, scene 9, p. 48 [588].

sex has separated us, and cast us out of their company ... the Masculine sex is of the opinion that we are only fit to breed and bring forth children."[66] Lady Victoria suggests that the men keep them from participating in war so that women can be excluded from forms of honor and recognition. Yet, Lady Victoria argues that women "we are fit to be copartners in their governments, and to help to rule the world, where now we are kept as slaves forced to obey."[67] While Justin's Amazons are motivated purely by the desire to avenge their husbands, Cavendish inserts the claims about female slavery earlier into the narrative, suggesting that women may become seditious if they are systematically prevented from receiving honors and recognition. In this way, she further highlights Hobbes's sanitizing of the Amazonian origins. They are not the product of maternal power, but rather a response to patriarchal inequity.

Cavendish does seem to admit, however, that women are socialized into inequality. The play features a number of women whose capacities seem anything but dangerous. Cavendish claims that women's bodies "want strength" compared to men's,[68] and that they are more "delicate and beautiful."[69] Echoing Hobbes's claims that women have a "timorousness" which prevents them from participating war, Cavendish also claims that women's "minds seem fearful."[70] Cavendish insists that this inequality between the sexes is not natural, but a matter of socialization and custom: "custom is the father and mother of strength," Lady Victoria tells the women.[71] If the customs had been different, "[women] would have proved as good soldiers and privy counselors."[72] Yet, this fact that women are rendered less dangerous by custom perhaps undermines their abilities to resist inequity.

As the play unfolds, however, Cavendish shows civil wars can afford opportunities for women to *become* equal with men. Indeed, civil war affords them the opportunities to change these customs which stunt women's capacities. Freed from the watchful eyes of their husbands who were distracted by battle, the women steal materials from the garrisons and transform into Amazonian warriors. The women agree to adopt new customs which encourage the development of their capacities. They decide to bear arms and wear "an iron or steel habit" at all times, wearing them while they "sleep, eat, rest, and march."[73] Cavendish insists that this new custom will have the effect of making women better warriors: "custom will make [the arms] feel as light, as their skins on their flesh, or their flesh on their bones, nay custom hath that force, as they will feel as if their bodies were naked, when as their arms are off ... so

[66] Cavendish, "Bell in Campo," part 1, scene 9, p. 46 [587-8].
[67] Cavendish, "Bell in Campo," part 1, scene 9, p. 48 [588-9].
[68] Cavendish, "Bell in Campo," part 2, scene 3, p. 94 [617].
[69] Cavendish, "Bell in Campo," part 1, scene 9, p. 48 [588].
[70] Cavendish, "Bell in Campo," part 1, scene 9, p. 48 [588].
[71] Cavendish, "Bell in Campo," part 1, scene 9, p. 48 [588].
[72] Cavendish, "Bell in Campo", part 1, scene 9, p. 48 [588].
[73] Cavendish, "Bell in Campo", part 1, scene 11, p. 51 [590].

custom will make your arms seem as light as if you had none on."[74] The women also decide to avoid towns, and stay camping in the fields, since towns "beget a tenderness of bodies, and laziness of limbs, luxurious appetites."[75] They even decide to sing songs and tell stories only about "heroic actions done in former times by heroic women" because this practice "begets a courage to a like action" since "we are women ourselves."[76] Lacking a clear authority during civil war, the women are free from patriarchal customs. This gives them the opportunity to gain the experiences necessary to develop the capacities to make themselves equal to men. In this way, Cavendish challenges Hobbes's erasure of the civil war origins of the Amazons. By elaborating this aspect of their narrative, Cavendish sheds light on the fragility of customs that render women weaker, and hence unequal, to men. Cavendish uses the civil war context to show that there are always cracks and fractures in customs that allow individuals to prove their equality.

After defeating the army of the Kingdom of Faction, Cavendish's Amazons do not kill or exile all the men from their society. Unlike Justin's history of the Amazons, Cavendish ends her play on a note of reconciliation. The Amazons reconcile with their husbands (after a threat of enslaving them) and in turn they cooperate to defeat the Kingdom of Faction. The Amazons reinstall the male King, and peace is restored to the Kingdom. The Amazons agree to cooperate with men, if two sets of conditions are met. On the one hand, they demand that women who participated in the war be given recognition for their deeds. The King agrees that "All poets shall strive to set forth your praise," their forms "shall be cast in brass, and then set in the midst of the city" and their armour "shall be set in the Kings' armory."[77] They also demand a variety of changes to the domestic sphere:

> First, that all women shall hereafter in this kingdom be mistress in their own houses and families. Secondly, they shall sit at the upper end of the table above their husbands. Thirdly, that they shall keep the purse. Fourthly, they shall order their servants … Fifthly, they shall buy in what provisions they will. Sixthly, all the jewels, plate, and household furniture they shall claim as their own ... Seventhly, they shall wear what fashioned clothes they will. Eighthly, they shall go abroad when they will, without control, or giving of any account thereof. Ninthly, they shall eat when they will ... Tenthly, they shall go to plays, masques, balls, churchings, christenings, preachings, whensoever they will ... Lastly, that they shall be of their husbands' counsel.[78]

[74] Cavendish, "Bell in Campo", part 1, scene 11, p. 51 [590].
[75] Cavendish, "Bell in Campo", part 1, scene 11, p. 54 [591].
[76] Cavendish, "Bell in Campo", part 1, scene 11, p. 55 [592].
[77] Cavendish, "Bell in Campo," part 2, scene 20, p. 117 [632].
[78] Cavendish, "Bell in Campo", part 2, scene 20, p. 116 [631].

Several commentators have been disappointed with this insufficiently radical conclusion to the play. Erin Laing Bonin, for example, has argued that these reforms are purely domestic, and that these reforms serve to "[delegate] women to the private, domestic sphere" while reinforcing the idea that "men's 'natural' place is in the public, political realm."[79] Even the domestic changes are seen as largely gestural. While she advocates for certain liberties for women—like freedom of movement—she does seem to reinforce women's subordinate place by stating that wives shall be "of their husbands' counsel." On the one hand, this criticism might seem unfair. Afterall, Cavendish is a royalist who does not believe that most *men* have a right to participate in politics either. Yet, this criticism of *Bell in Campo* reflects the broader concern about how to reconcile Cavendish's royalism with her feminism.[80] Scholars such as Hilda Smith have diagnosed Cavendish with a "divided consciousness," torn between her belief in natural equality and her support for hierarchies.[81] A woman who cannot see the radical implications of her own views.

Read alongside Hobbes, Cavendish's feminist-royalism perhaps appears less contradictory than it does at first blush. For Hobbes and Cavendish, natural equality does not entail the kind of political egalitarianism we would expect today. The state of nature is a state of war because of the kind of equality that exists there, so both thinkers concede that hierarchies are necessary for stability. Yet both thinkers also recognize the importance of acknowledging natural equality, even in situations of clear social and political hierarchies. While Cavendish's recommendations at the end of her play may be largely gestural, they push on the fundamental tension in Hobbes's account of women. If women and men are naturally equal, then women's equality should also be acknowledged in civil society. These gestures are a way of offering that acknowledgment. Far from her reputation as a "harebrained" thinker—as Virginia Woolf put it in *A Room of One's Own*—we see that Cavendish offers a sophisticated reading of Hobbes's comments on women and natural equality, as well as an entirely justified correction.

6 Conclusion

Hobbes's Amazons are often taken as evidence of men's and women's natural equality, but scholars have disagreed about the rhetorical dimensions of these figures, questioning whether they are

[79] Erin Laing Bonin, "Margaret Cavendish's Dramatic Utopias and the Politics of Gender," *Studies in English Literature, 1500-1900* 40 (2000), 339-54 (342).

[80] Hilda Smith famously articulated this puzzle of Cavendish's Tory feminism in *Reason's Disciples*: *Seventeenth-Century English Feminists* (Champaign, IL: University of Illinois Press, 1982), 81-82. Recent scholarship has tried to make sense of this puzzle by suggesting that Cavendish is not truly a royalist. See for example, Mihoko Suzuki's *Subordinate Subjects: Gender, the Political Nation, and Literary Form in England, 1588-1688*, (London and New York: Routledge, 2003), 182-202; Suzuki, *Antigone's Example*, 241-276; Lisa Walters, "Margaret Cavendish the republican? Revolution and gender in Cavendish's romances," in Lisa Walters, *Margaret Cavendish: Gender, Science and Politics* (Cambridge: Cambridge University Press, 2014), 195-247.

[81] Smith, *Reason's Disciples*, 81.

admirable or fearsome. Yet this debate neglects the fact that there were fearsome representations of the Amazons, that did not necessarily limit their feminist potential. The most common story of the Amazons is of their rebellion, and this was used by authors like Cavendish to show the threat these women posed to patriarchal commonwealths. Hobbes would have certainly been aware of this trope, and yet his Amazon story conspicuously erases the dangers they pose. In this paper, I have tried to suggest that this revisionist history did not escape Cavendish's notice.

Turning to Cavendish, I hope, sheds light on the thorny problems surrounding Hobbes's comments on women, the Amazons, and natural equality. Yet she may also be taken to offer insights into ongoing debates in democratic theory about the nature of equality. Today, there is increasing literature on "basic equality," which seeks to understand why we consider one another equals. Most of this literature assumes that equality is an appeal to some positive quality, like reason or dignity, and dismisses the Hobbesian conception of equality—that we are equally capable of killing—as brutal.[82]

While much of the literature on basic equality finds inspiration in the Early Modern period, few scholars of "basic equality" read any Early Modern women.[83] If they did, they would perhaps not be so quick to dismiss the Hobbesian conception of equality. As Mihoko Suzuki has recently shown, many historical feminist authors engaged were preoccupied with ideas about civil war, as they saw the unique opportunities it afforded for women's advancement.[84] Turning to Cavendish can help revalorize the ignored conception of equality found in Hobbes. By leveraging the brutal idea that women are dangerous, Cavendish can demand recognition and acknowledgment. The reasons for recognizing women are not purely moral but prudential. Cavendish shows that women should be treated as equals, not just because they morally deserve it, but that it is even in men's own interest to do so for the stability of the commonwealth. Thus, turning to Cavendish, perhaps sheds light on the value of a theory of equality that is often maligned and dismissed. A theory of equality which emphasizes the dangers posed

[82] In his book on natural equality, Jeremy Waldron dismisses Hobbes's theory of equality as "brutal" and with no normative import (*One Another's Equals: The Basis of Human Equality* (Cambridge, MA: Harvard University Press, 2017), 98). This book, based on his earlier Carlyle Lectures, marks the start of a significant debate in democratic theory about the nature of equality, with contributions including Anne Phillips' *Unconditional Equals* (Princeton: Princeton University Press, 2021), Paul Sagar's *Basic Equality* (Princeton: Princeton University Press, 2024), and Andrea Sangiovanni's *Humanity without Dignity: Moral Equality, Respect, and Human Rights* (Cambridge, MA: Harvard University Press, 2017), as well as the edited volume *Do All Persons Have Equal Moral Worth? On "Basic Equality" and Equal Respect and Concern*, ed. Uwe Steinhoff (Oxford: Oxford University Press, 2014). No one has treated Hobbesian equality as a significant source of inspiration for this debate.

[83] The rare exception would be Teresa Bejan's article, which brings Astell to bear on these contemporary debates about equality, "Since All the World is mad, why should not I be so? Mary Astell on Equality, Hierarchy, and Ambition," *Political Theory* 47 (2019): 781-808.

[84] Suzuki, *Antigone's Example*, 8.

by equals rather than their rational minds might have more emancipatory potential than previously supposed.

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Hobbes Studies 38/1 (2025), 89-102

Cavendish as Critic and Reviser of Hobbes on Matter and Motion

Marcus P. Adams

Department of Philosophy, State University of New York at Albany, Albany, NY, USA

madams2@albany.edu

Abstract

Margaret Cavendish's materialism holds that all motion is self-motion. Although she shows affinities to Hobbes's understanding of "entire cause," her strategy opposes features of Hobbes's account of matter while revising his understanding of "motion." Cavendish's rejection of Hobbes's persistence principle and his account of "place" can be interpreted as following from a more thorough interpretation of the impossibility of abstracting accidents from bodies.

Keywords

Margaret Cavendish, Thomas Hobbes, Matter, Motion

Introduction

This paper discusses Margaret Cavendish's criticisms and revisions of Hobbes's understanding of matter and motion.[1] The aim is not merely to contrast their philosophies. Instead, clarifying

[1] I cite Thomas Hobbes, *The English works of Thomas Hobbes*, 11 vols., ed. Sir William Molesworth (London: John Bohn, 1839–1845) and *Thomae Hobbes malmesburiensis opera philosophica*, 5 vols., ed. Sir William Molesworth (London: John Bohn, 1839–1845) as EW and OL, respectively, by reference to volume and page number. I cite Margaret Cavendish, *Philosophical Letters: Or Modest Reflections upon Some Opinions in Natural Philosophy maintained by Several Famous and Learned Authors of this Age, Expressed by way of Letters* (London, 1664) as PL by reference to part number, letter number, and page number; *Philosophical and Physical Opinions* (London, 1663) as PPO by reference to part number, chapter number, and page number; and *Observations upon Experimental Philosophy*, ed. Eileen O'Neill (Cambridge: Cambridge University Press, 2001 [1666]) as OEP by reference to page number.

their disagreements shows Cavendish revising parts of Hobbes's philosophy rather than rejecting it wholesale, and at the same resists seeing Cavendish's innovations with respect to motion as "completely original," as Alison Peterman has recently argued.[2]

1 Cavendish as critic of Hobbes

Hobbes and Cavendish agree that all that exists in nature is matter. Neither directly argues for the claim that only matter exists; both hold that the human mind has ideas (images)[3] of material things and, insofar as we have access only to those ideas, philosophers can appeal only to material things as *explanantia*. As a result, broadly speaking, both leave theology outside of philosophy and seek to offer a metaphysics sufficient for natural philosophy.[4] However, while Hobbes arrives at this view by admitting only ideas received from sense experience, Cavendish allows for "reason" to self-move and form its own ideas. Nevertheless, even these ideas formed independently by reason and outside of sense experiences are *of* material things and are made *by* a material thing (rational matter in motion). This section examines some of Cavendish's criticisms of Hobbes on the nature of matter and motion.

Given the limited aim of providing a metaphysics for natural philosophy, Hobbes unsurprisingly begins *Leviathan* chapter 1 with an epistemology founded in an account of sense. Hobbes suggests that all ideas, which he also calls "thoughts," "conceptions," or "phantasms," are either directly received in sense experiences, or they are derived from those that are (like

[2] Alison Peterman, "Margaret Cavendish on Motion and Mereology," *Journal of the History of Philosophy* 57 (2019): 471-99.
[3] I take for granted that Hobbes is an imagist. For discussion of Cavendish's imagistic view, see David Cunning, *Cavendish* (Abingdon and New York: Routledge, 2016), 21-7. See also David Cunning, "Cavendish, *Philosophical Letters*, and the Plenum," in *Margaret Cavendish: An Interdisciplinary Perspective*, ed. Lisa Walters and Brandie R. Siegfried (Cambridge: Cambridge University Press, 2022), 98-111.
[4] For example, see *De corpore* VII.1 (EW I, 91; OL I, 81) and *De corpore* I.8 (EW I, 10; OL I, 9). Likewise, Cavendish seeks to "strictly follow the Guidance of Natural Reason and keep to [her] own ground and Principles" since doing otherwise would be "… an injury to the holy Profession of Divinity" (PL I.1, 3).

Hobbes, I will use these terms as synonyms).[5] Thus, the claim that only matter, or as he more often says "body," exists is given indirect support by considering ideas as that to which human knowers have direct access and the means by which they know anything at all. As he declares in *De corpore* VII.1, "we compute nothing but our phantasms."[6]

Since computing ideas received in sense is the only source of human knowledge, what can be said about our idea of "body"? Consistent with his epistemology rooted in sense-based ideas, Hobbes asks the reader of *De corpore* VII-VIII to imagine a particular scenario to make a thought experiment, in order to articulate the nature of body (among other aims). The thought experiment considers a person who remains after the annihilation of the world and contemplates the ideas that they received from prior sense experiences.[7] This contemplation involves inspecting conceptions to determine what they contain. Hobbes understands any conception of a particular body, which I call a conglomerate conception, as composed of a collection of conceptions that can be broken down (by analysis) into component parts, or put back together or augmented with additional conceptions (by synthesis). When I inspect my conception of the tree in the courtyard outside my office window, I can analyze it in various ways, considering it as a tree generally, considering it as having leaves that appear red rather than green, or even simply as a body that has magnitude. Hobbes recognizes two kinds of analysis: analysis of spatio-temporal components of an idea (e.g., imagining the tree without a limb or chopped in half), which he calls "dividing," and considering components that are essential attributes (e.g., *considering* a tree *as* "extended"). The former is commonplace with all human reasoning, but the latter makes

[5] Hobbes, *Leviathan*, ed. Noel Malcolm (Oxford: Clarendon Press, 2012), ch. 1, p. 22 [3].
[6] EW I, 92; OL I, 82.
[7] For discussion of this thought experiment, see Marcus P. Adams, "Hobbes's Laws of Nature in *Leviathan* as a Synthetic Demonstration: Thought Experiment and Knowing the Causes," *Philosophers' Imprint* 19 (2019): 1-23.

philosophizing possible by isolating the foundational conceptions of scientific knowledge, or what Hobbes calls "our simplest conceptions."[8]

The conception contained in *any* conglomerate conception received in sense is "imaginary space," which Hobbes explicates as "the phantasm of a thing existing without the mind simply."[9] In other words, the conception "imaginary space" is found when "we consider no other accident, but only that it appears without us."[10] Hobbes's usage of "consider" is intentional, since elsewhere he uses this term, or alternatively the phrase "consider as," to describe a cognitive ability to attend carefully to certain features of a conception and ignore others to arrive at its "nature."[11] Thinking about "a man as a rational animal" is a case of "considering as," but thinking of that same man as having arms or legs is not.[12]

After explicating various "simplest conceptions," Hobbes argues in *De corpore* VIII.1 that "body" has two features: body is mind independent, and body takes up a portion of imaginary space, that is, body has place.[13] Since Hobbesian "place" is a part of imaginary space, the latter of which depends only upon the mind that perceived some previously existing body, Hobbes notes that unlike "magnitude," which is an accident of a body itself that differentiates one body from another, "place is *nothing out of the mind*" (emphasis added).[14] I leave the details to the side, but unlike magnitude, which is "true extension," place is merely "feigned

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[8] On simplest conceptions, see *De corpore* VI.6 (EW I, 70; OL I, 62). For the distinction between dividing and considering as, see "Anti-White" II.1 (Thomas Hobbes, *Critique du "De mundo" de Thomas White*, ed. Jean Jacquot and Harold Whitmore Jones (Paris: Vrin, 1973), 108; Thomas Hobbes, *Thomas White's "De mundo" Examined*, ed. and tr. Harold Whitmore Jones (London: Bradford University Press, 1976), 29).
[9] See EW I, 94; OL I, 83. For discussion of Hobbesian definitions by explication, see chapter 4 of Marcus P. Adams, *Hobbes's Two Sciences: Politics, Geometry, and the Structure of Philosophy* (Oxford: Oxford University Press, 2025), 95-128. For discussion of imaginary space, see Edward Slowik, "Hobbes and the Phantasm of Space," *Hobbes Studies* 27 (2014): 61-79.
[10] EW I, 94; OL I, 83.
[20] See discussion in Adams, "Hobbes's Laws of Nature as a Synthetic Demonstration," 13. For development of Hobbes's understanding of "considering as," see chapters 2-4 of Adams, *Hobbes's Two Sciences*, 16-128.
[12] See *De corpore* VI.2 (EW I, 66-8; OL I, 59-60).
[13] EW I, 102; OL I, 91.
[14] EW I, 105; OL I, 94.

extension."[15] Having offered his definition of "body," Hobbes gives *a priori* arguments concerning how bodies behave, in which the conclusions take the form of principles: the persistence principle and the principle of action by contact.[16] The persistence principle is as follows:

> That which is at rest is always understood to be at rest, unless there is some other body besides it, and assuming this, it can no longer be at rest [… and] that which is in motion is always understood to be in motion, unless there is something else external to it for the sake of which it is at rest.[17]

This principle implies that all change[18] is due to an extrinsic cause. The other principle – the principle of action by contact – is defended a chapter later in *De corpore* IX.7: "There can be no cause of motion, except in a body contiguous and moved."[19] Hobbes uses these principles in geometry and natural philosophy, such as in *De Corpore* XXII.14 and *De Corpore* XXX.4.[20] As Hobbes puts it succinctly in *Leviathan*, the "reason" for both principles is "the same, (namely, that nothing can change it selfe)."[21]

The principles offer an understanding of Hobbesian matter that is in some ways aligned with the Cartesian account. Although the grounds for such claims differ between Hobbes and

[15] See also Adams, "Hobbes's Laws of Nature as a Synthetic Demonstration," 9.
[16] I follow Jesseph in using these names for these two principles. For discussion, see Douglas Jesseph, "Hobbesian Mechanics," in *Oxford Studies in Early Modern Philosophy*, vol. 3, ed. Daniel Garber and Steven Nadler (Oxford: Clarendon Press, 2006), 119-52 (131-35).
[17] OL I, 102-103. The Molesworth English edition adds "by endeavouring to get into its place by motion," which is phrasing not present in the Latin (cf. EW I, 115). For discussion of this difference, see Jesseph, "Hobbesian Mechanics," 132, fn. 17, and 150-2.
[18] Hobbes is clear that all change is motion in *De corpore* IX.9 (EW I, 126; OL I, 111-2).
[19] EW I, 124; OL I, 110.
[20] EW I, 345; OL I, 281, and EW I, 512; OL I, 417, respectively.
[21] Hobbes, *Leviathan*, ch. 2, p. 26 [4].

Descartes, the result for both is that body is extended and causally inert. Indeed, both Hobbes and Descartes rely upon God as the mover who introduces motion into the system of nature.[22] However, while Descartes's view contains an *immaterial* active principle, and Hobbes's contains none at all, Cavendish straightforwardly rejects the persistence principle and develops an account of matter itself as active.

Marcy P. Lascano argues that Cavendish also rejects the principle of action by contact, thus allowing for action at a distance without the need for an intermediary. I will not defend this claim, but I take Cavendish to understand air as a self-moving body such that it copies the shape of external objects and acts as a medium for perception and for body-body (occasional) causal interactions generally.[23] Such a view would still have a place for body-body contact in a plenum.[24] For example, the air next to my eye self-moves according to the external objects illuminated in my visual field and is, as a result, the (non-mechanical) occasion for my seeing the computer screen in front of me. Giving up on *mechanical* action by contact need not require

[22] There are significant differences that I leave to the side, not the least of which are God's continual re-creation and the status of the laws of nature. For discussion of God's re-creation, see Daniel Garber, *Descartes's Metaphysical Physics* (Chicago: University of Chicago Press, 1992), 264ff. On the absence of God in Hobbes's account of motion, see Jesseph, "Hobbesian Mechanics," 151-2.

[23] Marcy P. Lascano, "The Power of Self-Motion in Cavendish's Nature," in *Powers: A History*, ed. Julia Jorati (Oxford: Oxford University Press, 2021), 169-88. There is lack of consensus on this issue. Some argue that air is a perceptual medium: see, for example, Marcus P. Adams, "Visual Perception as Patterning: Cavendish against Hobbes on Perception," *History of Philosophy Quarterly* 33 (2016): 193-214 (197); Colin Chamberlain, "Color in a Material World: Margaret Cavendish against the Early Modern Mechanists," *Philosophical Review* 128 (2019): 293-336 (308-9); and David Cunning, "Cavendish, *Philosophical Letters*, and the Plenum," in *Margaret Cavendish: An Interdisciplinary Perspective*, ed. Lisa Walters and Brandie R. Siegfried (Cambridge: Cambridge University Press, 2022), 98-111 (109-10). A complementary view understands light as a special part of the medium that forms copies of external objects to enable perception (Brooke Sharp, "Veil of Light: The Role of Light in Cavendish's Visual Perception," *Ergo* 10 (2023): 1471-94). However, in some texts air seems to play little role, so many scholarly accounts do not mention air. For example, see Deborah Boyle, *The Well-Ordered Universe: The Philosophy of Margaret Cavendish* (New York: Oxford University Press, 2018), 77; Karen Detlefsen, "Reason and Freedom: Margaret Cavendish on the Order and Disorder of Nature," *Archiv für Geschichte der Philosophie* 89 (2007): 157-91 (164); Michael Bennett McNulty, "Margaret Cavendish on the Order and Infinitude of Nature," *History of Philosophy Quarterly* 35 (2018): 219-39 (233-4).

[24] Cavendish's description of her views in *Philosophical Letters* suggest she is a plenist during that critical period in which she is contrasting her own natural philosophy with Hobbes's and others'. For example, see discussions of magnetism and disease contagion in PL III.15, 290; PL III.16, 301-2; PL IV.2, 423. For discussion of Cavendish's plenism, see Cunning, *Cavendish*, 142-6.

Cavendish to give up on contact being a necessary feature of change in nature. I leave the principle of contact to the side and discuss Cavendish's reactions to Hobbes's account of body and then focus on the persistence principle and her view of matter.

Were the persistence principle correct, and thus all change extrinsic, Cavendish suggests that nature would be disorderly. For example, she argues that under such conditions perception would be disorderly because the "pressure of outward objects" would result in "dents and holes therein, as to make them sore and patched in a short time."[25] More generally, the ideas in the mind caused in acts of perception "would always remain" and new pressures causing new ideas would "make a strange and horrid confusion of Figures," preventing any ideas from being "distinct."[26]

Further to this, Cavendish's rejection of the persistence principle is sustained by her attack on Hobbes's understanding of "place," which cuts at the foundation of his first philosophy. As I will discuss below, this leads her to a distinct conception of motion, but one that is still amenable to Hobbes's view of "entire cause." Cavendish rejects Hobbes's distinction between the mind-dependent conception "place" and the mind-independent "magnitude" by asserting that place, magnitude, and body are "but one thing."[27] Cavendish defends this claim by arguing against two of the inferences that Hobbes makes regarding "place" that follow from its definition: that place is immovable, and that motion is the continual relinquishing of one place for another. Against the immovability of "place," she claims that place and body are "one thing" because "wheresoever there is body, there is also place, and wheresoever is place, there is body."[28] Perhaps Cavendish's anti-abstractionist point would be clearer if she had used indefinite

[25] PL I.5, 22.
[26] PL I.5, 22.
[27] PL I.17, 56.
[28] PL I.17, 56.

articles: wherever there is *a* body, there is also *a* place (more on her anti-abstractionism below). Likewise, against taking motion to be leaving one place and gaining another, she avers that "there is no such thing as place different from body."[29]

These reactions to Hobbesian "place" make sense if Cavendish holds that Hobbesian "considering as" is a form of abstraction, i.e., that considering one accident of a body in isolation of others amounts to abstraction. As mentioned, Hobbes explicates "imaginary space" as discovered when "we consider no other accident, but only that it appears without us." Although he explicitly rejects characterizing "considering as" as abstraction,[30] Cavendish's criticisms add up if she is holding more strictly to the view, which she shares with Hobbes, that all ideas are particular images. She is insisting – against Hobbes – that any rumination upon those conceptions must remain particular. We can see this rejection of abstraction in areas of her philosophy beyond these criticisms of Hobbes. For example, she resists talking about light as reducible to a single kind of motion and seeks to explain diverse phenomena as constituted by their own unique types of motions.

> … whosever will study Nature, must consider the Figures of every Creature, as well as their Motions, and must not make abstractions of Motion and Figure from Matter, nor of Matter from Motion and Figure, for they are inseparable, as being but one thing, *viz*. Corporeal Figurative Motions; and whoever conceives any of them as abstract, will, in my opinion, very much erre …[31]

[29] PL I.17, 56.
[30] For example, in "Anti-White" XXX.36, Hobbes differentiates his own approach of "speaking clearly from a consideration [*considerationem*] of place, parts, and time" from White's "abstractions [*abstractiones*] from place, from continuous parts, from time, and the like" (Hobbes, *Critique du "De mundo" de Thomas White*, 366; Hobbes, *Thomas White's "De mundo" Examined*, 388).
[31] PL I.19, 65.

She makes a similar claim in *Philosophical and Physical Opinions*, arguing that the motion of swimming is different among kinds of animals and even among different individuals in a given kind. She argues that "… a Fish Swims, a Swan swims, a Man Swims" but none swims like the others.[32] Likewise, in *Observations upon Experimental Philosophy* IV, Cavendish is skeptical concerning any abstract account of cause, arguing that "there are so many different sorts of productions in nature, as it is impossible for any particular creature to know or describe them …"[33] Cavendish raises similar worries against the Cartesian attempt to understand motion mechanically; doing so, she argues in *Observations* XVII, would be like thinking that "this world and all natural creatures are produced by a whirling motion, or a spherical rotation, as if some spirits were playing at bowls or football."[34] Cavendish counters that "nature has infinite ways of motions, whereof none is prime or principle, but self-motion."[35] In sum, Cavendish resists abstraction because doing so departs from the myriad ways in which nature presents, and she seems to take Hobbesian "considering as" to be a form of abstraction.

How do these worries undercut Hobbes's persistence principle? The background framing of that principle understands motion as the continual relinquishing of one place for another, and the principle aims to show that such change can begin (motion) or cease (rest) only by an extrinsic cause. If Cavendish is right that place, magnitude, and body are "but one thing," the plenist picture that results is one of change by means of relational changes, e.g., one body might join with another body to form a new conglomerate body. She clearly rejects Hobbes's apparent reduction of all change (motion) to *loco*motion since she holds there is no coherent notion of

[32] PPO V.2, 152.
[33] OEP 53.
[34] OEP 74.
[35] OEP 74.

Hobbesian "place" (mind-dependent "feigned extension") to provide, but what exactly is *motion* for her if not change of place?

Her view would seem to imply that order (regularity) is created when different parts of some whole self-move in ways that harmoniously work together, and disorder when not. So for a given whole, such as a living being, consider digestion: order is brought about when eating a food that has its own self-motions (call them self-moving, vitamin C motions), which by joining with the human body provide the occasion for the digestive tract to self-move in a way coordinated with the vitamin C motions (call them self-moving, immune-boosting motions), and then those gastrointestinal self-motions are the occasion for some coordinated self-motions of the overall living thing (call them self-moving, health-promoting motions). In such cases, change (motion) amounts to self-initiated motions of parts that either coordinate with the other parts and join with them, or they do not. In the case of vitamin C, a new conglomerate is formed that is the original human body plus the vitamin body that is introduced.

Cavendish uses political metaphors to describe the ways in which parts of the human body, and other parts of nature, relate to one another for health or disease. She describes health as when "their Figure is Inlarged by Nourishing motions, and Sympathetical matter," but she contrasts this with something that is "Received into the Stomach, [but] is not Nourishing."[36] The result is that a conflict of motions occurs (not joining together), "like Several Factions," and the undesirable thing in the stomach is an occasion for the bodily motions to be "Hinder[ed] and Obstruct[ed]"[37] and expel the thing since it works against the health of the organism. Nutritious food, she says several chapters later, is "Agreeable to Matter and Motions" insofar as it helps the

[36] PPO VII.1, 307.
[37] PPO VII.1, 308.

body retain its integrity, which is a "help to the Consistence of the Body."[38] When someone "[t]aste[s] Cheese, or any Meat they dislike Naturally," they have indigestion because "the Exterior motion Antipathizes with the Natural motion belonging to the Body."[39] Disagreement in such cases amounts to a claim that these two bodies do not join with one another in a new harmonious conglomerate.

Alison Peterman has recently argued for a view that understands Cavendish in much this way; all change for Cavendish is mereological change according to which the actual motion of a body happens when it divides and joins with another body.[40] I broadly follow Peterman's understanding of Cavendishian motion but wish to reject an implication that Peterman draws from it, namely that despite Cavendish's apparent embrace of the mechanist criticisms offered by Hobbes, Cavendish's rejection of the reduction of all motion to locomotion resulted in a "completely original account of motion."[41] Instead, I suggest that Cavendish's account of motion can be understood as broadly helping to make (in Cavendish's view) Hobbes's natural philosophy more coherent: that is, Cavendish can be understood as a reviser of Hobbes.[42]

2 Cavendish as reviser of Hobbes

How would understanding Cavendish as a reviser of Hobbes's natural philosophy go? Recall that Hobbes's persistence principle holds that any change to a body must be due to some extrinsic cause. The English translation of *De corpore* tried to make sense of how this could be, by adding

[38] PPO VII.63, 429.
[39] PPO VII.65, 433-4.
[40] Peterman also argues for an account of "motive force" in Cavendish's philosophy, but I will not focus on this (see Peterman, "Margaret Cavendish on Motion and Mereology," 488ff).
[41] Peterman, "Margaret Cavendish on Motion and Mereology," 498.
[42] Whiting has also recently criticized the claim that Cavendish's view is "completely original" by locating in Digby a view of motion understood as change in parthood. For discussion, as well as connection between the social context of Digby and the Cavendishes, see Daniel Whiting, "Kenelm Digby (and Margaret Cavendish) on Motion," *Journal of Modern Philosophy* 6 (2024): 1-27 (4-9, 14-5).

"by endeavouring to get into its place by motion,"[43] but this is not Hobbes's own conception of motion. Hobbesian matter contains no conception of force and, as such, can perhaps explain why body A changed from one place to another (i.e., because of some extrinsic cause B) but cannot explain *how* B brought about that change. Unlike Descartes, Hobbes's natural philosophy lacks appeal to God other than as the initiator of motion.[44] Thus, one could understand Cavendish as seeing an explanatory gap in Hobbes's materialism and seeking to fill it by appealing to a principle of change as present in every part of matter.

Nonetheless, it may still seem that Hobbes's purported reduction of all causality to efficient and material causality, alongside his goal of showing how, even in the case of human beings, final causality plays no role,[45] could not cohere with a Cavendishian mereological account of motion. However, Hobbes's conception of causality (and the examples he provides) rejects a characterization of "motion" as simple local motion. His conception in *De corpore* IX is of "entire cause" where a cause is the

> … aggregate of all the accidents both of the agents how many soever they be, and of the patient, put together; which when they are all supposed to be present, it cannot be understood but that the effect is produced in at the same instant; and if any one of them be wanting, it cannot be understood but that the effect is not produced.[46]

[43] See fn. 17 above.
[44] See fn. 22 above.
[45] Despite beginning *Leviathan* chapter 17 by referring to the "finall Cause, End, or Designe of men …" (Hobbes, *Leviathan*, ch. 17, 254 [85]), Hobbes is clear in *De corpore* X.7 that, although it is appropriate to talk of things with "sense and will" using final-causal descriptions, even this he will "prove … to be an efficient cause" (OL I, 117; EW I, 132).
[46] EW I, 121-2; OL, 107-8.

In short, Hobbes understands change (motion) as the joining together (aggregation) or breaking apart (division) of bodies such that their combinations of accidents result in some effect being instantaneously and necessarily produced. Hobbes similarly understands "power" in terms of what an "agent" body could bring about when joined to some patient: "whensoever any agent has all those accidents which are necessarily requisite for the production of some effect in the patient, then we say that agent has power to produce that effect, if it be applied to a patient."[47] The difference between what we call "cause" and "power" is merely a matter of the time at which we are judging: "cause respects the past, power the future time."[48]

I suggest that Cavendishian change may not be far from Hobbes's conception of causality as joining together and separating bodies to generate effects. Indeed, Hobbes's account of "entire cause" is not developed in isolation but is grounded in his first philosophy, which is founded upon division and aggregation. Consider that "part" and "division" are the third and fourth conceptions explicated in Hobbes's first philosophy of *De corpore* VII-VIII, following the conceptions "imaginary space" and "imaginary time."[49] I will not discuss all of the details of the thought experiment, and some parts have been discussed above, but Hobbes explicates the two conceptions at the beginning as "imaginary" because at that moment no body is being considered by the lone individual within the experiment. Immediately following the explicatory definitions of these two conceptions, which are understood merely as after-effects from that individual's prior experiences, Hobbes explicates the conceptions "part," "division," "one," "number," "composition," and "whole," all of which concern division and aggregation.[50]

[47] EW I, 127; OL I, 113.
[48] EW I, 128; OL I, 113.
[49] For discussion, see Adams, "Hobbes's Laws of Nature as a Synthetic Demonstration."
[50] EW I, 95-8; OL I, 85-7.

Importantly, these explications occur *before* the explication of "body" and "motion" in *De corpore* VIII. Why does this ordering matter? It matters because the thought experiment builds in a synthetic composition from simplest conceptions to more complex conceptions that are understood to contain those simples. As a result, since the reader explicates "part" and "whole" prior to explicating "body" and "motion," the latter are understood only in terms of the former.

This becomes clear when considering the definitions in *De corpore* VIII after a body is reintroduced into the lone individual's world. There Hobbes defines "body" as "that, which having no dependence upon our thought, is coincident or coextended with some *part* of space."[51] To be a body, then, is not only to be mind-independent and extended but, more importantly for the present purposes, to be a *part* of space. To be a "part," as defined in the previous chapter, is simply to be "compared with something that contains it."[52] The definition of "motion" as "continual relinquishing of one place, and acquiring of another"[53] similarly depends upon the earlier explication of "place," which Hobbes already explicated as "feigned extension" insofar as to be in a place is to be a *part* of the previously explicated "imaginary space." As Hobbes says, "That space, by which word I here understand imaginary space, which is coincident with the magnitude of any body, is called the *place* of that body."[54]

The claim that when a body moves it does not "keep the same place" implies that a perceiver's representation of bodies in motion necessarily includes their location in different *parts* of imaginary space. In short, far from understanding motion as simple locomotion by thinking of Hobbes as grounding his philosophy in "body" and "motion" *simpliciter*, Hobbes

[51] EW I, 102; OL I, 91; emphasis added.
[52] EW I, 95; OL I, 85.
[53] EW I, 109; OL I, 97.
[54] EW I, 105; OL I, 93.

understands motion as occurring when mind-independent, extended bodies in a plenum leave one part of imaginary space for another and in doing so join with other bodies in different parts of space. Doing so may result in some new "whole" being formed, since a whole is "conceived to be compounded of parts,"[55] and, given Hobbes's understanding of "entire cause," will result in a new aggregate of accidents and the simultaneous generation of some new effect.

Furthermore, *the* archetypical examples of Hobbesian explanation incorporate this understanding of change in terms of joining and dividing by putting together some new whole out of parts. For example, although the explanation of sensation that figures in Hobbes's major works, including *Leviathan* chapter 1 and *De corpore* XXV, could be construed as simply caused by pressure imprinting upon the human sense organ that results in the creation of an image in the brain (as Cavendish attacks it),[56] Hobbes is clear that sensation is caused by the *combination* of inward motions from external bodies and outward motions from within. The "entire cause" of a phantasm then is a conglomerate of these inward and outward motions that is made in the act of sensation, instantaneously creating the phantasm. The same can be said about Hobbes's most prominent explanation in *Leviathan* for how to generate the commonwealth, which is constructed by individual human bodies (i.e., parts) coming together to form an artificial body (i.e., a new whole) by aggregating in ways instructed by the Laws of Nature so that they create peace.[57] Finally, the very activity of the Hobbesian mind is understood not in terms of simple locomotion, i.e., not in terms of changing place since the mind is contained in a single place (the brain), but in terms of the dividing (analysis) and compounding (synthesis) of ideas. Hobbes, differently from Cavendish, does not turn to occasional causation to explain interactions between bodies; yet, this

[55] EW I, 97; OL I, 86.
[56] See PL I.4, 18-20.
[57] Adams, "Hobbes's Laws of Nature as a Synthetic Demonstration," argues that the construction of the commonwealth should be understood as a synthetic demonstration that constructs the complex from simples.

need not prevent us from seeing this link between Hobbes and Cavendish in terms of their understanding of "entire cause."[58]

Beyond seeing these connections between Hobbes and Cavendish on the nature of "cause," such an understanding takes Cavendish's own expressed agreements with Hobbes seriously. Both agree that extension is an essential property of all matter and cannot be generated or destroyed.[59] Similarly, both agree that motion cannot be transferred from body to body, which Cavendish takes to be a consequence of Cartesian physics.[60] Cavendish disagrees with many features of Hobbes's natural philosophy, not the least of which is her attack on Hobbes's view that accidents *other* than extension can be generated and destroyed, but taking her agreements seriously, alongside the foundational role that division and composition play for both philosophers, suggests viewing Cavendish's account of motion as a revision of the Hobbesian view, or at least coherent with parts of it, rather than something "completely original."

Extending this line of thought, where does Cavendish begin in her account of matter and motion that separates her from Hobbes? Cavendish's issue with Hobbes's understanding of motion and place is that it is incoherent given the inertness of matter and the account of "place" he provides, which in her view both rely upon abstraction. According to Cavendish, the starting point for the argument offered in *De corpore* VIII.19, which asks the reader to imagine "some finite body exist and be at rest, and that all space besides be empty," is inconceivable.

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[58] Lascano argues that in addition to occasional causes, Cavendish also holds that there are causes by "substance transfer," such as in the case of generation or corruption ("Cavendish and Hobbes on Causation," in *A Companion to Hobbes*, ed. Marcus P. Adams (Hoboken, NJ: Wiley, 2021), 413-30 (414-5)). However, Cavendish could take such events as occasional, as well. For instance, the mixing of water and earth (for this example, see PL I.31, 102) could be understood as being occasioned by someone placing them in proximity of one another such that they form a new conglomerate (mud) that is unified only insofar as their respective sensitive matter self-moves in coordination. If heat or sunlight is present, that may occasion separation and the transfer of water elsewhere into air so that air and water then form a new conglomerate. In short, it seems that Cavendish could treat such cases like this (or generation and corruption) as occasional.

[59] EW I, 116; OL I, 103; PL I.XVII, 58.

[60] PL I.XVI, 54; EW I, 117; OL I, 104. For Cavendish's criticisms of Descartes on this, see PL I.XXX, 97-8.

Abstraction of this sort – whether attempting to abstract a body existing apart from all else at the beginning of the thought experiment described above or "place" from a particular body – is illegitimate. She makes this clear:

> I do not understand those that say, that a whole Figure may be Divided into many several Parts, but yet those Parts are not really there as in the whole Figure, untill by Division they are parcelled out, and the whole Figure, out of which they were made, ceases to be any longer a Whole, for then every several Part becomes a Whole …[61]

Cavendish's point here is that "dividing" something from some whole (like color or extension or place from a particular idea) does not make it a "part" any longer. Instead, the thing divided either becomes a new whole on its own, or we see that it is not possible for it to exist on its own (in the case of secondary qualities). This move straightforwardly denies a basic assumption of Hobbes's philosophical method that division of some part from all else (and the special kind of division, "considering as") is possible.

Conclusion

This paper has argued that despite Cavendish's many criticisms of Hobbes's philosophy, her account of motion can be viewed as a revision of Hobbes's related to both philosophers' understanding of a cause as "entire cause." Despite her attacks on Hobbes's understanding of "motion" and "place," and Hobbes's dependence upon abstraction, the foundational status of

[61] PPO III.20, 87.

"part" and "whole" in Hobbes's first philosophy provides a link to Cavendish's view that change (motion) is mereological.

ACCEPTED VERSION – Please quote published version
Hobbes Studies 38/1 (2025), 103-108

Book Review

Hobbes, Thomas, and William Cavendish. *Discours sur l'histoire*. Edited and translated by Jauffrey Berthier and Nicolas Dubos. Paris: Gallimard, coll. Folio Essais, 2024. 260 pages. ISBN 978-2-07-304068-8.

The editors of the volume and translators of the texts have aimed at giving access to two essays on history translated into French for the first time, with a comprehensive critical apparatus. The two texts, "Of reading history" and "Upon the beginning of Tacitus" are selected from a larger collection of essays published anonymously in 1620, the *Horæ Subsecivæ. Observations and Discourses*. They represent 66 pages of translated text, the rest of the volume being devoted to a lengthy introduction, a bibliography, and notes. Needless to say that William Cavendish, 2nd Earl of Devonshire, is hardly known in France, up to the point of being mistaken for both his father (2567William Cavendish) and the Earl of Newcastle (also a William Cavendish) in the Catalogue of the Bibliothèque nationale. Thomas Hobbes, of course, is more familiar, and the catalogue of *Folio Essais* (a highly popular paperback collection intended for the general public) includes a French translation of *Leviathan* by Gérard Mairet. This may explain why the two editors are so keen to present the two essays as the result of a close collaboration between Cavendish and his then-tutor Hobbes. On the cover itself, Cavendish's name even appears under that of Hobbes, giving potential readers the impression that his role as a writer was subsidiary at best. At the beginning of their introduction, the editors present the question of Hobbes's authorship (or at least co-authorship) as the justification of the whole enterprise: "our aim is to add decisive elements to our knowledge of the first career of the author of *Leviathan* and to our understanding of his later political works" (16). According to Berthier and Dubos, the *Horæ*

Subsecivæ were indeed written by Hobbes and Cavendish, and they should not be considered as juvenile productions—"moving but not very interesting" (17)—but as serious ones. The question of attribution is only hastily mentioned at the beginning of the general presentation, and most of what is said on the subject later in the introduction is mainly squeezed into two footnotes at the end of the volume. If the aim was to convince readers of the importance of the two essays, the question of authorship should not have been left in the background but should have been dealt with more seriously as the starting point of this editorial endeavour. To avoid a too lengthy discussion on the subject in their introduction, Berthier and Dubos could have settled, at the very least, for a nuanced approach and presented their French readers with the arguments put forward by Quentin Skinner in the third volume of his *Visions of Politics*.[1] If Skinner provisionally agrees to consider that Hobbes may have contributed to the *Horæ* with the three longer essays singled out as his by computer analysis,[2] he does not consider the question of their attribution to the author of *De Cive* as settled once and for all. The editors of this French volume could have been equally cautious without diminishing the interest of the two essays they have translated. What they do not announce at the beginning of their introduction is that they not only view these two essays on history as heralding the contents of Hobbes's later works ("Hobbes before Hobbes," 13) but that what they present as a close collaboration between Hobbes and Cavendish was actually done under the close supervision of Francis Bacon, and was even an essential step in the editorial evolution of his own *Essays*, leading to their revised third edition.

Berthier and Dubos' introduction is nonetheless a useful presentation of the two essays in their context, and more particularly in relation to Tacitism and Hobbes's later works. Although at times strangely repetitive in its structure (the texts are, for instance, presented at

[1] Quentin Skinner, *Visions of Politics, Vol. III: Hobbes and Civil Science* (Cambridge: Cambridge University Press 2002).
[2] Noel B. Reynolds and John L. Hilton, "Thomas Hobbes and Authorship of the *Horae Subsecivae*," *History of Political Thought* 14, no. 3 (1993): 361–80.

the beginning of the introduction ("Présentation des textes," 18–23) and presented again at the end of the introduction in a section entitled "Notice sur les textes originaux," 101–107), the introduction is divided into three parts: the first (26–65) offers an overview of civil science in 1620, the second part (66–80) deals with the conception of the *Horæ* essays and the role the editors ascribe to Francis Bacon in their composition, and the final part (81–100) is devoted to Tacitean elements in Hobbes's new political science.

To emphasise the importance of the essay "Upon the Beginning of Tacitus," the editors insist on the capital influence of Tacitus in the early-modern evolution of political thought and on the omnipresence of his works – especially the *Annals* – in contemporary discussions of political power and forms of government, Tacitism being linked to the idea of the necessity of strong political power to preserve social cohesion and to resist the fragmentation of religious communities and the decay of the feudal system at a time when war (including civil war) is more than a threat. The conflicts that arose during the Reformation, such as the Saint Bartholomew's massacre, revealed the dangers of exercising power contrary to the interests of the community. Machiavellianism (which, the editors underline, suffused Elizabethan drama) is seen as the incarnation of the corruption of political power, which is why England has long been wary of the concept of reason of state. As opposed to Machiavelli, who saw the exercise of power as a permanent conflict between the prince and his subjects, Giovanni Botero contributed to the development, in England, of the idea that the prince's power was inseparable from the notion of common good. Tacitism then appeared as a useful resource to determine a form of political power that could preserve social order in an otherwise morally corrupt civil society without evolving into a Machiavellian "monstrosity" (36). Berthier and Dubos then explain how the works of Tacitus were the object of renewed interest after the widely read commentaries of Justus Lipsius were published in 1574. The new political humanism inspired by Tacitus and illustrated by Lipsius and Montaigne forms the background of the reflections on

history developed by Hobbes and Cavendish in the *Horæ* in the specific political context of their time. They then turn to Robert Devereux and Henry Savile, but also to the "anti-Tacitean reaction" (48) that characterised the court of James I, under the influence of Isaac Casaubon, to give French readers a more detailed presentation of the fortune of Tacitus in England in the years that led to the composition of "Upon the beginning of Tacitus." After a detailed description of the content of the essay (the impossibility of an abstract political science, disconnected from the context of the time; the necessity to define the nature of the political problem faced by early-modern societies and to assess the viability of the Tacitean principate in the seventeenth century; the arguments against the republican model, despite its obvious merits; the vital obedience of the subjects to preserve social order and ensure the common good), the editors turn to *scientia civilis* and the reflection on the respective role of philosophy and history to define civil government. Berthier and Dubos then focus on Francis Bacon and the idea that history should "form the basis of a pyramid dominated by philosophy" (61) to define the main subject of the two essays: a way of reading history that enables the transformation of past political experiments into applicable principles. To them, the Baconian project of a "true *inductive* rationality" (65) is precisely what was sketched in "Of Reading History" and later consciously expounded in "Upon the Beginning of Tacitus," which they view as a "collaboration" between Cavendish, Hobbes, and Bacon (65–66).

The second part of the introduction is devoted to expanding on the thesis that the *Horæ* are not just the result of cooperative work between William Cavendish and Thomas Hobbes (whose respective roles are never precisely delineated), but that they were written by the two men under the close supervision of Bacon, by then Lord Chancellor and "at the height of his political and intellectual career" (66). According to the editors of the volume, the

attribution (by Reynolds and Saxonhouse[3]) of three of the longer essays to Hobbes (while the rest were attributed to Cavendish alone) led specialists to overlook the general coherence of the collection of essays and to underestimate the connection with Bacon, which they reduced to Cavendish's servile imitation of Bacon's *Essays* (68). To Berthier and Dubos, the fact that (as "discovered", according to them, by Mark Neustadt in his PhD thesis)[4] the "Discourse of Laws" in the *Horæ*, attributed to Hobbes by computer analysis, was in large part a translation of Bacon's *Aphorismi de jure gentium* is proof enough that the question of attribution is a moot question which overshadows the unifying principle of the *Horæ*: its close proximity with Bacon's new civil science. For the editors, the anonymous publication of the *Horæ* is another clue pointing to Francis Bacon, anonymity being an advisable way for a high-ranking member of the aristocracy to avoid being directly associated with a literary endeavour that could suddenly become embarrassing or dangerous. Anonymity also exemplifies the tension between *vita contemplativa* and *vita activa* central to the essay "Of Reading History," and acts as a metaphor for dissimulation, again a central theme of "Upon the Beginning of Tacitus." The editors also claim anonymity would lead curious readers to track further clues to a possible attribution in the essays themselves, clues that would have been obvious enough to convince early-modern readers that Baconian ideas were being discussed in the highest circles. The editors then aim to demonstrate that the whole collection of the *Horæ Subsecivæ* was meant to promote a more palatable version of Bacon's essays in the highly codified form of Tacitean commentaries. By doing so, Cavendish and Hobbes encouraged the circulation of Bacon's thought under the familiar humanistic modes of exposition of moral philosophy and

[3] Noel B. Reynolds and Arlene W. Saxonhouse, "Hobbes and the Horae Subsecivae," in *Thomas Hobbes, Three Discourses: A Critical Modern Edition of Newly Identified Work by the Young Hobbes*, ed. Noel B. Reynolds and Arlene W. Saxonhouse (Chicago: Chicago University Press, 1995), 3–19.
[4] Mark Neustadt, "The Making of the Instauration: science, politics and law in the career of Francis Bacon," PhD thesis (Johns Hopkins University, 1987), 215, n. 91. The editors of the volume under review seem to be unaware of the demonstration by Andrew Huxley that the translated parts only amount to 14% of the text in the *Horæ*: see Andrew Huxley, "The *Aphorismi* and a *Discourse of Laws*: Bacon, Cavendish, and Hobbes 1615-1620," *The Historical Journal* 47, no. 2 (2004): 399–412.

civil science. To Berthier and Dubos, the *Horæ* were "an essential step in the process that led Bacon to develop, in the third edition of his *Essays*, a way of writing civil science that was very different from that of the earlier editions" (80), and the two essays they chose to translate into French are the best illustrations of their hypothesis. In the last part of their introduction, they emphasise the link between Tacitism and Hobbes's new political science as delineated in *Leviathan*, dividing this final part of their analysis into two subparts devoted to "ethics" and "politics."

Although this aspect may seem quite irrelevant for the English-speaking readers of this review, this editorial endeavour also involves a translation into French. The two essays are not particularly easy to translate, and the French version – no doubt the result of hard work – has succeeded in providing French readers with a text that captures their original meaning. It is, however, irritating at times, too ambiguous for its own good, and even faulty. I will not give here the tedious enumeration of the things that should have been rectified before publication and will limit my remarks to a few problems in the translation of the first essay. One of the first things French students learn in translation classes is that the English pronoun "you" can be translated in many ways, from the obvious (but tricky) "tu" and "vous" to the less obvious "on." The translators have chosen to translate the English "you" by "tu," (see, for instance, p. 111 "tu y trouveras", and p. 115 "tu vas commencer", "tu vas poursuivre") which could certainly be justified by Montaigne's use of the same pronoun throughout the *Essais*, but which leads here to useless oddities, for example when the sentence "there is required a due, and diligent observation of the times and chronologie, when you find it mentioned" is quite perplexingly translated as "une observation diligente et droite des temps et de la chronologie est requise quand celle-ci est mentionnée dans *ton histoire*" (117, emphasis mine): to translate "due" by "droite" is a choice for which no explanation comes to mind, but the addition of "ton histoire" is here totally unjustified and misleading. While I am very much in favour of

conveying part of the 'flavour' of seventeenth-century English into a modern translation by using some French words in a sense that is no longer their usual one (provided the choice of words corresponds to the original meaning), this can sometimes lead to unnecessary confusion, especially with words that are still very commonly used in French. The adjective "exquisite" ("an exquisite expression"), meaning here "carefully chosen," should have been translated as "remarquable" or "recherchée" instead of "exquise," (111) which may also have meant "carefully chosen" in the past, but now means only "delicate" or "delightful." The same is true of "vicieux," (113) which may have once had the same meaning as the word "vicious" ("could distinguish between two vicious extremes") and is used by the author of the first essay to mean "spoiled by some imperfection" or "defective," but is now mainly used to describe moral or sexual misconduct and should have been rendered as "pernicieux" for the sake of clarity. Sometimes, the choice of words adds unnecessary obscurity to the text, even when the original is quite clear: for instance, "the forms and situations of the regions," rendered as "les figures et les situations des régions" (118), does not mean much in French. The sentence "Et même si l'expérience que l'on a de son temps peut apporter de l'aide et une direction à nos actions" (114; translation of "And though a man's experience of his owne times, may give him much help and direction in all his actions") does not mean much either and "apporter une direction" is not correct French. Even more puzzling is the translation of "to eschew" by "échouer" ("to fail," see p. 114), probably because the two words sound very vaguely the same. This translation is very often uselessly and frustratingly convoluted, be it by choice or by an excess of confidence, which is sometimes detrimental to the general intelligibility of the text. The most remarkable and useful feature of the volume is by far its critical apparatus, especially the endnotes, which are rich and carefully researched. No doubt French readers will be able to find in the notes the clarity and precision that is sometimes lacking in the translation.

Sylvie Kleiman-Lafon | ORCID: 0000-0001-7329-8627

Paris Nanterre University, Nanterre, France

s.kleimanlafon@parisnanterre.fr