THE MATERIAL CULTURE OF PHYSICAL IMPAIRMENT

Assistive Technology in Northern Europe, c. 1400–c. 1600

Rachael Gillibrand

Submitted in accordance with the requirements for the degree of
Doctor of Philosophy in Medieval Studies

The University of Leeds
Institute for Medieval Studies
School of History

January 2020

The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

This copy has been supplied on the understanding that it is copyright material and that no quotation from the thesis may be published without proper acknowledgement.

Assertion of moral rights:

The right of Rachael Gillibrand to be identified as Author of this work has been asserted by her in accordance with the Copyright, Designs and Patents Act 1988.

©2020 The University of Leeds and Rachael Gillibrand

ACKNOWLEDGEMENTS

First and foremost, I would like to thank my supervisors, Iona McCleery and Eva Frojmovic, for their invaluable advice and assistance. This process has been difficult at times, but you have always been patient, thoughtful, and kind. You have taught me so much more than just how to write a thesis. Thank you.

I am also extremely grateful to the University of Leeds for enabling me to undertake this PhD through the generous provision of their 110th Anniversary Scholarship, as well as the School of History and Institute for Medieval Studies at Leeds whose research stipend have funded several conferences and research trips.

My thanks also go to Bill Flynn for teaching me medieval Latin (*habes patientiam sancti*!), to Alan Murray for his assistance with all things warfare and with my German pronunciation ('gœts' not 'gɒts'!), to Julia Barrow and Melanie Brunner for providing feedback on my transfer extract, to Emilia Jamroziak for being a fantastic personal tutor and for inspiring my undergraduate self to study the Middle Ages, and finally to Alaric Hall for always being on hand to provide honest and helpful guidance concerning broader academic life.

I am very appreciative of those people outside of the University of Leeds who have also offered me their time and support – namely Bob Woosnam-Savage, the reenactors of the Royal Armouries, and Jacob Deacon who have helped to bring my understanding of medieval weaponry and warfare to life, Karen Watts for our discussions concerning medieval armour, prostheses, and spectacles, Jim Spriggs and the Yorkshire Archaeological Trust for facilitating my investigations into the Worcester Pilgrim's staff, and all the brilliant librarians and archivists who have helped me along the way – especially the staff at Ripon Cathedral and the Museo Stibbert.

Speaking of librarians and archivists, this project would have been much more difficult were it not for my fantastic colleagues at the University of Leeds Health Sciences Library. You have been so considerate and have made the final year of my PhD as pain-free as possible. Likewise, thank you to my postgraduate

colleagues in the School of History and the denizens of the Le Pat – especially Joanna Phillips, Trevor Russell Smith, Sunny Harrison, and Florence H. R. Scott. You know the trials and tribulations of this process well and have been there to celebrate and commiserate in equal measure!

I am also extremely grateful for the encouragement, advice (and beer!) provided by my brilliant friends. Stephen Basdeo and Caris Shekell – I'm looking at you! Special thanks also go to Rose Sawyer (my friend, sister, and grandmother) and to James Titterton. I can't put into words how much the two of you have helped me through this process. You're incredible.

I would also like to thank my wonderful family for their love and kindness – especially to my Auntie (Sandra Gillibrand) and Julie Lomas for your help financially and, of course, to my Mum (Lesley Gillibrand), Dad (Andrew Gillibrand), and my sister (Abigail Gillibrand). You have been on this journey with me from the beginning and have always been on the end of the phone, come day or night, rain or shine, to share in my successes and console me in my failures. I could not have done this without you. You mean the world to me.

Thank you also to Humphrey McColl. Over the last eighteen months you have endured tears, frustrations, and many a rant over hideous translations, but you never stopped believing in me. I am extraordinarily lucky to have you in my life. I love you very much.

And lastly thank you to Alf, my beautiful, tiny monster.

ABSTRACT

This thesis proposes the use of an interdisciplinary approach grounded in both visual and material culture in order to study the relationship between the body, technology, and notions of dis/ability in Northern Europe c. 1400–c. 1600. It will take an 'object-driven' approach to its source material in order to discover the practical ways in which fifteenth- and sixteenth-century assistive aids were designed, constructed, and sold, whilst also considering the cultural connotations associated with assistive technology – in particular, its connection with popular notions of status and gender. Chapter One provides a historiographical overview of the field and asks why assistive technology has been excluded from this discussion. Chapter Two focusses on 'Crutches, Sticks, and Staffs' to demonstrate how different kinds of ambulatory aids were used within fifteenth- and sixteenth-century imagery to signify different social groups and statuses. Chapter Three considers visual representations of 'Chairs, Carts, and Barrows', asking what these images reveal about contemporary understandings of the relationship between gender and the use of assistive technology. Chapter Four discusses the physical and cosmetic importance of mechanised prostheses in relation to high-status masculinity, with a particular focus on the case study of Götz von Berlichingen. Finally, Chapter Five will show how service dogs and spectacles came to have multiple (and often contradictory) meanings when represented in different visual contexts.

CONTENTS

LIST OF IMAGES

Please see appendices for complete image references.

APPENDIX II: CHAIRS, CARTS AND BARROWS

APPENDIX III: PROSTHETIC LIMBS

APPENDIX IV: SERVICE DOGS AND SPECTACLES

Image 4.1: Raymund of Peñafort, *Smithfield Decretals*, Fourteenth Century (British Library, Royal 10 E IV, fol. 218v)

Image 4.2: Raymund of Peñafort, *Smithfield Decretals*, Fourteenth Century (British Library, Royal 10 E IV, fol. 219v)

Image 4.3: Raymund of Peñafort, *Smithfield Decretals*, Fourteenth Century (British Library, Royal 10 E IV, fol. 110r)

Image 4.4: Anon, *Hours of Mary of Burgundy*, c. 1477 (Austrian National Library, Codex Vindobonensis, fol. 39v)

Image 4.5: Anon, *Psalter-Hours*, Fourteenth Century (Walters Art Museum, Ms. W.82, fol. 207r)

Image 4.6: Anon, *Psalter-Hours*, Fourteenth Century (Walters Art Museum, Ms. W.82, fol. 171r)

Image 4.7: Jehan de Grise, *Romance of Alexander*, c. 1338–1410 (Bodleian Library, Ms. Bodl. 264, fol. 77v)

Image 4.8: Jehan de Grise, *Romance of Alexander*, c. 1338–1410 (Bodleian Library, Ms. Bodl. 264, fol. 108v)

Image 4.9: Conrad von Soest, *Passionsaltar*, c. 1403

Image 4.10: *Rivet Spectacles*, Fourteenth Century

Image 4.11: *Bow-Rivet Spectacles*, Fifteenth Century

Image 4.12: *Bow Spectacles*, Fourteenth Century

Image 4.13: Konrad Seusenhofer, *The Horned Helmet*, 1512

Image 4.14: *Trig Lane Spectacles*, c. 1410

Image 4.15: After Pieter Bruegel the Elder, *The Sleeping Pedlar Robbed by Monkeys,* c. 1562

Image 4.16: Jacob Cornelisz van Oostsanen, *Laughing Fool*, c. 1500

Image 4.17: Anon, *Laughing Fool*, c. 1540

LIST OF FIGURES

Please see in-text figures for full references.

INTRODUCTION

In the late 1960s, the Scandinavian Design Students Organisation invited Victor Papanek to host three workshops on the theme of socially responsible design practices. The last of these workshops, which took place in Konstfack in 1968, encouraged participants to work in groups to consider design needs relating to education, disability, developing countries, residential environments, and communications.[1] Working as a part of the 'disability' team was Susanne Koefoed, who contributed a sketch of a simplified figure using a wheelchair, depicted in white against a dark background.[2] The following year, Rehabilitation International adopted a revised version of this image as the International Symbol of Access – a universally recognisable pictogram to be used in accessibility signage across the world (see image 2.1).[3] Today, the International Symbol of Access is ubiquitous in urban environments – appearing on parking bays, public bathrooms, elevators, and fire escape signs to name but a few examples. As such, Koefoed's image of a person using a wheelchair has become synonymous with understandings of disability in the present day and is arguably the most well-known representation of impairment around the globe.

As Irina Metzler suggests in her seminal monograph, *Disability in Medieval Europe*, 'the term 'disabled' in contemporary society stereotypically tends to

[1] Ida Kamilla Lie, "Make Us More Useful to Society!': The Scandinavian Design Students Organization (SDO) and Socially Responsible Design, 1967–1973', *Design and Culture*, 8:3 (2016), 327–361 (p. 340).
[2] Elizabeth Guffey, 'The Scandinavian Roots of the International Symbol of Access', *Design and Culture*, 7:3 (2015), 357–376 (p. 359).
[3] Ben-Moshea Liat, Justin J. W. Powell, 'Sign of Our Times? Revis(it)ing the International Symbol of Access', *Disability & Society*, 22:5 (2007), 489–505 (p. 491).

conjure up the image of the wheelchair user' – which, I would argue, is largely due to the pervasiveness of Koefoed's pictogram.[4] As a result, Koefoed's image raises a number of questions about the relationship between dis/ability, technology, and visual culture. For example, how do we define 'dis/ability' and does this reflect the lived experience of having a physical impairment? What does it mean to be 'dis/abled', and is this unique to a specific time, place, or culture? How is bodily impairment depicted in visual mediums, and what power does that have to shape a society's perceptions of 'dis/ability'? Why are 'dis/ability' and technology so closely connected and is the relationship between the two always a positive one? Whilst scholars from a variety of disciplines (including, but not limited to, medicine, politics, sociology, psychology, and design) are currently asking these questions of twenty-first-century 'disability',[5] the field of medieval disability studies (although growing rapidly) is comparatively young and, as such, there have been very few attempts to uncover the relationship between bodily impairment, assistive technology, and visual culture in the later Middle Ages. Consequently, this thesis seeks to bridge this gap in the scholarship by considering the debates associated with bodily augmentation and assistive technology in the twenty-first century and asking how (if at all) these lines of enquiry can be retrospectively applied to the fifteenth and sixteenth centuries.

---

[4] Irina Metzler, *Disability in Medieval Europe: Thinking about Physical Impairment in the High Middle Ages, c. 1100–c. 1400* (London: Routledge, 2006), p. 4.

[5] See, for example, the work of the Disability Rights Movement (a political movement which, inspired by the activism of other marginalised groups, emerged in the 1960s and continues to shape discussion around social discrimination to this day), as well as the work of several leading Disability Studies networks – e.g. the Society for Disability Studies (USA); the Disability Studies Association (UK); the Nordic Network of Disability Research; and the Academic Network of European Disability Experts.

In order to do this, it will follow three main avenues of questioning. Firstly, it will consider the practical factors associated with the production and use of assistive aids, asking what types of assistive technology were available in the fifteenth and sixteenth centuries, how and by whom were they constructed, and how did they function within the medieval urban environment? It will then discuss the role that disability aids played in the lives of people with impairments, thinking about the ways in which individuals and society responded to concepts of bodily augmentation, as well as how people with disabilities perceived their own relationship with assistive technology. Finally, this thesis will push its analysis one step further by drawing upon popular representations of impairment (in visual culture or literature) so that we might understand how impairment and assistive technology were used as ways of signifying other socio-cultural concerns.

It should be mentioned here that this thesis defines 'technology' in its broadest sense – as a man-made object that was created or adapted to fulfil a specific need. From a twenty-first-century perspective, it is quite easy to conflate 'technology' with electrical goods or cutting-edge gadgets, and to forget about the broader spectrum of objects and processes that the term 'technology' could refer to. In order to overcome this narrower, twenty-first-century definition of technology, this thesis draws inspiration from the Greek term *techne* (τέχνη), which refers to 'an art, skill, or craft; technique, principle, or method by which

something is achieved or created'.[6] When applied to disability aids, this definition will let us think more openly about what might constitute an 'assistive technology', rather than allowing ourselves to get caught up in twentieth-century preconceptions. For example (in the case of this thesis) 'technologies' might include crutches to make it easier to walk, guide dogs to assist with daily tasks, prosthetic hands to restore manual dexterity, or spectacles to improve one's eyesight. As a result of this approach to technology as both a method (or object) by which something is achieved (i.e. a crutch to assist walking) and as an 'art, skill, or craft' in and of itself, this thesis not only contributes to the field of medieval disability studies, by offering insights into the ways in which contemporaries used and interpreted assistive technology, but also contributes to the history of technology through its analysis of the construction and capabilities of these later medieval disability aids.

PROJECT SCOPE

As suggested by the title of this thesis, my investigation into assistive technology will be limited to Northern Europe in the period between c. 1400–c. 1600. The following section of this introduction will outline my justifications for choosing this periodisation and geographical area, whilst also outlining material that (although important to the study of assistive technology more broadly) will not feature in this thesis.

---

[6] Oxford English Dictionary, *Techne* (2010) <https://www.oed.com/view/Entry/273538?rskey=Bbc2MM&result=1&isAdvanced=false#eid> [accessed November 2019].

1. CHRONOLOGICAL REMIT

In regards to my chronological remit, it should first be noted that, although the date range covered by this thesis extends into the sixteenth century (a century frequently considered to be part of the 'early modern' period), I will still be referring to the years between 1400 and 1600 as 'late medieval'. I have chosen to avoid the term 'early modern' in this thesis, as I agree with Matt Phillpott that it unhelpfully 'emphasises progression and advancement above all else and therefore has often restricted historical enquiry to an altogether ill-conceived labelling of elements existing in the period as either 'medieval' or modern in nature'.[7] As this thesis will demonstrate (see, in particular, the 'Persistence of the Dark Ages Myth' section of chapter two) this language of advancement has been damaging to the study of medieval disability.

I could also have chosen the term 'Renaissance' to describe my periodization, as this term traditionally covers the years between 1300 and 1600. However, I believe the term 'Renaissance' carries too many misleading cultural connotations to best serve the needs of this thesis. It is, for example, very heavily associated with Italian artistic movements which feels deceptive given the Northern European focus of this thesis. The fact that the term 'Renaissance' can also be taken to mean 're-birth' further problematises the use of this periodization, as the ideas, beliefs, and technological developments discussed in this thesis form part of a longer historical trajectory, rather than an abrupt break

[7] Matt Phillpott, review of *Society in Early Modern England: The Vernacular Origins of Some Powerful Ideas,* by Phil Withington (Cambridge: Polity Press, 2010) (2010) <https://reviews.history.ac.uk/review/1011> [accessed January 2020].

from the past. Consequently, for the sake of clarity and to prevent myself from contributing to a dialogue of progress which often favours the 'modern' over the 'medieval', I will be referring to my period as either 'late medieval', 'the later Middle Ages', or as the 'fifteenth and sixteenth centuries'.

Nevertheless, that is not to imply that the term 'late medieval' is perfect. Traditionally, the European Middle Ages are said to end c. 1500; however, more specific end dates for this period can fluctuate quite dramatically depending on geographical remits or political circumstances. For example, some would place the end of the Middle Ages as early as 1453 as this was the year in which the Turks conquered Constantinople, others might cite the death of a specific monarch as the end of the Middle Ages (i.e. the death of King Richard III of England at the Battle of Bosworth in 1485, or the death of King Ferdinand II of Spain in 1516), or one might use a date of a significant event such as the Protestant Reformation in 1517 or Christopher Columbus's first voyage to the Americas in 1492. However, I would argue that abiding by a single fixed date for the end of the medieval period is an arbitrary exercise at best and, at worst, damaging to investigations (such as this) which might benefit from extending beyond rigid chronological boundaries.

I have chosen to end my period of investigation at c. 1600, as the seventeenth century sees the development of several new technologies that were previously absent from Northern Europe. For example, it is during the seventeenth century that concave spectacle lenses (for individuals with myopia) reach Northern Europe, which corresponds with the appearance of spectacle 'arms' (which rest on top of the ears, securing the spectacles to the face) in the

period between c. 1650 and c. 1680.[8] Similarly, in 1655 Stephen Farffler (1633–1689), a renowned German clock-maker, invented the first self-propelled wheelchair, which was designed 'based on a three-wheel chassis, and worked by turning handles attached to a geared front wheel using a system of cranks and cogwheels' (as depicted in image 2.4).[9] Finally, the seventeenth century saw the development of the first non-locking below the knee prosthesis, created by the Dutch surgeon Pieter Verduyn (1625–1700) in 1696, which paved the way for the creation of later lower-limb prostheses.[10] Consequently, I believe that this combination of seventeenth-century innovations marks enough of a break from the preceding centuries for me to comfortably end my period of investigation at c. 1600.

2. GEOGRAPHICAL REMIT

Geographically, this thesis covers Northern European urban environments (paying particular attention to what we now understand to be England, Germany, and the Netherlands). Whilst there is still much work to be done on rural disability technologies, the greater strength of evidence for the use of assistive

[8] Vincent Illardi suggests that spectacles with arms were probably invented by Edward Scarlett in London in the early-eighteenth century – see Vincent Illardi, *Renaissance Vision: From Spectacles to Telescopes* (Philadelphia: American Philosophical Society, 2007), p. 164. However, research conducted by the College of Optometrists has found evidence of spectacle sides appearing much earlier (e.g. on a bespectacled grotesque on the rood screen of Wormleighton Church, dating from c. 1685, as well as in a portrait of Francesco Caetani, Duke of Sermoneta (1594-1683) dating from c. 1660–1662). See Anon, *A Bit on the Side: The Development of Spectacle Sides* (2019) <https://www.college-optometrists.org/the-college/museum/online-exhibitions/virtual-spectacles-gallery/a-bit-on-the-side.html> [accessed September 2019].

[9] Kay Nias, *History of the Wheelchair* (2019) <https://blog.sciencemuseum.org.uk/history-of-the-wheelchair/> [accessed September 2019].

[10] Jennifer Van Horn, *The Power of Objects in Eighteenth-Century British America* (Chapel Hill: University of North Carolina Press, 2017), p. 388.

technology in urban environments (coupled with both time and word constraints) has meant that I have chosen to exclude rural uses of disability aids from this thesis.

I have also selected Northern Europe as my geographical location as – unlike areas of Southern Europe, which have been the focus of several monographs relating to fifteenth and sixteenth-century impairment (such as Connie Scarborough's *Viewing Disability in Medieval Spanish Texts* and Encarnación Juárez Almendros's *Disabled Bodies in Early Modern Spanish Literature*) – it has not yet been considered as a unique region within the field of disability studies.[11] More often than not, medieval disability historians group Northern Europe together with Europe more broadly (seen for example, in Metzler's *Disability in Medieval Europe*, Turner and Pearman's essay collection *The Treatment of Disabled Persons in Medieval Europe*, and Skinner's *Living with Disfigurement in Early Medieval Europe*).[12] Whilst this is not usually a problem, grouping Europe together as a single entity does not work effectively for the study of assistive technology as it overlooks the differences in the development of assistive aids in Southern Europe and Northern Europe and subsequently prevents a more targeted consideration of when (and from where) certain attitudes and technologies first arrived in the north.

---

[11] Connie Scarborough, *Viewing Disability in Medieval Spanish Texts: Disgraced or Graced?* (Amsterdam: Amsterdam University Press, 2018); Encarnación Juárez Almendros, *Disabled Bodies in Early Modern Spanish Literature: Prostitutes, Aging Women and Saints* (Liverpool: Liverpool University Press, 2017).

[12] Metzler, *Disability in Medieval Europe*, p. 12; Wendy Turner, Tory Vandeventer Pearman (eds.), *The Treatment of Disabled Persons in Medieval Europe: Examining Disability in the Historical, Legal, Literary, Medical, and Religious Discourses of the Middle Ages* (New York: Edwin Mellen Press, 2010); Patricia Skinner, *Living with Disfigurement in Early Medieval Europe* (New York: Palgrave, 2016).

Consequently, this thesis will focus specifically on the understudied region of urban living environments in Northern Europe, as this focus will enable me the breadth to take a comparative approach to my source material (by considering the transmission of ideas, images, and objects throughout the north of Europe) whilst also remaining a small enough area to tackle specific objects, individuals, and case studies with the depth of research they deserve.

3. EXCLUDED MATERIAL

Finally, I would like to briefly discuss material that I have chosen to exclude, and my reasons for these decisions. For example, this thesis will not discuss chronic illnesses with disabling symptoms, such as leprosy or syphilis. Although each of these conditions could result in the loss of one's limbs and other bodily extremities (often necessitating the use of one or more of the assistive aids discussed in this thesis), the contagious nature of these conditions meant that leprosy and syphilis were understood quite differently to congenital or acquired impairments. As Elma Brenner suggests, despite earlier efforts to treat leprous people with sympathy, in the fourteenth and fifteenth centuries we begin to see 'less positive responses to the leprous, as well as the fear of contagion' take hold in the medieval West.[13] These contagious, chronic illnesses consequently gained their own very specific political and cultural associations amongst contemporaries. For example, both syphilis and leprosy became associated with the socially feared 'other' (seen in syphilis's naming as either the French, Spanish,

[13] Elma Brenner, *Leprosy and Charity in Medieval Rouen* (Woodbridge: The Boydell Press, 2015), p. 2.

or Italian disease, depending upon one's chosen national enemy); similarly, each of these diseases also came to be related to moral discourses around sinful behaviour and sexual excess.[14] The cultural contexts surrounding these chronic illnesses have gained a lot of scholarly attention from individuals such as Carole Rawcliffe, Timothy Miller, John Nesbitt, Kevin Brown and Claudia Stein.[15] Therefore, due to the unique treatment of contagious illnesses with disabling consequences by contemporaries (as compared to those impairments that were acquired either congenitally, by accident, or by injury), coupled with the large amount of research that has already been conducted into attitudes towards these conditions, this thesis will not consider chronic illnesses in its discussion of disability.

Secondly, this thesis will not consider how assistive aids were employed to overcome facial disfigurement. Although facial disfigurement certainly has socially disabling consequences, the methods employed to overcome this often take the form of ointments, pastes and powders, cosmetic prostheses and face 'masks', and, in more extreme circumstances, reconstructive surgery. Whilst Patricia Skinner has made a great deal of progress in investigating how facial

[14] Byron Lee Grigsby, *Pestilence in Medieval and Early Modern English Literature* (London: Routledge, 2004), p. 68.

[15] See for example:

Leprosy: Luke Demaitre, *Leprosy in Premodern Medicine: A Malady of the Whole Body (*Baltimore: Johns Hopkins University Press, 2007); Timothy Miller, John Nesbitt, *Walking Corpses: Leprosy in Byzantium and the Medieval West* (Ithaca: Cornell University Press, 2014); Carole Rawcliffe, *Leprosy in Medieval England* (Woodbridge: Boydell, 2006).

Syphilis: Kevin Brown, *The Pox: The Life and Near Death of a Very Social Disease* (Stroud: Sutton, 2006); Olivier Dutour, György Pálfi, Jacques Berato and Jean-Pierre Brun (eds.), *L'origine de la syphilis en Europe: avant ou après 1493?* (Toulon: Editions Errance, 1994); Claudia Stein, *Negotiating the French Pox in Early Modern Germany* (Aldershot: Ashgate, 2009).

disfigurement was acquired, treated, and socially perceived in relation to early medieval Europe and Emily Cock has considered attitudes towards facial disfigurement in the seventeenth and eighteenth centuries, very few scholars have asked the same questions of the fifteenth and sixteenth centuries.[16] Unfortunately, this thesis's predominant focus on technology does not facilitate an investigation into the ways in which surgery and cosmetics could be employed as 'assistive aids' in overcoming facial disfigurement.

Finally, this thesis will not consider the role of people as a form of assistive technology, unless these people were specifically employed to act as 'living technologies'. For example, servants, who are expected to provide physical assistance to their employers (such as the children employed as guides for the blind discussed in chapter five or the staff employed to push Philip II of Spain's wheelchair, as discussed in chapter three) could be considered a form of assistive technology as they are providing care in return for goods, such as payment,

[16] See, for example, Emily Cock, 'Wounded: 'A Small Scar will be much Discerned': Treating Facial Wounds in Early Modern Britain', *Science Museum Group Journal*, 11:11 (2019), unpaginated; Patricia Skinner, Emily Cock, '(Dis)functional Faces: Signs of the Monstrous?', in *Monstrosity, Disability, and the Posthuman in the Medieval and Early Modern World*, ed. by Richard H. Godden and Asa Simon Mittman (London: Palgrave, 2019), pp. 85–105; Patricia Skinner, Emily Cock (eds.), *Approaching Facial Difference: Past and Present* (London: Bloomsbury, 2018); Patricia Skinner, *Living with Disfigurement in Early Medieval Europe* (London: Palgrave, 2017); Patricia Skinner, 'Mutilation and the Law in Early Medieval Europe and India: A Comparative Study', *The Medieval Globe*, 2:2 (2016), 115–139; Patricia Skinner ''Better off Dead than Disfigured'? The Challenges of Facial Injury in the Premodern Past', *Transactions of the Royal Historical Society*, 26 (2016), 25–41; Emily Cock, 'Off dropped the Sympathetic Snout': Shame, Sympathy, and Plastic Surgery at the Beginning of the Long Eighteenth Century', in *Passions, Sympathy and Print Culture: Public Opinion and Emotional Authenticity in Eighteenth-Century Britain*, ed. by Heather Kerr, David Lemmings and Robert Phiddian (London: Palgrave Macmillan, 2016), pp. 145–164; Emily Cock, 'Lead[ing] 'em by the Nose into Publick Shame and Derision': Gaspare Tagliacozzi, Alexander Read and the Lost History of Plastic Surgery, 1600–1800', *Social History of Medicine*, 28:1 (2015), 1–21; Patricia Skinner, 'The Gendered Nose and its Lack: "Medieval" Nose-Cutting and its Modern Manifestations', *Journal of Women's History*, 26:1 (2014), 45–67.

lodging, or food. The relationship between the servant and the impaired person who hired them is symbiotic, as it is unlikely that the same servants would be willing to provide these forms of assistance if they were not personally benefitting from the arrangement. Therefore, due to the transactional nature of this relationship, I would argue that individuals who have been hired for the specific purpose of providing assistance to an impaired individual, can be considered 'living technologies' and therefore considered within the remits of 'assistive aids'.

However, I do not believe that this categorisation applies to all human caregivers. Often, and especially in miracle collections, we see disabled individuals being carried to saints' shrines by their friends and/or members of their family – as Metzler suggests, 'travel by the disabled was heavily reliant on help given by other people, either in the form of financial support to cover the costs of travel or active personal support, such as physically carrying the impaired person around'.[17] However, although these individuals certainly assisted their impaired loved ones, I would argue that they cannot be considered to be a form of 'living technology' because the two parties do not have an equal need of one another and that they were, instead, voluntary caregivers.[18] As I will discuss below, this thesis takes a transhuman and cyborg-theory inspired approach to its source material and, as such, considers the symbiotic relationship between an

[17] Irina Metzler, 'Have Crutch, Will Travel: Disabled People on the Move in Medieval Europe', in *Travels and Mobilities in the Middle Ages: From the Atlantic to the Black Sea*, ed. by Marianne O'Doherty and Felicitas Schmeider (Turnhout: Brepols, 2015), pp. 91–117 (p. 96).

[18] On the basis of this differentiation between 'assistive technologies' and 'carers' this thesis will also exclude mental disabilities as, more often than not, assistance for mental disability was provided in the form of human care and support of one's emotional wellbeing, rather than material objects (as is the focus of this thesis).

impaired individual and their disability aids to be an important element of what defines 'assistive technology'. I would therefore suggest that unlike servants, these individuals who helped 'disabled' members of the community without receiving payment or personal gain should be considered in the capacity of caregivers, rather than assistive aids and, as such, unpaid human assistance will not be considered in this thesis.

APPROACHES, MATERIALS, AND METHODOLOGIES

1. APPROACHES

Broadly speaking, this thesis takes two main theoretical approaches to its source material. Firstly, and arguably most importantly, it draws upon the key arguments and frameworks discussed within the field of disability studies. Following Irina Metzler's example, it considers how (if at all) current questions regarding dis/ability, technology, and access can be retrospectively applied to the Middle Ages, so that we might better understand the lived experience of those who used assistive aids in the later medieval period. Secondly (although very closely connected to a number of discussions occurring within the field of disability studies), it applies the concepts of transhumanism and cyborg theory to its source material in order to ask how medieval individuals conceptualised 'the body' and, by association, the augmentation of the body through the use of prosthetic technology. The following section of this chapter will subsequently outline the benefits and challenges associated with these approaches.

DISABILITY THEORY

Interacting with contemporary disability theory provides a useful way of thinking about how 'disability' can be understood. There are several 'models of disability', each of which proposes a framework through which disability can be defined. This thesis generally adheres to a socio-cultural model of disability, as I believe that (whilst it is always going to be difficult to cast modern preconceptions and prejudices aside), this is the most useful model for attempting to understand how medieval people thought about and responded to disability. However, before we can discuss the value of the socio-cultural model of disability for understanding medieval attitudes towards impairment and assistive technology, we must first assess why the opposing models are problematic.

MEDICAL MODEL

The first of these is the medical model of disability. This model places bodily impairment as the central reason as to why an individual is unable to fully participate in society. For example, it might suggest that the reason a wheelchair user cannot enter a public building with stairs is because they cannot walk, rather than the fact that there is no disability access.[19] The medical model suggests that we should focus on the treatment and rehabilitation of people with bodily impairments, aiming to 'adapt the individual to the conditions of society in which

[19] Parliamentary and Health Service Ombudsman, *Introduction to the Social and Medical Models of Disability* (2018) <https://www.ombudsman.org.uk/sites/default/files/FDN-218144_Introduction_to_the_Social_and_Medical_Models_of_Disability.pdf> [accessed January 2018].

she or he lives'.[20] Continuing the example above, the medical model would therefore prefer to use medical and technological innovation to help the individual leave their wheelchair to walk, or climb, the short distance into the public building, rather than facilitating wheelchair-friendly access. As such, this model proved especially popular with medical professionals writing at the beginning of the twentieth century due to the way in which it subtly champions the role of the doctor and the use of modern medicine for improving the lives of individuals with bodily impairments.

However, that is not to suggest that providing medical treatment for bodily impairment is problematic in and of itself – it is not. There are many individuals with bodily impairments who seek out, and successfully receive, medical treatments which significantly improve their quality of life. The problem emerges, however, when people fail to recognise that bodily impairment and wellness can co-exist. As Sapey, Stewart, and Donaldson suggest in their discussion of contemporary perceptions of disability, 'if disabled people are treated as unwell, they are expected to occupy a particular role in society as a patient', as somebody who ought to be 'cured' regardless of their own opinions, or the capability of medical technology.[21] Consequently, this attitude contributes to the normalisation of the 'able' body, the stereotype that disability is always a

[20] Liz Johnson, Eileen Moxon, 'In Whose Service? Technology, Care and Disabled People: The Case for a Disability Politics Perspective', in *Disability and Technology: Key Papers from Disability and Society*, ed. by Alan Roulstone, Alison Sheldon and Jennifer Harris (London: Routledge, 2015), pp. 10–27 (p. 14).
[21] Bob Sapey, John Stewart and Glenis Donaldson, 'Increases in Wheelchair Use and Perceptions of Disablement', in *Disability and Technology: Key Papers from Disability and Society*, ed. by Alan Roulstone, Alison Sheldon and Jennifer Harris (London: Routledge, 2015), pp. 97–113 (p. 112).

negative challenge to be overcome, and a lack of consideration for the way in which society, attitudes and institutions can have a disabling influence.

As a result of these problems, the medical model of disability received an increasing amount of criticism throughout the 1970s and 1980s. The first formal criticism of this model was proposed by the Union of the Physically Impaired Against Segregation in Britain in 1975, who explained that, 'in our view it is society which disables physically impaired people. Disability is something imposed on top of our impairments by the way we are unnecessarily isolated and excluded from full participation in society'.[22] It was this statement that paved the way for the formulation of the social model of disability by Michael Oliver in 1990. Oliver argued that disability must be understood in relation to material factors such as housing, employment, education, finance, and the built environment; calling for a shift in focus from the individual to society.[23] It is this shift in thinking from impairment as being caused by the body to being caused by one's material environment that underpins the social model of disability.

SOCIAL MODEL

The social model of disability predominantly seeks to 'explore disability as the product of social and material forces, with an emphasis on exposing the ways that

[22] UPIAS, *The Union of the Physically Impaired Against Segregation and the Disability Alliance Discuss Fundamental Principles of Disability: Being a Summary of the Discussion Held on 22nd November 1975 and Containing Commentaries from Each Organisation* (London: The Disability Alliance, 1975), p. 4.
[23] Michael Oliver, *The Politics of Disablement* (Basingstoke: McMillan, 1990) – in particular, chapter two, 'The Cultural Production of Impairment and Disability', pp. 12–24.

social and spatial factors serve to disable impaired individuals'.[24] It argues that disability should be overcome by re-evaluating and adapting the ways in which society operates, instead of attempting to 'fix' an individual's impairment. So, in relation to the wheelchair example discussed above, rather than suggesting that (when trying to access a public building with steps) a wheelchair user must either ask for help, abandon their wheelchair, or not enter at all, the social model of disability would advocate for the adaptation of the building to make it wheelchair accessible (e.g. ramp or lift access, automatic doors, door handles at appropriate heights, etc.). Whilst it does not deny the importance of medicine in the treatment of certain impairments, it believes that there does not need to be a highly dependent relationship between people with impairments and their doctors. Instead, medical and social care professionals should 'see themselves as a resource to be tapped by disabled clients, rather than as professionals trained to make highly specialised assessments of what is appropriate for individual disabled people'.[25]

By focussing on the fact that an individual is 'disabled' by society (rather than their physical condition) the social model draws an important distinction between the meanings of 'impairment' and 'disability'. 'Impairment', it argues, is the physical, biological condition affecting the individual, whereas 'disability' is

[24] David M. Turner, 'Introduction: Approaching Anomalous Bodies', in *Social Histories of Disability and Deformity: Bodies, Images and Experiences*, ed. by David M. Turner and Kevin Stagg (London: Routledge, 2006), pp. 1–16 (p. 3).
[25] Vic Finkelstein, 'Disability: An Administrative Challenge? (The Health and Welfare Heritage)', in *Social Work – Disabling People and Disabling Environments*, ed. by Michael Oliver (London: Jessica Kingsley Publishers, 1991), pp. 63–77 (p. 75).

the social construct built around this impairment. This distinction is described especially well by Metzler, who explains that,

> a broken leg that never heals fully leaves the person with an unusable limb – this is the impairment, which can exist in all societies, at all times, past and present. Of itself, this is not a disability. However, the availability or not of mobility aids is a cultural and economic factor which can or can not make the individual disabled.[26]

Metzler goes on to suggest that it is this distinction between 'impairment' and 'disability' that makes the social model so useful for discovering 'how, why, and in what way impaired people may or may not have been regarded as disabled by their cultures'.[27] On the whole, I agree with Metzler that the separation of 'impairment' and 'disability' is a very valuable tool for thinking about the ways in which people interpreted and responded to the non-normative body in the Middle Ages and, as a result, I will also be adopting this distinction throughout this thesis.

However, outside of these semantic distinctions, I believe that the social model is flawed in its lack of consideration of the ways in which impairment is depicted in cultural mediums, such as imagery or literature, and how this can contribute to society's understanding of 'disability'. As such, I agree with Turner's assertion that scholars require an approach which 'simultaneously appreciates that disability is shaped by 'people's particular social and cultural identities and

[26] Irina Metzler, 'Disability in the Middle Ages: Impairment at the Intersection of Historical Inquiry and Disability Studies', *History Compass*, 9:1 (2011), 45–60 (p. 45).
[27] Metzler, *Disability in the Middle Ages*, p. 46.

their positions, while recognising that social and medical discourses, institutional practices and spatial environments also act to shape bodies and experiences'.[28]

SOCIO-CULTURAL MODEL

I believe that this multifaceted approach can be found in a socio-cultural model of disability. Unlike the medical and social models of disability, a socio-cultural model does not focus on one singular factor in its approach to disability, but instead focuses on how a range of factors might influence both an individual's and a society's attitudes towards disability. Whilst some of these factors may be informed by medical or social elements, they are presented as a part of a larger cultural tapestry, rather than singular isolable aspects. By focussing 'on how different notions of disability and non-disability operate in the context of a specific culture', a socio-cultural model of disability also facilitates relativism (i.e. the importance of defining disability for specific times and spaces).[29] This allows us to draw distinctions between the definitions of 'impairment' and 'disability', as the social model proposes, without limiting the definition of 'disability' to purely social factors.

However, this model's biggest strength for the subject matter of this thesis lies in its consideration of what Snyder and Mitchell refer to as 'cultural locations of disability' – that is, the areas in which disabled people find

[28] Turner, 'Introduction: Approaching Anomalous Bodies', p. 3.
[29] Marno Retief, Rantoa Letšosa, 'Models of Disability: A Brief Overview', *HTS Teologiese Studies/Theological Studies*, 74:1 (2018), 1–8 (p. 6).

themselves depicted, either consentingly or against their will.[30] These 'cultural locations of disability' consequently represent 'a saturation point of content about disability that has been produced by those who share certain beliefs about disability as an aspect of human difference'.[31] Writing in 1994, Tom Shakespeare suggested that these cultural representations of disability (which he categorised as appearing in theatre, paintings, literature, film, and the media – and to which I would also add video games) contributed to the 'objectification' of disabled people within society.[32] This notion paved the way for discussions of disability as a trope in contemporary media – i.e. the 'supercrip narrative', the 'single episode disability' narrative, or the narrative of the disabled person as monstrous or evil. One scholar who is currently considering these questions in relation to contemporary representations of impairment is Kate Ellis, who, like this thesis, sees 'the continuing relevance of the social model of disability but also its inability to explain every situation'.[33] As a result, she also adopts the social model's distinction between 'impairment' and 'disability', whilst combining it with a broader range of cultural factors.

As this thesis draws predominantly on visual source material, it will use the socio-cultural model of disability to investigate how fifteenth- and sixteenth-century 'representations of disability [...] help to articulate a range of values,

[30] Sharon L. Snyder, David T. Mitchell, *Cultural Locations of Disability* (Chicago: University of Chicago Press, 2006), p. 3.
[31] Snyder, Mitchell, p. 3.
[32] Tom Shakespeare, 'Cultural Representation of Disabled People: Dustbins for Disavowal?', *Disability & Society*, 9:3 (1994), 283–299 (p. 287).
[33] Kate Ellis, *Disability and Popular Culture: Focussing Passion, Creating Community and Expressing Defiance* (New York: Routledge, 2016), p. ix. See also Kate Ellis, *Disability and Digital Television Cultures: Representation, Access and Reception* (New York: Routledge, 2019).

ideals, or expectations that were important to that culture's organization and identity'.[34] This approach will enable us to understand how impairment functioned both at the margins of society and at the margins of popular culture (whether in misericords, marginalia, altarpieces, or architecture), and will allow us to consider whether these margins were a space of representation, carnival, subversion, or a combination of the three. By drawing upon visual culture, we will see how impaired individuals were transformed (often by the able-bodied) into popular tropes that reveal the ways in which physical disability was understood by society more broadly.

Currently, there are no other historians of medieval disability undertaking this socio-cultural approach to their source material (which, as we will see in chapter one, could be due to the fact that few scholars in the field of medieval disability studies have chosen to take an interdisciplinary image- and object-driven investigation of impairment and have therefore not needed to think about the implications of visual representations of dis/ability within later medieval society). As such, my socio-cultural approach will be informed by the work of academics in the field of contemporary disability studies, enabling me to consider how their methodologies can be adapted and applied to discussions of impairment and assistive technology in the fifteenth and sixteenth centuries.

[34] Nyasha Junior, Jeremy Schipper, 'Disability Studies and the Bible', in *New Meanings for Ancient Texts: Recent Approaches to Biblical Criticisms and Their Applications*, ed. by Steven L. McKenzie and John Kaltner (London: John Knox Press, 2013), pp. 21–37 (p. 35).

TRANSHUMANISM AND CYBORG THEORY

The second theoretical approach that this thesis will take concerns the philosophical concepts of 'cyborg theory' and 'transhumanism' pioneered by scholars such as Donna Haraway and Max More. Each of these theories questions the rigidity of the human body's biological borders and asks how the body might be augmented by technology, animals, and other human bodies. This consideration of the ways in which the body (both able and dis/abled) interacts with material technologies as well as other corporeal bodies is of particular use for this thesis. However, before we discuss how and why I have adopted these transhumanist and cyborg approaches, let us first consider the intricacies of these concepts.

In her 1985 'A Cyborg Manifesto', Donna Haraway first introduces the concept of 'Cyborg Theory' as a rejection of the traditional biological and social boundaries that separate humans, animals and machines. She criticizes the 'antagonistic dualisms' of human/animal, animal-human/machine, or physical/non-physical, and refuses to accept the systematic repression that these taxonomies perpetuate.[35] Technology, she argues, provides a challenge to these dualisms by transgressing boundaries and allowing for 'potent fusions' – fusions which are epitomised within the human/animal/machine body of the cyborg.[36] The current interest in cyborg theory, she argues, is a result of four 'wounds' that human narcissism has had to suffer. The first three wounds were compiled by

[35] Donna Haraway, 'A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s', in Donna Haraway, *The Haraway Reader* (New York: Routledge, 2004), pp. 7–45 (pp. 10–12).
[36] Haraway, 'A Manifesto for Cyborgs', p. 12.

Sigmund Freud and include the Copernican Wound (i.e. the decentring of Europe from the centre of the world), the Darwinian Wound (i.e. the decentring of humanity from organic life by disproving that mankind owed its existence to a sentient creator), and the Freudian Wound (i.e. the suggestion that the unconscious plays a significant role in determining and shaping human behaviour).[37] Haraway adds a fourth 'Synthetic Wound' to this list, suggesting that there has been a decentring of the natural from the artificial, which has been made possible by humanity's progress through the prior three wounds.[38]

This blurring of lines between human and technology is mirrored in the philosophical movement of transhumanism. This school of thought emerged in the 1980s, inspired by science fiction and earlier futurist thought. However, it was not until Max More's article, 'Transhumanism: Towards a Futurist Philosophy', that transhumanism was formally defined as follows:

> Transhumanism is a class of philosophies that seek to guide us towards a posthuman condition. Transhumanism shares many elements of humanism, including a respect for reason and science, a commitment to progress, and a valuing of human (or transhuman) existence in this life [...] Transhumanism differs from humanism in recognizing and anticipating the radical alterations in the nature and possibilities of our lives resulting from various sciences and technologies.[39]

The transhuman climate of the late twentieth and twenty-first century has ushered in a redefinition of what it means to be 'human', with technological extensions and enhancements (be that using prosthetic limbs, wearing earbuds to

---

[37] Donna Haraway, *From Cyborgs to Companion Species: Lecture as the 2003–2004 Avenali Chair in the Humanities at the Townsend Center for the Humanities, UC Berkeley* (2004) <https://www.youtube.com/watch?v=Q9gis7-Jads> [accessed June 2018].
[38] Haraway, 'From Cyborgs to Companion Species'.
[39] Max More, 'Transhumanism: Towards a Futurist Philosophy', *Extropy*, 6:1 (1990), 6–12 (p. 6).

listen to music, driving a car, or even the creation of a digital online identity on popular social media platforms) leading to a fusion of the human and cyborg.[40]

However, much like my socio-cultural model of disability, these concepts of transhumanism and cyborg theory have very rarely been retrospectively applied to the Middle Ages. This is exemplified in the searchable database of the International Medieval Bibliography, which only returns two hits for the search term 'cyborg' and none for 'transhuman/ism'.[41] However, this broad lack of interest should not be interpreted to mean that academics are ignoring this altogether – as Katherine Hayles suggests, transhumanism is 'not unique to the 20th [sic] century', in fact, 'the human has always been a kind of contested term'.[42]

Over the last decade, a select number of scholars such as J. J. Cohen and E. R. Truitt have made use of online blogs and discussion boards in order to introduce the concepts of cyborg theory and transhumanism into the field of medieval studies.[43] Cohen, for example, has suggested that, although

---

[40] Francesca Ferrando, *Humans, Cyborgs, Posthumans: Lecture at TEDx SiliconAlley* (2013) <https://www.youtube.com/watch?v=RGjMUw03Bvo'> [accessed 12th June 2018].

[41] The two results returned for 'cyborg' are: Marilynn R. Desmond, 'From Book-Lined Cell to Cyborg Hermeneutics', in C*hristine de Pizan and the Categories of Difference*, ed. by Marilynn R. Desmond (Minneapolis: University of Minnesota Press, 1998), pp. x–xix; and Felice Lifshitz, 'A Cyborg Initiation? Liturgy and Gender in Carolingian East Francia', in *Paradigms and Methods in Early Medieval Studies*, ed. by Celia Chazelle and Felice Lifshitz (Basingstoke: Palgrave Macmillan, 2007), pp. 101–117 – both of which discuss 'cyborgs' in relation to gender and religion, but not in response to disability or prosthetic technology.

[42] Don Solomon, *Interview with N. Katherine Hayles: Preparing the Humanities for the Post Human* (2007) <http://onthehuman.org/archive/more/interview-with-n-katherine-hayles/> [accessed May 2018].

[43] However, it should be noted that, whilst these scholars are bringing the debates surrounding cyborg theory and transhumanism to the field of medieval studies, they are predominantly approaching these topics from a literary perspective. Scholars with backgrounds in history or art history consider far less frequently how these influential debates can be used to shed light upon their own source material. Examples of their work include: J. J. Cohen, *Hybridity, Identity and Monstrosity in Medieval Britain: Of Difficult Middles* (London: Palgrave Macmillan, 2006); J. J. Cohen, *Medieval Identity Machines* (Minneapolis: University of Minnesota Press, 2003); E. R. Truitt, 'Mysticism and Machines', *History Today*, 65:7 (2015), unpaginated; E. R. Truitt, *Medieval*

contemporary theorists believe that transhumanist enquiry is 'a possibility enabled only through a recent proliferation of technologies, [...] medievalists have long known better'.[44] He draws upon Mary Carruthers's work on medieval aesthetic values to suggest that medieval culture did not subscribe to a clearly defined 'human'/'machine' binary.[45] Truitt's research, on the other hand, introduces the idea of 'medieval robots' through a study of medieval mechanics and automata. She also raises a number of interesting questions on her online blog – such as whether or not it was important for historical prostheses to look like their biological counterparts.[46] This thesis intends to build upon the work of Cohen and Truitt in order to investigate how corporeal boundaries, bodily augmentation, and the relationship between technology and identity were understood in the fifteenth and sixteenth centuries.

During this time, the body was not understood to be a fixed entity – as Rublack and Selwyn point out, the body 'was not regarded as a whole and clearly delineated entity, but rather [...] was understood as something that was constantly changing, absorbing and excreting, flowing, sweating, being bled, cupped and purged'.[47] Much like today then, late medieval bodies were believed

---

Robots: Mechanism, Magic, Nature, and Art (Philadelphia: University of Pennsylvania Press, 2015); E. R. Truitt, 'Fictions of Life and Death: Tomb Automata in Medieval Romance', *Postmedieval: A Journal of Medieval Cultural Studies*, 1:1–2 (2010), 194–198.

[44] J. J. Cohen, *More on Wonder: MIMs* (2007) <http://www.inthemedievalmiddle.com/2007/06/more-on-wonder-mims.html> [accessed May 2018].

[45] See Mary Carruthers, *The Craft of Thought: Meditation, Rhetoric, and the Making of Images, 400–1200* (Cambridge: Cambridge University Press), p. 22.

[46] E. R. Truitt, *Studies in Post-humanity 1* (2011) <http://www.medievalrobots.org/2011/08/studies-in-posthumanity-i.html> [accessed May 2018].

[47] Ulinka Rublack, Pamela Selwyn, 'Fluxes: The Early Modern Body and the Emotions', *History Workshop Journal*, 53:1 (2002), 1–16 (p. 2).

to be malleable, marked by their levels of 'fluids and juices, to their motions, interruptions, consistency and purity in interaction with heat, cold, emotions, nourishment and movement'.[48] However, as a result of its malleability, the body was also modifiable and could be transformed by both internal and external factors. For example, the internal regulation of the body's four humours could shape an individual's health and wellbeing, as could regulating external factors such as one's diet, sleeping patterns, and exercise.[49] However, it was not just earthly forces that could act upon the human body – its permeable nature also allowed it to be shaped and transformed by supernatural forces. In some cases, these supernatural influences had positive outcomes for an individual's bodily wellbeing – as can be seen in examples of saintly intervention and healing miracles; whereas, in other cases, the permeability of the body facilitated spirit possession which could lead to both mental illness and the physical control of the body by demonic forces.[50] Finally, the body could be shaped by external, man-made objects such as clothing, armour, weaponry, or (as is the subject of this thesis) by assistive technology. Therefore, even though individuals were not calling it 'cyborg theory' or 'transhumanism', medieval people were still raising questions about corporeal limits and bodily modification.

[48] Rublack, Selwyn, p. 1.
[49] These external factors originate from Galen's theory of how the 'six non-naturals' (i.e. air, food and drink, rest and exercise, sleep and waking, excretions and retentions, and affectations of the mind) could act upon the human body.
[50] Unfortunately, the relationship between transhumanist thinking and bodily possession in the later Middle Ages will not be discussed in any greater length in this thesis, although it would be a valuable avenue of enquiry for future scholars.

An example of this can be seen in medieval literature, in which the relationship between the corporeal body of the knight and his forged armour is often used as a metaphor for the boundaries of the body, public identity, and one's personal sense of self. As Raymund Papica points out, although armour is not always worn (sometimes it can be gifted or displayed, either in one's home or above one's tomb), it is 'intrinsic to the body and influential in how the body is shaped, perceived, and understood'.[51] As a result, armour can be used to not only indicate someone's status and wealth, but also their individual knightly identity. Take, for instance, the literary example of *Sir Gawain and the Green Knight* (an Arthurian romance, attributed to the '*Pearl*-Poet', which dates from the late-fourteenth century).[52] When the Green Knight first arrives at court he is described as having 'no helm, nor hauberk neither,/Nor plate, nor appurtenance appending to arms'.[53] The fact that he is not wearing armour makes him an 'unknown rider'.[54] As a knight, his armour is not only an extension of his body but also a representation of his identity – as a result, the Green Knight's lack of armour in this instance results in a lack of identity, rendering him anonymous.[55] This symbiotic relationship between body and armour is therefore a perfect illustration of Haraway's definition of a cyborg, as a 'cybernetic organism, a

[51] Raymund Papica, *The Armor Network: Medieval Prostheses and Degenerative Posthuman Bodies* (Unpublished Doctoral Thesis, UC Riverside, 2016), p. 2.
[52] There is only one extant manuscript dating from c. 1375–c. 1424 (British Library MS. Cotton Nero A X/2) which is believed to be a copy of an earlier original.
[53] Marie Borroff, Laura L. Howes (eds.), *Sir Gawain and the Green Knight*, Norton Critical Edition, trans. by Marie Borroff (New York: W.W. Norton & Company, 2009), ll. 203–205.
[54] Borroff, *Sir Gawain and the Green Knight*, l. 136.
[55] Of course, as we will discuss in relation to *The Knight of the Cart* in chapter three, literary examples should not be seen as a direct and uncomplicated window onto the past. Just like the visual sources discussed in this thesis, they are coloured by complex traditions as well as the views of the author and, in some cases, the individuals who commissioned them.

hybrid of machine and organism, a creature of social reality as well as a creature of fiction' – demonstrating that cyborgs and understandings of the transhuman are not a solely modern concept, but can also be found in the Middle Ages.[56]

As such, this thesis sees cyborg and transhumanist approaches not as 'a radical break with previous ideas of 'the human'', but instead as a kind of continuity which can be used to help investigate the medieval relationship between disability and technology in new and innovative ways.[57] Like Haraway, it will use the concept of cyborg theory to assess how individuals with impairments developed symbiotic relationships with material technologies (such as crutches or prosthetic limbs), as well as with other corporeal bodies (such as those belonging to children and dogs, discussed in chapter five). It will also use transhumanist methodologies to assess how medieval individuals who required disability aids understood their bodies and their relationship with assistive technologies.

2. MATERIALS & METHODOLOGY

As its title suggests, this thesis provides a unique insight into the lived experience of people who used assistive technology by considering the 'material culture of physical impairment'. The use of material objects as a recognised resource for historical research first emerged in the 1990s. It was during this time that historical scholarship underwent a 'material turn', with academics finding new

[56] Haraway, 'A Cyborg Manifesto', p. 151.
[57] Ruth Evans, 'Our Cyborg Past: Medieval Artificial Memory as Mindware Upgrade', *Postmedieval: A Journal of Medieval Cultural Studies*, 1:1–2 (2010), 64–71 (p. 66).

value in the analysis of 'objects' or 'artefacts' for the study of the past.[58] Prior to this, the study of history had been (as evidenced in chapter one's overview of the historiography of my field) predominantly based in documentary and literary sources. The 'material turn' saw new questions being asked about how objects can be used as a way of understanding the past, as well as the emergence of several methodologies and frameworks proposing how historians ought to interact with material culture.

In his essay, 'The Truth of Material Culture: History or Fiction', Jules David Prown defines material culture as:

> the manifestations of culture through material productions. And the study of material culture is the study of material to understand culture, to discover the beliefs – the values, ideas, attitudes and assumptions – of a particular community or society at a given time. The underlying premise is that human-made objects reflect, consciously or unconsciously, directly or indirectly, the beliefs of individuals who commissioned, fabricated, purchased or used them and, by extension, the beliefs of the larger society to which these individuals belonged. Material culture is thus an object-based branch of [...] cultural history.[59]

Prown's definition is useful as it lays out the argument that the study of material culture is not simply the study of objects, but rather a study of what objects can reveal about the individuals, communities, and larger societies that created them. This is a very similar approach to that of Bernard Herman who, three years prior to Prown, argued that scholars ought to 'reconnect objects to their historical

[58] Anne Gerritsen, Giorgio Riello, 'Introduction: Writing Material Culture History', in *Writing Material Culture History*, ed. by Anne Gerritsen and Giorgio Riello (London: Bloomsbury, 2014), pp. 1–14 (p. 1).
[59] Jules David Prown, 'The Truth of Material Culture: History or Fiction?', in *History from Things: Essays on Material Culture*, ed. by Steven Lubar and W. David Kingery (Washington, D. C.: Smithsonian Institution Press, 1995), pp. 1–19 (p. 1).

contexts'.[60] He suggested that historians need to move beyond an 'object centred' approach (i.e. a descriptive analysis of an object in isolation), to take an 'object driven' approach (i.e. using an object as a springboard for understanding the society that created that object). By peeling back the layers of meaning that surround an object it is possible, he argues, to discover things about the people who interacted with that item.

In both its broader structure and more specific case-study analysis, this thesis grounds itself in an object driven approach. Each chapter is devoted to a specific kind of object (i.e. ambulatory aids, wheeled technologies, mechanised prostheses, and ocular aids) and, within these chapters, the construction, practical use, and iconographic use of these items is discussed in order to learn more about the people and societies who created and interacted with these objects. As the rest of this thesis will demonstrate, this approach allows us to consider objects not just as 'passive' items that are acted upon by external forces, but rather as 'active' items that contribute to the construction of cultural beliefs and practices (take, for instance, the ways in which the spectacles, discussed in chapter five, shaped the ways in which society demonstrated attributes such as piety, learnedness, and foolishness).

However, whilst this thesis adopts an 'object driven' approach by investigating how later medieval assistive technologies can be analysed to reveal contemporary attitudes towards disability and bodily impairment, it does not (unlike Herman and Prown) take an exclusively 'artefact-centred' approach to its

[60] Bernard Herman, *The Stolen House* (Charlottesville: University of Virginia Press, 1992), p. 4.

source material. Although it draws upon physical artefacts in its analysis (such as surviving material examples of crutches, staffs, wheelbarrows, prosthetic limbs, and spectacles), it also considers visual and textual references to these objects in order to formulate a more cohesive understanding of the range of assistive technologies available, as well as how these objects were constructed, used, and interpreted by a contemporary audience. As Katherine Ott suggests, objects are grounded in both the 'information that is specific to them, such as their design, materials, and sensory stimuli (e.g., colo[u]r, weight, size)', as well as in the 'information that comes from elsewhere, such as written sources about them, relevant historical facts, and the skills and knowledge of the owner or interpreter'.[61]

Visual and literary representations of material objects can, therefore, help us to think about the ways in which an object was used and the types of people who used it, which might not have been immediately apparent from the physical object itself. By comparing physical objects to their visual and literary representations, we are able to form a much fuller idea of how these objects were used in a practical, physical sense, as well as how these items came to embody specific cultural meanings that allowed them to operate as visual and textual metaphors for larger ideas, such as the notion of a crutch as symbolic of old age or the walking frame as a signifier of childishness.[62] As a result, this thesis defines 'material culture' not solely as the study of physical artefacts, but rather as the

[61] Ott, p. 129.
[62] The construction of culturally understood signs through the use of signifiers and signified will be discussed later in this introduction.

study of objects alongside other visual, literary, and documentary records of these objects. Therefore, the following section of this introduction will consider the challenges associated with using both archaeological examples as well as visual renderings of these items.

SURVIVAL RATES OF WOODEN ARTEFACTS

Although it might seem like a rather obvious point to raise, it is important to remember that the later Middle Ages were a time without plastic or high-strength, low-density metals (such as titanium). The creation of these lightweight, durable, and (perhaps most importantly) affordable materials, has completely transformed the ways in which we use and produce assistive technology – as seen, for instance, in the recent uptake of 3D printing technology for the quick and inexpensive production of disability aids.[63] However, unlike their present day equivalents, the fifteenth- and sixteenth-century assistive technologies considered in this thesis were predominantly constructed out of wood, bone, glass, cloth, and iron. This not only affected the types of assistive aids that could be constructed and the ways in which they were likely to have been used (wooden and iron aids, for example, would have been significantly heavier to use than their plastic and titanium parallels), but the materials from which these disability aids were made also affects their archaeological survival

[63] As Schwartz (et al.) point out, 'a search for the term "assistive technology" [conducted in 2018] on Thingiverse, a 3D printing object repository, reveals sixty devices from adaptive feeding equipment, to sock aides, to reachers. Many of the assistive technology entries boast numerous "likes" and photos from other users who have printed their own device'. See Jaclyn K. Schwartz, et al., 'Methodology and Feasibility of a 3D Printed Assistive Technology Intervention', *Disability and Rehabilitation: Assistive Technology*, 1748–3115 (2019), 1–7 (p. 1).

rates and, subsequently, the number of material artefacts to which we have access. With the exception of the mechanised prostheses discussed in chapter four, which were largely made of iron, many of the disability aids discussed in this thesis were constructed from organic materials (i.e. the wood, cloth, and bone mentioned above). Whilst this meant that they could be produced more affordably and in larger numbers it also means that they have a low archaeological survival rate.

As outlined by Kibblewhite (et al.), the archaeological survival rate of organic material is largely determined by the soil environment in which they have (either intentionally or unintentionally) been buried. This soil type can be affected by seven factors: (1) hydrology (i.e. how waterlogged the ground is), (2) acidity and alkalinity, (3) solute types and concentrations (i.e. the mineral content of the soil), (4) levels of dissolved organic matter in the soil, (5) vulnerability to erosion, (6) the 'stiffness' of the soil, preventing brittle objects from fracturing, and (7) other factors, such as continual soil formation, or a lack of human and animal interference, etc.[64] The most favourable environment for the survival of organic artefacts must take one of two extremes – either soil which contains a high level of static water with an alkaline pH or that which is very dry, but still 'stiff'.[65] This is because both of these soil types contain low levels of naturally occurring organic materials, making it a poor habitat for worm

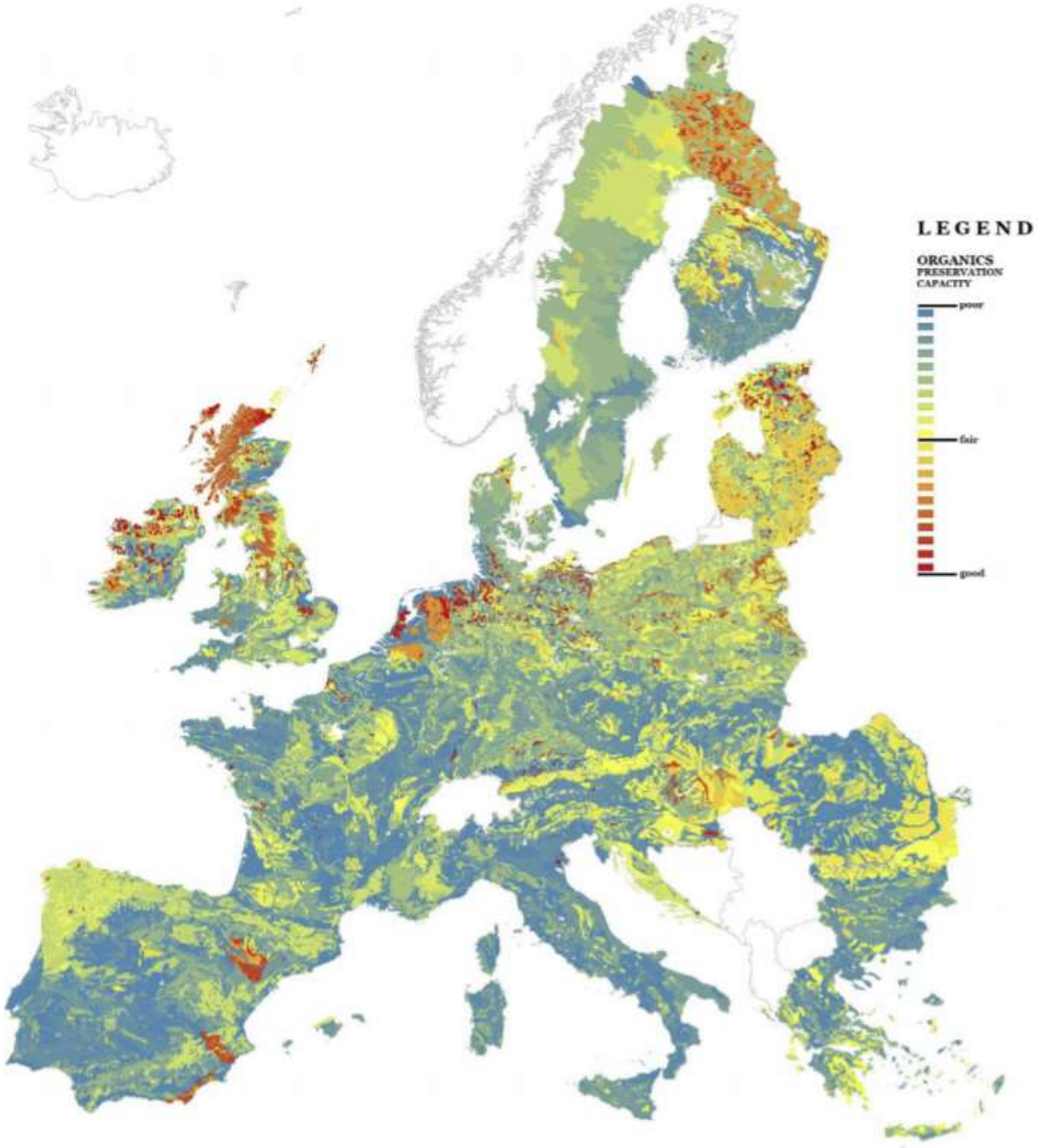
[64] Mark Kibblewhite, Gergely Tóth and Tamás Hermann, 'Predicting the Preservation of Cultural Artefacts and Buried Materials in Soil', *Science of the Total Environment*, 5:9 (2015), 249–263 (p. 251).
[65] Angela Karsten, et. al., *Waterlogged Organic Artefacts Guidelines on their Recovery, Analysis and Conservation* (Swindon: English Heritage Publishing, 2012), pp. 8–9.

populations and, in turn, a less appealing place for burrowing birds and mammals to seek out worms. As a result, the artefacts buried here are likely to face accelerated aerobic degradation, to be displaced, or to be subjected to animal, annelid, or bacterial decomposition. Conversely, the least preserving soil conditions are those where there is a continual cycle of moisture, i.e. the soil is wetter in the winter months and drier in the summer months. This 'cycling of soil moisture levels encourages 'flushes' of more intense microbial activity as the soil wets up', thereby encouraging a more rapid decomposition of organic material.[66]

Although the soil quality of Europe is, on the whole, generally quite poor for the preservation of organic material (as we can see from the map depicted in figure 1, most of Portugal, Spain, Italy, France and Germany is coloured blue and green – indicating a low chance of survival for organic artefacts), there is a much greater likelihood of finding material remains in the north than in the south. As figure 1 depicts, areas of Northern Europe (such as the Netherlands, Belgium, Great Britain, and Ireland) consist of more red, orange, and yellow areas – representing a fair to good chance of organic archaeological remains having been preserved. As such, this greater likelihood of finding material objects further justifies the Northern European focus of this thesis. Nevertheless, even though the preservative capacities of soil are better in Northern Europe than in Southern Europe, there are still a number of Northern European countries considered by this thesis that still have a lower preservation rate of organic material.

[66] Kibblewhite, et al., pp. 250–251.

Figure 1: Soil-Based Preservation Capacity for Organic Material[67]



Consequently, this thesis will not rely on a source base of archaeological finds alone, but will also consider a broader range of materials in which these objects are represented. In the case of assistive technology, these other representations most often appear in the form of visual culture. As such, the final section of this

[67] Kibblewhite, et al., p. 256.

introduction will now outline my methodologies for approaching visual representations of material artefacts (rather than surviving examples of the artefacts themselves).

APPROACHING IMAGES

When dealing with later medieval visual culture, it can be very tempting to view images as a direct 'window to the past' – believing that anything depicted in a visual format is an 'accurate' or 'truthful' representation of its subject matter. In fact, since the eighteenth century, historians have been guilty of presenting imagery as 'a totally unproblematic representation of exterior reality, [which is] somehow 'truer' to some idea of what constitutes 'life' in a period than any other conventional representation in text or document'.[68] However, this is not the case. Much like literary and documentary evidence, visual source material is heavily coloured by the beliefs of its creator as well as the person, family, or institution who commissioned it. As Nelson Coon argues, an 'artist of any time or place, generally draws upon his own particular observations of the world around him [...] making alterations as are demanded by [...] the desires of his patron'.[69] Therefore, at a basic level of analysis, the artist's own observations, coupled with the desires of his patron, leaves an image with at least two layers of interpretation which scholars should seek to explore. However, despite the layers of meaning and interpretation that exist within visual sources, scholarship continues to use

[68] Michael Camille, 'Labouring for the Lord: The Ploughman and the Social Order in the Luttrell Psalter', *Art History*, 10:4 (1987), 423–454 (p. 424).
[69] Nelson Coon, *A Brief History of Guide Dogs for the Blind* (Morristown, N.J.: The Seeing Eye, Inc., 1959), p. 11.

artwork as an uncritical window onto the past, or worse, as a colourful embellishment to support textual sources – an approach which, as Camille rightly argues, would 'be scandalous were these texts and not images'.[70]

In order to avoid this problematic and uncritical use of images, this thesis grounds itself in art historical methodologies. Perhaps the most important of these, for the purposes of this thesis, is the concept of the 'signifier + signified = sign'. In his *Course on General Linguistics*, Ferdinand de Saussure (1857–1913) suggested that a sign (defined as anything that communicates a meaning to the interpreter of the sign) is made up of two components – the signifier and the signified. The signifier consists of a sound, image, or word, whereas the signified is the concept associated with that sound image or word.[71] These two understandings come together to create a sign whose meaning is commonly understood within a particular time, place, and culture.

This concept of the 'signifier + signified = sign' can be applied to the example of the International Symbol of Access discussed earlier. The simplified image of a person in a wheelchair acts as a signifier, signifying disability, and the blue background signifies mandatory instructions (e.g. only disability badge holders can park in this space). However, since its initial conception the wheelchair has also come to represent more negative notions. For example, rather than impartially representing impairment, the static image of the wheelchair has also come to signify dependence, entrapment, or incapability. As

[70] Camille, p. 424.
[71] Ferdinand De Saussure, *Course in General Linguistics*, ed. by Charles Bally and Albert Sechehaye, trans. by Wade Baskin (New York: McGraw-Hill Book Company, 1966), p. 68.

such, activist groups (such as the Accessible Icon Project, discussed in chapter three) have sought to remodel the sign used as the International Symbol of Access, so that it might signify more positive meanings.

Figure 2: Signifier + Signified = Sign (International Symbol of Access)

SIGNIFIER	SIGNIFIED	SIGN
Person in Wheelchair	Impairment, Dependence, Entrapment, Incapability	
Blue Background	Mandatory Instructions/Information	

This thesis will use this methodological approach of the 'signifier + signified = sign' to analyse medieval visual culture. This will not only offer insights into the ways in which assistive technology was understood, but, by considering how a range of signifiers interact in one specific image, it will also help us to use assistive technology as a lens through which attitudes towards gender, status, and religious beliefs can be studied.

***

Overall then, this thesis will take an interdisciplinary, object-driven approach to its source material in order to draw innovative conclusions about the ways in which assistive technology was constructed, used, and represented in fifteenth- and sixteenth-century Northern Europe. By grounding itself in current disability

studies scholarship and philosophical thought, this thesis will also be able to draw upon contemporary debates and concerns surrounding assistive technology in order to ask if these notions can be retrospectively applied to the fifteenth and sixteenth centuries.

Each chapter will be devoted to a specific kind of assistive technology, with chapter two considering crutch-based aids, chapter three discussing wheeled assistance, chapter four focussing on mechanised prostheses, and chapter five thinking about those assistive aids that were associated with sight loss and ocular complaints. I have selected these four types of disability aids in order to demonstrate that bodily impairment, augmentation, and assistive technologies are not transhistorical conditions and objects. Since crutches, wheelchairs, mechanised prostheses, and spectacles are still prevalent in society today, scholars have often assumed that attitudes towards assistive technology have stayed as static as the objects. However, as this thesis will demonstrate, this is not the case. Although there is some continuity between the types of aids used in the Middle Ages and the kinds of technology employed today, neither the disability aids themselves not popular attitudes towards impairment and augmentation have remained the same since the Middle Ages. In fact, the gendered, economic, and religious associations surrounding different kinds of assistive technologies shifted quite significantly both during and after the later medieval period. Therefore, I have selected the four kinds of assistive aids with which twenty-first-century readers are likely to be most familiar in order to

combat the notion that impairment and the use of disability technology has remained unchanged throughout history.

However, before we discuss each of these different kinds of technologies, the first chapter of this thesis will reflect upon the ways in which medievalist scholarship has engaged with disability studies, as well as the ways in which enquiries into medieval disability have interacted with the themes of gender, status, religion, and the lifecycle. By considering the ways in which medievalists have either applied or ignored modern disability theory, we will be able to assess why there has not yet been an extended investigation into later medieval disability aids, and how this thesis can remedy this gap in the scholarship.

Chapter One
MEDIEVAL DISABILITY STUDIES: A HISTORIOGRAPHY

To understand how this thesis fits into the broader field of academic study, it is important to assess the scholarship that has gone before and how this thesis intends to challenge, build upon, or complement these earlier studies. In order to demonstrate this, this chapter will provide an overview of the historiographical development of the field of medieval disability studies (paying particular attention to the ways in which scholars have considered the relationship between impairment and gender, status, religion, and the lifecycle), before considering why scholars have overlooked the subject of later medieval assistive technology, and how this thesis contributes to the field by introducing a discussion of assistive technology to the pre-existing dialogue.

Throughout this thesis I refer to my field as 'medieval disability studies', rather than 'the history of medieval disability'. This is due to the overarching interdisciplinary nature of the subject matter. As this chapter demonstrates, evidence relating to the subject of disability in the Middle Ages is often sparse and fragmentary. Therefore, scholars who specialise in this area are required to be interdisciplinary if they are to weave together the many (and often disparate) threads of evidence in order to construct an argument. Enquiries into medieval disability are conducted by both individuals and teams from the fields of history, literature, medicine, art history, material culture studies, and archaeology (to name a few) – rendering this field an area of multidisciplinary (i.e. 'people from different disciplines working together, each drawing on their disciplinary

knowledge') and interdisciplinary (i.e. 'integrating knowledge and methods from different disciplines, using a real synthesis of approaches') pursuit, rather than an intradisciplinary (i.e. 'working within a single discipline') 'history' – although, as we will see, this has not always been the case.[1]

My own research, although heavily grounded in material and visual culture studies, makes use of a broad range of primary sources, including literature, documentary evidence, autobiographies, visual culture, material culture, and skeletal remains; drawing upon the work and methodologies proposed by scholars in the fields of history, art history, material culture studies, archaeology, and philosophy in order to interpret these sources. However, before we move on to my research, let us first assess the ways in which the field of medieval disability studies has developed and why there is a significant lack in scholarship pertaining to the creation, use, and representation of assistive technology.

DEVELOPMENT OF THE FIELD

The first attempts to study historical disability emerged in the 1920s and 1930s and were predominantly conducted by orthopaedic medical professionals who had an interest in learning about the history behind their profession. The timing of the 1920s and 1930s is significant because, as Metzler suggests, these are the years immediately following the First World War, in which 'large numbers of maimed soldiers return[ed] from the front, prompt[ing] academic as well as

[1] Alexander Refsum Jensenius, *Disciplinarities: Intra, Cross, Multi, Inter, Trans* (2012) <https://www.arj.no/2012/03/12/disciplinarities-2/> [accessed January 2020].

medical interest in disability and 'rehabilitation'.'[2] An example of this can be seen in Frederick Watson's *Civilisation and the Cripple* published in 1930.[3] Watson, who was the son-in-law of the renowned orthopaedic surgeon Sir Robert Jones, portrays impairment as a trans-historical problem that could be dealt with through science and medicine.[4] However, Watson, like many of his contemporaries, glosses over the medieval period – devoting little more than a paragraph to this era. As Metzler suggests, the Middle Ages were viewed by many early medical historians 'as an unwelcome interruption in the glorious advancement of medical science from (classical) antiquity to the present day, with at best an apparent stagnation, or at worst even collapse of medical knowledge during that time'.[5]

It was not until the publication of Henri-Jacques Stiker's *History of Disability* in 1982, that medieval responses to disability were considered more thoroughly. Stiker dedicates a whole chapter of his book to the Middle Ages in which he discusses his difficulties in finding medieval source material which discusses disability, and attempts to reconstruct the ways in which medieval people understood and responded to disability (concluding that the status of

[2] Irina Metzler, *Disability in Medieval Europe: Thinking about Physical Impairment in the High Middle Ages, c. 1100–c. 1400* (London: Routledge, 2006), p. 12.

[3] Frederick Watson, *Civilisation and the Cripple* (New York: Arno Press, 1930).

[4] Ana Carden-Coyne, *Reconstructing the Body: Classicism, Modernism, and the First World War* (Oxford: Oxford University Press, 2009), p. 22; Brendan Gleeson, *Geographies of Disability* (London: Routledge, 1999), p. 24; Metzler, *Disability in Medieval Europe*, p. 12.

[5] Metzler, *Disability in Medieval Europe*, p. 8.

disabled people was generally very fluid in the Middle Ages, despite impairment being frequently associated with fear).[6]

Margaret A. Winzer also reflects on medieval disability in her article 'Disability and Society before the Eighteenth Century: Dread and Despair', which was published in the first edition of Davis's *Disability Studies Reader*.[7] Although this work proved controversial – with Winzer wrongly arguing that, in the Middle Ages, 'the great majority of disabled persons had no occupation, no source of income, limited social interaction, and little religious comfort' – the fact that this chapter focussed specifically on pre-modern impairment (rather than glossing over the supposed 'Dark Ages' in favour of more 'enlightened' periods, as had many earlier scholars) renders it an important contribution to the field of medieval disability studies as a specific and unique area of enquiry.[8]

However, it was Irina Metzler's seminal monograph, *Disability in Medieval Europe: Thinking about Physical Impairment in the High Middle Ages, c. 1100–c. 1400* (published in 2006), that really facilitated the development of the field of medieval disability studies by providing a useful theoretical framework through which medieval impairment and dis/ability can be understood. By drawing upon theories used in modern sociological and anthropological practice (in particular,

---

[6] Henri-Jaques Stiker, *A History of Disability*, trans. by W. Sayers (Ann Arbor: University of Michigan Press, 1999) – see chapter 'The Systems of Charity'. See also Metzler, *Disability in Medieval Europe*, p. 16.

[7] Margaret A. Winzer, 'Disability and Society Before the Eighteenth Century: Dread and Despair', in *The Disability Studies Reader*, First Edition, ed. by Lennard Davis (New York: Routledge, 1997), pp. 75–109.

[8] Winzer's article was dropped from the second edition of *The Disability Studies Reader* (published in 2006), thereby demonstrating the changing attitudes both towards and within the field of medieval disability studies in the mid-2000s. For more information on the perpetuation of the 'Dark Ages' myth by non-medievalists, see the 'Explaining the Absence of Assistive Technology' section of this chapter.

the social model of disability, discussed in the introduction to this thesis), Metzler distinguishes the concept of 'impairment' from the concept of 'disability'. She explains that 'disability' is a cultural construct laid upon a physical, biological condition which can be referred to as an 'impairment'. As such, one cannot 'speak automatically of all impaired persons as disabled at all times, in all places'.[9] For example, there was no specific umbrella term under which people with disabilities were referred to in the Middle Ages – instead, individuals were labelled by their conditions (e.g. the 'crippled', 'mute', 'deaf', and 'epileptics'). She states that, 'in medieval Latin [...] *infirmi*, *aegri* and *egroti* were often used as interchangeable terms for 'diseased', 'sick' and 'impaired'', making it difficult to establish whether these terms actually imply 'disability' as we would understand it today.[10] Consequently, Metzler proposed that scholars of medieval disability resist the temptation to be generalising and comparative, in order to 'describe the specific world-view of a culture as it is usual within that culture'.[11]

Metzler's provision of a framework through which to study medieval disability, coupled with her subsequent call to arms for future scholars to 'build on the basic structures of [her] theoretical frame', laid the foundations for other scholars hoping to study medieval disability.[12] Since the publication of her first book in 2006, the field of medieval disability studies has flourished, with a large number of academics contributing articles, chapters, and monographs to its development. Unfortunately, there is not enough time to discuss each of these

[9] Metzler, *Disability in Medieval Europe*, p. 9.
[10] Metzler, *Disability in Medieval Europe*, p. 5.
[11] Metzler, *Disability in Medieval Europe*, p. 10.
[12] Metzler, *Disability in Medieval Europe*, p. 2.

works individually; however, I have selected four areas of intersectionality within medieval disability studies that are (as the following chapters will demonstrate) particularly relevant to this thesis, to provide a brief overview of some of directions in which the field is developing.

1. DISABILITY AND GENDER

One area in which the field of medieval disability studies has developed quite significantly is in its consideration of the relationship between impairment, 'dis/ability', and gender. A great deal of the initial work in this area has been conducted by Tory Vandeventer Pearman, whose book, *Women and Disability in Medieval Literature*, was the first monograph to take a specifically gendered, feminist approach to medieval disability studies.[13] Whilst Pearman has continued her research into medieval women and disability,[14] other scholars with similar interests have emerged in her wake, such as Mikee Delony and Edna Edith Sayers (both of whom offer insights into the connection between femininity and disability in Chaucer's *Wife of Bath's Tale*), as well as Connie Scarborough and Jonathan Hsy who each talk about the relationship between disability and gender through the case study of Teresa de Cartagena.[15] Unfortunately, the relationship

[13] Tory Vandeventer Pearman, *Women and Disability in Medieval Literature* (New York: Palgrave Macmillan, 2010).

[14] See Tory Vandeventer Pearman, 'Disruptive Dames: Disability and the Loathly Lady in the Tale of Florent, the Wife Of Bath's Tale, and the Weddynge Of Sir Gawain And Dame Ragnelle', in *The Treatment of Disabled Persons in Medieval Europe: Examining Disability in the Historical, Legal, Literary, Medical, and Religious Discourses of the Middle Ages*, ed. by Wendy Turner and Tory Vandeventer Pearman (Lewiston: Edwin Mellen Press, 2010), pp. 291–312; Tory Vandeventer Pearman, "O Sweete Venym Queynte!' Pregnancy and the Disabled Female Body in the Merchant's Tale', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyler (Farnham: Ashgate, 2010), pp. 25–38.

[15] Mikee Delony, 'Alisoun's Aging, Hearing Impaired Female Body: Gazing at the Wife of Bath in Chaucer's Canterbury Tales', in *The Treatment of Disabled Persons in Medieval Europe: Examining*

between masculinity, disability, and bodily integrity has not yet received the same level of attention from scholars as the relationship between disability, femininity, and medieval conceptions of womanhood. There have been some initial forays into this area, for example, Bianca Frohne's 'Performing Dis/ability? Constructions of 'Infirmity' in Late Medieval and Early Modern Life Writing', David Green's 'Masculinity and Medicine: Thomas Walsingham and the Death of the Black Prince', and Kristina Richardson's 'Drug Overdose, Disability and Male Friendship in Fifteenth-Century Mamluk Cairo'.[16] However, on the whole, scholarship focusing specifically on medieval constructs of masculinity and its relationship with disability still remains rather sparse.

This thesis will therefore consider how later medieval assistive technology interacted with both the feminine *and* masculine body. It will ask how society's perceptions of impairment might differ according to the gender of the 'disabled' person and, in relation to this, will discuss whether one's gender affected, or dictated, the kinds of disability aids an individual might be expected to use.

Disability in the Historical, Legal, Literary, Medical, and Religious Discourses of the Middle Ages, ed. by Wendy Turner and Tory Vandeventer Pearman (Lewiston: Edwin Mellen Press, 2010), pp. 313–346; Edna Edith Sayers, 'Experience, Authority and the Mediation of Deafness: Chaucer's Wife of Bath', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyler (Farnham: Ashgate, 2010), pp. 81–92; Connie Scarborough, *Viewing Disability in Medieval Spanish Texts: Disgraced or Graced* (Amsterdam: Amsterdam University Press, 2018); Jonathan Hsy, 'Disability', in *The Cambridge Companion to the Body in Literature*, ed. by David Hillman and Ulrika Maude (Cambridge: Cambridge University Press, 2015), pp. 24–40.

[16] Bianca Frohne, 'Performing Dis/ability? Constructions of 'Infirmity' in Late Medieval and Early Modern Life Writing', in *Infirmity in Antiquity and the Middle Ages: Social and Cultural Approaches to Health, Weakness, and Care*, ed. by Christian Krötzl, Katariina Mustakallio and Jenni Kuuliala (Farnham: Ashgate, 2015); David Green, 'Masculinity and Medicine: Thomas Walsingham and the Death of the Black Prince', *Journal of Medieval History*, 35:1 (2009), 34–51; Kristina Richardson, 'Drug Overdose, Disability and Male Friendship in Fifteenth-Century Mamluk Cairo', *Postmedieval: A Journal of Medieval Cultural Studies*, 3:2 (2012), 168–181.

2. DISABILITY AND STATUS

Another area in which medieval disability studies has developed is through the consideration of impairment's relationship with constructions of social status. This has been particularly well researched in relation to specific medieval monarchs – take for instance the countless articles asking how Richard III of England's scoliosis might have affected popular perceptions of his character.[17] Similarly, individuals such as Julie Singer have discussed how Charles VI of France's mental illnesses might have affected France's international relationships,[18] and scholars such as Bernard Guenée have used contemporary source material to unearth what contemporaries might have thought of Charles VI and his mental disabilities.[19]

However, despite these investigations into the relationship between high-status individuals and their impairments, there has been very little enthusiasm for scholarship focussing specifically on the relationship between disability and poverty in the later Middle Ages. There are several monographs that refer to a relationship between impairment and poverty, although this relationship is not usually the primary focus of the work. This is evident in Frank Rexroth's *Deviance*

---

[17] Abigail Elizabeth Comber, 'A Medieval King 'Disabled' by an Early Modern Construct: A Contextual Examination of Richard III', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyler (Farnham: Ashgate, 2010), pp. 182–196; Michael Hicks, *Richard III: The Man Behind the Myth* (London: Collins & Brown Ltd, 1991); Ian Frederick Moulton, '"A Monster Great Deformed": The Unruly Masculinity of Richard III', *Shakespeare Quarterly*, 47:3 (1996), 251–268; Lindsay Row-Heyveld, *Dissembling Disability in Early Modern Drama* (New York: Palgrave MacMillan, 2018) – see chapter five 'Rules of Charity: Richard III and the Counterfeit Disability Tradition', pp. 134–169; Phillip Schwyzer, *Shakespeare and the Remains of Richard III* (Oxford: Oxford University Press, 2013); Isabel Tulloch, 'Richard III: A Study in Medical Misrepresentation', *Journal of the Royal Society of Medicine*, 102:8 (2009), 315–323.

[18] Julie Singer, *Representing Mental Illness in Late Medieval France: Machines, Madness, Metaphor* (Rochester: Boydell and Brewer, 2018).

[19] Bernard Guenée, *La folie de Charles VI: Roi Bien-Aimé (*Paris: CNRS Editions, 2018).

and Power in Medieval London, in which he discusses the case of a beggar brought to trial for feigning disability. Rexroth mines this case study for information regarding authority and morality in the city, but the connection between begging and disability is overlooked.[20] Similarly, in Sharon Farmer's *Surviving Poverty in Medieval Paris*, there are several references to the relationship between poverty and impairment (i.e. in reference to a disabled husband's inability to provide financially for his wife or concerns over 'false beggars' and the tendency of people to feign disability to receive a larger proportion of alms).[21] However, like Rexroth, Farmer does not include these case studies in order to learn about medieval attitudes towards impairment, but instead uses them to draw conclusions about the lived experience of poverty in medieval Paris.

Consequently, this thesis will seek to remedy this sidelining of the relationship between poverty and impairment by considering how strongly one's social status and access to economic resources dictated the kinds of assistive technologies that an individual had access to, whilst also attempting to analyse elite attitudes towards poverty and disability through a close analysis of manuscript marginalia.

3. DISABILITY AND RELIGION

Perhaps most thoroughly, medieval disability studies scholars have considered how impairment interacted with contemporary religious beliefs and practices. On

[20] Frank Rexworth, *Deviance and Power in Late Medieval London*, trans. by Pamela E. Selwyn (Cambridge: Cambridge University Press, 2007), p. 145.
[21] Sharon Farmer, *Surviving Poverty in Medieval Paris: Gender, Ideology and the Daily Lives of the Poor* (Ithaca: Cornell University Press, 2002), pp. 125, 151.

the whole, this approach has had a predominantly Christian focus, with scholars considering how disability and impairment are represented in miracle collections, canonization processes, and ecclesiastical law.[22] Although there has not been one singular monograph dedicated specifically to the relationship between Christianity and bodily impairment, the Church's dominance in Europe throughout this period makes it impossible to understand later medieval disability without paying at least some attention to the way in which impairment was perceived and represented within the contemporary Christian belief system.

This focus is taken to its extreme by Edward Wheatley, who argued that medieval impairment should be primarily understood through a 'religious model of disability'. He proposes this model as an alternative to the social and medical models of disability, claiming that medieval people understood the cause and cure of bodily impairment through the lens of Christianity. He claims that medieval disability was constructed 'as a spiritually pathological site of absence of the divine' where treatment could be obtained through 'freedom from sin and increased personal faith'.[23] As this thesis will demonstrate, Wheatley's approach

[22] Example of this include Jenni Kuuliala, 'Heavenly Healing or Failure of Faith? Partial Cures in Later Medieval Canonization Processes', in *Church and Belief in the Middle Ages: Popes, Saints, and Crusaders*, ed. by Kirsi Salonen and Sari Katajala-Peltomaa (Amsterdam: Amsterdam University Press, 2016), pp. 171–200; Brandon Parlopiano, 'Propter Deformitatem: Towards a Concept of Disability in Medieval Canon Law', *Canadian Journal of Disability Studies*, 4:3 (2015), 72–102; Hannah Skoda, 'Representations of Disability in the Thirteenth-Century Miracles de Saint Louis', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyler (Ashgate: Farnham, 2010), pp. 53–66; Louise Elizabeth Wilson, 'Hagiographical Interpretations of Disability in the Twelfth-Century Miracula of St. Frideswide of Oxford', in *The Treatment of Disabled Persons In Medieval Europe: Examining Disability in the Historical, Legal, Literary, Medical, and Religious Discourses of the Middle Ages*, ed. by Wendy Turner and Tory Vandeventer Pearman (Lewiston: Edwin Mellen Press, 2010), pp. 135–165.

[23] Edward Wheatley, *Stumbling Blocks Before the Blind: Medieval Constructions of a Disability* (Ann Arbor: University of Michigan Press, 2010), p. 11.

to medieval impairment is far too narrow in its focus. It does not consider the ways in which other socio-cultural factors contributed to understandings of 'dis/ability' and offers no satisfactory explanation as to where individuals who do not seek a cure for their impairment fit into the model. It is also extremely Christian-centric and subsequently fails to consider the ways in which individuals of non-Christian faiths interpreted bodily impairment.

However, despite Wheatley's oversights, there are two scholars, Kristina Richardson and Ephraim Shoham-Steiner, who have considered the relationship between impairment and religion in medieval Muslim and Jewish communities. Richardson's monograph, *Difference and Disability in the Medieval Islamic World: Blighted Bodies*, investigates attitudes towards individuals with non-normative or 'dis/abled' bodies in medieval Islam by drawing upon the work of six male Sunni scholars based in Cairo, Damascus, and Mecca. She considers a range of intersectional factors, including (but not limited to) the relationship between impairment and social class in medieval Islamic thought, disability and gender – in particular how impairment is connected to male homoeroticism (also discussed in her article pertaining to disability and male friendship, mentioned above), and ideas surrounding impairment and self-representation.[24] Shoham-Steiner, on the other hand, maintains a more European focus, but considers how bodily impairment was understood within medieval Jewish communities. His monograph, *On the Margins of a Minority*, focusses on 'social attitudes' towards

[24] Kristina Richardson, *Difference and Disability in the Medieval Islamic World: Blighted Bodies* (Edinburgh: Edinburgh University Press, 2012); Richardson, 'Drug Overdose, Disability and Male Friendship'.

disabled individuals as well as the lived experiences of people with bodily impairments, discussing the often paradoxical policies concerning those who ought to be embraced, and those who ought to be excluded from Jewish society.[25]

Whilst religious representations of impairment are not the primary concern of this thesis, a vast majority of the source materials consulted (including, but not limited to, visual representations of the Bible, marginalia found in books of hours, and miracle collections) are grounded in contemporary religious beliefs and practices. As such, this thesis will draw upon the work of scholars who have investigated the relationship between impairment and religion in the medieval world, so that it might properly frame its source material within the diverse (and often tumultuous) religious landscape of fifteenth- and sixteenth-century Northern Europe.

4. DISABILITY AND THE LIFECYCLE

The final area that will be considered is the relationship between disability and the lifecycle. Although this has been less-well studied than the previous three themes, it is one of the only places in which evidence for a broad range of assistive technologies are brought together in relation to the body and its ageing. An example of scholarship which focusses specifically on impairment at the beginning of the lifecycle is Jenni Kuuliala's *Childhood Disability and Social*

[25] Ephraim Shoham-Steiner, *On the Margins of a Minority: Leprosy, Madness, and Disability among the Jews of Medieval Europe*, trans. by Haim Waltzman (Detroit: Wayne State University Press, 2014). See also Ephraim Shoham-Steiner, 'Poverty and Disability – The Medieval Jewish Perspective', in *The Sign Languages of Poverty*, ed. by Gerhard Jaritz (Vienna: VÖAW, 2007), pp. 75–94.

Interaction in the Middle Ages.[26] Through a consideration of thirteenth- and fourteenth-century canonisation processes, Kuuliala considers the way in which impairment was understood by a disabled child's family (as well as their wider community) before attempting to reconstruct the lived experience of childhood disability in the Central Middle Ages.

Although there has not yet been a single monograph which deals with these same questions in relation to old age, there are several articles and book chapters which consider the relationship between ageing and impairment. For example, Encarnación Juárez-Almendros's *Disabled Bodies in Early Modern Spanish Literature* dedicates a chapter to the disabling of elderly female bodies by social narratives surrounding witchcraft and monstrosity.[27] Similarly, in an attempt to bring together disability studies and old age studies, Sarah Gordon considers the ways in which the elderly body was presented as 'dis/abled' in sixteenth-century French farce. She argues that, although theatrical representations of disability differ from the lived experience, they can offer a useful insight into contemporary attitudes towards, and perceptions of, bodily impairment.[28] In her *Social History of Disability*, Irina Metzler also devotes a chapter to old age and disability, considering how old age 'sits problematically at the intersection of physical characteristics or impairments, such as blindness,

[26] Jenni Kuuliala, *Childhood Disability and Social Interaction in the Middle Ages: Constructions of Impairments in Thirteenth- and Fourteenth-Century Canonization Processes* (Turnhout: Brepols, 2016).
[27] Encarnación Juárez-Almendros, *Disabled Bodies in Early Modern Spanish Literature: Prostitutes, Aging Women and Saints* (Liverpool: Liverpool University Press, 2017).
[28] Sarah Gordon, 'Representations of Aging and Disability in Early-Sixteenth-Century French Farce', in *Old Age in the Middle Ages and the Renaissance: Interdisciplinary Approaches to a Neglected Topic*, ed. by Albrecht Classen (Berlin: Walter De Grutyer, 2007), pp. 421–436.

bodily weakness and infirmity, with cultural and social concepts of charity, alms, or working ability'.[29]

By focussing on a broad array of assistive technologies, I will contribute to this discussion surrounding disability and the lifecycle by considering how different disability aids were used from childhood through to old age. For example, I will consider how infants made use of technologies such as walking frames and squint caps, whilst elderly individuals might have used crutches, walking sticks, or (in the case of elderly women) have been transported in wheelbarrows. As such, this thesis will situate itself at the intersection of disability studies, old age studies, and gender studies, in order to investigate how later medieval individuals both used and represented bodily impairment and augmentation.

***

However, despite the development of the field of medieval disability studies (and its relevance to this thesis in its consideration of gender, status, religion, and the lifecycle) there have been very few works which consider the role and representation of later medieval assistive technology. In the rare instances in which assistive technology is mentioned, analysis often remains descriptive, with little thought being given to the ways in which these assistive aids might have been used and interpreted within the socio-cultural context of the Middle Ages.[30] The only article that has discussed assistive technology specifically is Irina

[29] Irina Metzler, *A Social History of Disability in the Middle Ages: Cultural Considerations of Physical Impairment* (New York, Routledge, 2013), p. 94.
[30] See, for example, the work of Hernigou, discussed below.

Metzler's, 'Have Crutch, Will Travel: Disabled People on the Move in Medieval Europe'.[31] This article considers the relationship between disability and the urban environment – reflecting on modern attitudes towards 'disability-scaping' and considering how (if at all) these concerns manifested in the medieval past. However, unlike this thesis, Metzler's article is predominantly concerned with individuals 'on the move', that is, whilst in the context of long-distance travelling, most often in the form of a pilgrimage. As such, her article mainly discusses how mobility aids (such as crutches, carts, and other wheeled devices) were used to traverse long distances. Towards the end of the article there is some consideration of how these same devices might have operated in a more static urban environment and familiar domestic spaces. However, this is generally quite limited and does not consider the construction, purchase, and popular representation of these assistive technologies (a gap in the scholarship that this thesis seeks to fill). Why then, in a field that has been rapidly developing over the past two decades, has the everyday use of assistive technology been so infrequently studied?

EXPLAINING THE ABSENCE OF ASSISTIVE TECHNOLOGY

There appear to be three main reasons for this. Firstly, scholarship produced by non-medievalists has a tendency (albeit often unintentional) to perpetuate the 'dark ages' myth – presuming that the Middle Ages were a period of technological

[31] Irina Metzler, 'Have Crutch, Will Travel: Disabled People on the Move in Medieval Europe', in *Travels and Mobilities in the Middle Ages: From the Atlantic to the Black Sea*, ed. by Marianne O'Doherty and Felicitas Schmeider (Turnhout: Brepols, 2015), pp. 91–117.

regression. Secondly (and contrary to the problems associated with the 'dark ages' myth) is the notion that assistive technology was so widespread within the Middle Ages that evidence for its existence remains limited. Finally, assistive technology is often overlooked because it falls within a range of disciplines. In the few instances in which disability aids are discussed, scholars (as we will see in the case of Hernigou below) tend to focus on items that carry the most status or that are perceived as being the most 'shocking' (such as the mechanised prostheses discussed in chapter four), rather than those which might feel more commonplace or recognisable to a twenty-first-century reader (such as the spectacles discussed in chapter five).[32] By understanding the reasons why medieval assistive technology has not yet been satisfactorily studied, we can better identify ways in which we can overcome these difficulties. Consequently, the next section of this chapter will consider these reasons for the absence of scholarship relating to later medieval assistive technology in greater detail.

1. PERSISTENCE OF THE 'DARK AGES' MYTH

To begin with, there is still some perpetuation of the 'dark ages' myth in scholarship relating to the history of assistive technology. For many years, scholars referred to the Middle Ages as the 'dark ages' – suggesting that these years were a period of violence, superstition, and cultural decline following the 'advanced' period of classical Rome and preceding the 'enlightenment'. Today,

[32] A similar problem is evident in the modern design process surrounding assistive technologies. Designers and inventors appear to be more interested in working on projects that will generate greater status and kudos (such as running blades or 3D printed artificial limbs) instead of innovating in areas that are considered 'boring' or low status (such as improving the ergonomic design of crutches to facilitate a more comfortable user experience).

medieval historians generally reject the term 'dark ages', arguing that the phrase carries unhelpful and unrealistic connotations about medieval society, economy, and technology. However, despite these debates surrounding the damaging nature of the 'dark ages' myth, it is still very common to see non-medievalist scholars (who might be conducting a broader history of disability or assistive technology) dismissing source material from the Middle Ages in favour of classical and 'enlightenment' objects that have been hailed as the 'great gold standards' of technological advancement. As such, those who are unfamiliar with both the historiography of medieval disability studies and the period itself have frequently relied on their assumptions and (incorrectly) dismissed the possibility of innovation – inadvertently spreading the idea that the Middle Ages were a terrible time to be disabled as medieval people could not possibly have been skilled enough to consider (let alone craft) assistive aids.[33]

A clear example of this attitude can often be seen in the work of orthopaedic specialists who have chosen to write about the history of their profession. The field of medieval disability studies has good reason to be grateful to those medical professionals who expressed an interest in medical history, as it is as a result of these early investigations that the history of disability first began

[33] This attitude can be seen in the *Oxford Dictionary of National Biography*, which suggests that the 'the first articulated artificial limb ever devised' belonged to Henry William Paget (first Marquess of Anglesey) who famously lost his leg when hit by canon shots during the Waterloo Campaign, c. 1815. Paget's use of a prosthesis consequently led to this style of limb becoming known as 'the Anglesey Leg'. As this thesis will demonstrate, this is not the case – there are many examples of articulated prostheses dating from the sixteenth century. Unfortunately, the ODNB is one of many examples of the ignorance surrounding pre-modern prosthetic technology. Oxford Dictionary of National Biography, *Paget [formerly Bayly], Henry William, first Marquess of Anglesey (1768–1854)* (2008) <http://www.oxforddnb.com.wam.leeds.ac.uk/view/10.1093/ref:odnb/9780198614128.001.0001/odnb-9780198614128-e-21112?rskey=mwQipE&result=2> [accessed September 2018].

to emerge. However, whilst this scholarship has been valuable for drawing more attention to the history of disability, these medical authors almost always overlook the medieval period. An example of this can be seen in the work of Gordon Phillips who, whilst considering the construction of artificial limbs between 1890 and 1990, suggested that 'the Middle Ages was a period of the big sleep' in terms of the development of prosthetic technology.[34] Similarly, pioneering disability activist and scholar, Vic Finkelstein, does not devote any time to the Middle Ages in his investigation into 'attitudes and disabled people'.[35] Instead, he argues that the development of disability aids emerged alongside an industrialising society (i.e. greater opportunities for work led to there being more workers within the industrial sector, which generated a demand for assistive technology so that impaired workers could contribute within the workplace), and that within this industrialising society 'cripples disappeared and disability was created'[36] – suggesting that any previously negative attitudes towards individuals with social impairments were caused by exclusion from industrial society. As a result of this argument, Finkelstein implies that medieval work is not 'real' work; instead, it is seen as a small part of a broader lifestyle – for example, being a peasant necessitates that one participates in agricultural labour. This stems from the attitude that medieval agricultural labour was often enforced, involving obligations associated with unfreedom, whereas 'real work' is something

---

[34] Gordon Phillips, *Best Foot Forward: Chas. A. Blatchford & Sons, Ltd. – Artificial Limb Specialists, 1890–1990 (*London: Granta Editions, 1990), p. 41.
[35] Vic Finkelstein, *Attitudes and Disabled People: Issues for Discussion* (New York: World Rehabilitation Fund, 1980).
[36] Finkelstein, p. 8.

supposedly done for pay out of choice. Henri Lefebvre takes this one step further by suggesting that pre-modern people were shaped more by the rhythms of religion and the seasons, than by worktime. This attitude therefore leads to the assumption that there was not really a 'workplace' in the Middle Ages and, subsequently, workplace disability aids were not required.[37]

Why then have non-medievalists found themselves (often unknowingly) contributing to the 'dark ages' myth? Firstly, there is the problem of blindly following scholarship that has gone before. If all other scholars providing a survey of historical disability aids have claimed that the medieval period offered nothing of note, it is easy to presume this to be true. However, I believe that a more pertinent reason as to why non-medievalist scholars have so frequently ignored medieval assistive technology, is because medievalist scholars have too! Whilst medievalists have considered disability in the Middle Ages quite thoroughly, they have yet to pay close attention to the material culture associated with impairment. This may, at first, seem unusual, as assistive aids are littered throughout medieval visual culture, appearing in the margins of manuscripts, within church architecture and furnishings, or within popular prints and woodcuts. However, I believe that (contrary to Phillips's notion that the Middle Ages was a 'period of big sleep') it is, in fact, the ubiquity of medieval assistive aids which has made them invisible to modern scholars.

---

[37] Henri Lefebvre, *Du rural à l'urbain* (Paris: Anthropos, 1970); Henri Lefebvre, *La production de l'espace* (Paris: Anthropos, 1974).

2. UBIQUITY OF ASSISTIVE AIDS

Whilst the prevalence of an object might seem like an unusual reason for it to have been ignored, there are several explanations as to why this may be the case. To begin with, inexpensive, everyday objects are much less likely to appear in literary or documentary records. However, this should not necessarily be taken to mean that these items were rare or unusually absent from day-to-day life, but rather that they were so ubiquitous and mundane that contemporaries did not consider them to be worthy of recording. For example, if I were to write to a friend about a recent trip to the cinema, I would probably not feel compelled to tell her that I needed to put on my spectacles before attending (due to my mildly myopic vision) or that I sat in seat G18 (a fold down chair with a plastic cup holder to the right), as I would presume she was either already aware of, or uninterested in, these details. I would, however, tell her about the film (relaying any especially exciting moments) and give my opinion of the various actors' performances. Medieval source material operated in a similar way – unless we are looking at a very comprehensive account book or will, it is unusual to see everyday material objects discussed in significant detail. Consequently, the most commonly used examples of assistive aids are the most absent from the documentary record, making it possible to understand why scholars who work predominantly with literary and documentary texts might have overlooked or underestimated the importance of assistive technology in the Middle Ages.

However, assistive aids are not just absent from the documentary record, but (as the introduction to this thesis touched upon) they are also absent from the archaeological record. The reasons for this are threefold.

1. Firstly, as we have seen in the introduction to this thesis, although northern European soil conditions are preferable to those in southern Europe for the preservation of wooden artefacts, they are still less than perfect. As such, the areas in which assistive aids made out of organic materials are likely to be preserved remains limited.

2. Secondly, the most ubiquitous disability aids are also likely to have been the most affordable, and subsequently disposable. As such, they are unlikely to have been carefully preserved by their owners – making it much less probable that they would survive to the present day. As commonplace, functional objects, disability aids are more likely to have been passed down between family members and used until they were broken, left behind as a token of faith at a saint's shrine, or repurposed and recrafted once they were no longer of use.

3. Finally, there is a chance that some assistive aids might have been found archaeologically but have not been identified as such. As this thesis will demonstrate, many 'disability aids' were made from other everyday items that had been specially adapted for the purposes of an individual with an impairment (perhaps the most obvious example of this will be seen in chapter three, in which I will discuss the conversion of wheelbarrows into 'wheeled-chairs'). However, this subsequently means that, even if these items do survive in the archaeological record, it can be very difficult to assess how they might have been used.[38]

[38] Patricia Baker discusses a very similar problem in relation to Roman medical instruments, explaining that 'artefacts are not simply functional objects with straightforward identifications, but they are carriers of a multiplicity of meanings and uses'. She states that if, for example, a scalpel is taken out of its medicalised context, it could just as easily be a craftsperson's tool. See Patricia Baker, 'Roman Medical Instruments: Archaeological Interpretations of their Possible 'Non-Functional' Uses', *Social History of Medicine*, 17:1 (2004), 3–21 (p. 6).

This limited body of archaeological and documentary evidence for assistive technology subsequently demonstrates why it is so important to consider the visual culture of impairment – as this is one of the few places in which assistive technology appears as ubiquitously as it did in the medieval world. By applying a range of historical, art historical, and material culture studies methodologies to visual sources, we can not only reveal the broad array of assistive technologies that were available in the fifteenth and sixteenth centuries, but we can also assess how and by whom they might have been used, and how contemporaries responded to different kinds of disability aids. When coupled with the more restricted body of written references and material remains, visual sources can help to highlight new questions and avenues of enquiry.

Therefore, if we open ourselves up to the possibility of considering sources from a broader range of disciplines it is much easier to pull together a body of material which can be used to investigate impairment in the medieval past. However, as Irina Metzler rightly suggests, in order to do this, disability history 'has to be an interdisciplinary, even transdisciplinary history to be effective'.[39] This leads us on to our third and final reason for the paucity of scholarship pertaining to later medieval assistive technology – a lack of interdisciplinarity.

3. LACK OF INTERDISCIPLINARITY

Until recently, the few investigations which mention assistive technology have been carried out either by practising orthopaedic specialists and scientists with

[39] Irina Metzler, 'Disability in the Middle Ages: Impairment at the Intersection of Historical Inquiry and Disability Studies', *History Compass*, 9:1 (2011), 45–60 (p. 48).

an interest in history, or historians, art historians, and archaeologists who, traditionally, have only focussed on one particular type of source material (e.g. literature and documentary sources, visual culture, or physical remains, respectively). However, as we have seen, evidence of assistive technology is often disparate and spread across primary sources associated with different disciplines. It is therefore imperative for scholars to be willing to engage with other disciplines and experts from other fields, if we are to uncover a history of assistive technology.

One example of a scholar whose work would have significantly benefited from a more interdisciplinary perspective is that of Philippe Hernigou. Hernigou is an orthopaedic surgeon who has been celebrated for his role in the field of stem cell research; however, he has also published a number of papers on the history of orthopaedic ailments and treatments (including a series on medieval crutches, multiple works on Ambroise Paré, and medieval German orthopaedics).[40] Whilst these works hold some merit by acknowledging the

[40] In this sense, Hernigou is a rare example of a medical professional who does not subscribe to the 'Dark Ages' myth, discussed above. See Philippe Hernigou, 'History of Clubfoot Treatment, Part I: From Manipulation in Antiquity to Splint and Plaster in Renaissance before Tenotomy', *International Orthopaedics*, 41:8 (2017), 1693–1704; Philippe Hernigou, 'Medieval Orthopaedic History in Germany: Hieronymus Brunschwig and Hans von Gersdorff', *International Orthopaedics*, 39:10 (2015), 2081–2086; Philippe Hernigou, 'Crutch Art Painting in the Middle Ages as Orthopaedic Heritage (Part II: the Peg Leg, the Bent-knee Peg and the Beggar)', *International Orthopaedics*, 38:7 (2014), 1535–1542; Philippe Hernigou, 'Crutch Art Painting in the Middle Ages as Orthopaedic Heritage (Part I: the Lepers, the Poliomyelitis, the Cripples)', *International Orthopaedics*, 38:6 (2014), 1329–1335; Philippe Hernigou, 'Ambroise Paré IV: The Early History of Artificial Limbs (from Robotic to Prostheses)', *International Orthopaedics*, 37:6 (2013), 1195–1197; Philippe Hernigou, 'Ambroise Paré III: Paré's Contributions to Surgical Instruments and Surgical Instruments at the Time of Ambroise Paré', *International Orthopaedics*, 37:5 (2013), 975–980; Philippe Hernigou, 'Ambroise Paré II: Paré's Contributions to Amputation and Ligature', *International Orthopaedics*, 37:4 (2013), 769–772; Philippe Hernigou, 'Ambroise Paré's Life (1510–1590)', *International Orthopaedics*, 37:3 (2013), 543–547.

broader trajectory of the history of medicine and the medieval influence on modern medical practices, Hernigou lacks the historical skill set that is necessary to analyse his source material in a meaningful way.[41] This is particularly evident in his article on Ambroise Paré's contribution to prosthetic technology. Despite drawing upon a series of manuscript images and alleged first-hand testimonies from individuals who wore Paré's prostheses, Hernigou fails to include any references as to where he found this material. His work also lacks precision regarding dates and locations, suggesting, for example, that 'during the European mediaeval period, armoured knights used iron prosthetics to conceal lost limbs'; however, without a citation, date, location, or examples of these knights, his scholarship is, unfortunately, useless.[42] Consequently, although Hernigou's work raises a number of important questions and discusses understudied source material (albeit poorly referenced), he lacks the historical skill set necessary to properly contextualise and analyse these sources. If Hernigou were to have worked alongside disability historians, using inter- or transdisciplinary methodologies, he might have been able to ground the answers to his questions within more credible historical methodologies.

[41] The fact that Hernigou chooses to publish his articles in the journal *International Orthopaedics* (instead of a journal such as the *Social History of Medicine*, *The Journal of the History of Medicine and Allied Sciences,* or the *Histoire des Sciences Médicales*) is also problematic, as this contributes to the perception of medieval disability studies as either a novelty subject that might be of interest to surgeons curious about the history of their profession, or as a way to differentiate twenty-first-century medical practitioners as 'moderns' who are more advanced than their predecessors. The choice of *International Orthopaedics* as a place of publication also poses a problem in the sense that, as a scientific journal, it is more likely to employ scientists (rather than historians) as peer reviewers for Hernigou's material.

[42] Hernigou, 'Ambroise Paré IV'. The question of armoured knights using iron prostheses will be discussed at length in chapter four of this thesis.

These ways in which medical professionals might work more closely with historians is discussed by Monica Green in her article 'The Value of Historical Perspective', in which she asks, 'what does the history of health [...] offer researchers and policy analysts who are faced in the most urgent way with present ill-health and future threats of disease?'[43] She concludes that, whilst history might not be able to provide the answers to present day questions of medical scientists, through a consideration of historical social, sexual, political and migratory activities, it is able to help scientists and doctors 'ask the right questions' about the development, treatment, and social response to illness. Although Green is discussing the epidemiology of infectious diseases, her methodology is equally applicable to the study of assistive technology.[44] By allowing space for a serious consideration of historical impairment, the development of prosthetic technology, and the social, cultural, and gendered implications of this, medical professionals would be able to see the past not as a novelty interest, but rather as a solid foundation for future enquiries into physical impairment, disability, and access needs.

However, we should not assume that this lack of skills only applies to the work of medical professionals; it also applies to historians. What Hernigou lacks in historical interpretation, he makes up for in his knowledge of anatomy and

---

[43] Monica Green, 'The Value of Historical Perspective', in *The Ashgate Research Companion to the Globalization of Health*, ed. by Ted Schrecker (Farnham: Ashgate, 2012), pp. 17–38 (p. 17).

[44] The relationship between historians and scientists is also of crucial importance in fields outside of disability studies (e.g. epidemiology, genetics and climate science). A wonderful example of the results this can achieve can be seen in the work of an interdisciplinary team of scholars at Nottingham University. This team of researchers from both the sciences and humanities identified and reconstructed a potential remedy for *Staphylococcus aureus* infection from a tenth-century Anglo-Saxon leechbook. For the full outcomes of this project, see Freya Harrison, et al., 'A 1,000-Year-Old Antimicrobial Remedy with Antistaphylococcal Activity', *MBio*, 6:4 (2015), 1–7.

orthopaedic medicine. Conversely, we, as historians, may be able to frame an object within its historical context but, without a working knowledge of medicine and anatomy, might struggle to evaluate how an assistive aid functioned alongside human physiology. Consequently, it is important to remember that a monodisciplinary historical approach can be just as problematic as a specifically medical approach.

For example, despite there being many historical studies focussing on medicine and health, comparatively little work has been conducted on surgical and orthopaedic topics. The reason for this seems to be that historians have generally considered it to be much more difficult to assess how the experience of breaking a leg might have changed through time, than it is to consider the historical responses to infectious disease. In a similar way, it seems that historians also did not think disability could be historicised – following the essentialist theory that, whilst some historical analysis can be applied to the topic, certain elements of pain and impairment are shared between individuals and are beyond and outside of cultural interpretation.

However, it is not just medical professionals with whom disability historians ought to be interacting more frequently, but also archaeologists and material culture scholars. As we have already demonstrated in this chapter, although both historians and archaeologists have a limited corpus of source material individually, when these sources are brought together new investigations can be made and insights drawn. Whilst there have been some attempts to consider the material culture of medieval medicine, seen for example in Robert Arnott's collected edition of papers from the annual conference of the

Theoretical Archaeology Group, Roberta Gilchrist's *Medieval Life*, or Anne McClanan and Karen Encarnacion's *Material Culture of Sex, Procreation and Marriage* – there has yet to be a study which specifically studies the material culture associated with medieval disability.[45] This thesis will address this gap in the scholarship by engaging with archaeological and medical scholarship, as well as methodologies from the fields of art history and disability studies, in order to take a fully interdisciplinary approach to what might otherwise have been a limited body of source material.

***

Overall, this chapter has sought to demonstrate the ways in which the field of medieval disability studies has developed, whilst also demonstrating why (up until now) investigations into later medieval assistive technology have been consistently overlooked by scholars from a range of disciplines. This thesis seeks to address this gap in the scholarship by taking an interdisciplinary approach to its source material, drawing together a range of evidence from traditionally disparate disciplines (e.g. history, art history, archaeology) in order to introduce assistive technology to the pre-existing conversations within medieval disability studies. It will begin by discussing 'crutches, sticks, and trestles' which, whilst evidently the most ubiquitous disability aid in the later Middle Ages, is also the most absent from the documentary and archaeological record.

---

[45] Robert Arnott, *The Archaeology of Medicine: Papers Given at a Session of the Annual Conference of the Theoretical Archaeology Group held at the University of Birmingham on 20 December 1998*, BAR International Series 1046 (Oxford: Archaeopress Publishing Ltd., 2002); Roberta Gilchrist, *Medieval Life: Archaeology and the Life Course* (Woodbridge: The Boydell Press, 2012); Anne L. McClanan, Karen Rosoff Encarnacion (eds.), *Material Culture of Sex, Procreation and Marriage in Premodern Europe* (New York: Palgrave, 2002).

Chapter Two

CRUTCHES, STICKS AND TRESTLES: AMBULATORY AIDS

Ambulatory aids were undoubtedly the most widespread and varied form of assistive technology in the fifteenth and sixteenth centuries. Depicted in medical texts, devotional imagery, and manuscript marginalia, as well as appearing in miracle collections, hagiographies and, occasionally, as archaeological remains, ambulatory aids abounded within medieval society. The main reason for this abundance of ambulatory aids, which were used (as this chapter will demonstrate) by such a diverse range of people, was due to the wide variety of conditions that could lead to mobility impairments – be that arthritis associated with old age, a broken bone that had been poorly set, the loss of a limb, conditions stemming from nutritional deficiencies such as rickets, or partial paralysis, to name but a few. However, as Christian Laes suggests, mobility impairment was (and, in many instances, still is) a vague concept which is often 'not always caused by a clearly definable pathological condition'.[1]

Consequently, this chapter will not concern itself with the aetiology of the conditions that led an individual to require an ambulatory aid (except in a few cases where scientific analysis of skeletal remains has clearly demonstrated the presence of a condition such as arthritis). Instead, it will focus on the four main types of walking aids that were available in the fifteenth and sixteenth centuries (crutches and walking sticks, staffs, walking frames, hand trestles, and peg-legs),

[1] Christian Laes, 'Pedes habent et not ambulabunt: Mobility Impairment in Merovingian Gaul', in *Travel, Pilgrimage and Social Interaction from Antiquity to the Middle Ages*, ed. by Jenni Kuuliala and Jussi Rantala (London: Routledge, 2020), pp. 183–204 (p. 184).

which I have chosen to group together because they all share the common feature of allowing their users to propel themselves forwards, in either a bipedal or quadrupedal motion. It will discuss, where possible, how these different kinds of technologies might have been produced and acquired, before considering how they were used by different individuals and social groups.

Alongside this more practical consideration of the types of ambulatory aids which existed in the later Middle Ages and the ways in which they might have been used, this chapter will also consider how representations of ambulatory aids acted as visual signifiers.[2] When considered in isolation, it is easy to mistake ambulatory aids such as staffs, walking sticks, and crutches for one another as they share several design features. This proves to be a particular problem for archaeological examples of these items that are found with little to no context as to who their user might have been. Therefore, by drawing upon Snyder and Mitchell's concept of the 'cultural locations of disability' (as discussed in the introduction to this thesis) this chapter will consider how different kinds of ambulatory aids were combined with other popularly understood signifiers to become signs of social status, bodily infirmity, age, and impairment within contemporary society, as it is often the status of the person using the aid which provides the context for which category the ambulatory aid belongs to.[3] For example, when a stick-based ambulatory aid is depicted as being used by an older, able-bodied, elite man it becomes possible to argue that this item belongs

[2] For a more detailed discussion of the relationship between signifiers, the signified, and signs, please see the introduction to this thesis.
[3] Sharon L. Snyder, David T. Mitchell, *Cultural Locations of Disability* (Chicago: University of Chicago Press, 2006), p. 3.

to the category of 'staff' used for leisure perambulation (as we will discuss in the case of image 1.15). If a very similar item is depicted as being used by an amputee beggar (as depicted in image 1.26), we can assume that this aid was integral to the individual's ability to navigate their lived environment, and therefore falls into the category of 'walking stick' used as a disability aid. However, before we discuss these different kind of walking aids, their user groups, and their popular representation in any more detail, this chapter will first consider why ambulatory aids, specifically, have not received significant scholarly attention despite their prevalence within later medieval society and culture.[4]

UBIQUITOUS YET ABSENT: WHY HAVE AMBULATORY AIDS NOT BEEN CONSIDERED?

It cannot be said that ambulatory aids have been completely ignored in historical scholarship. They are so abundant within both written and visual source material that it would be almost impossible not to notice their existence and, as a result, they appear within historical scholarship all the time. For example, when discussing the *Danse Macabre des Femmes* (a French illuminated manuscript dating from c. 1491–1519), Kaia Magnusen discusses how death comes to visit a poor woman who is plagued by gout and uses crutches.[5] Similarly, whilst writing about mobility impairments in Merovingian Gaul, Christian Laes mentions that

[4] For more on the reasons why assistive technology has been overlooked as an area of enquiry more broadly, please see chapter one.
[5] Kaia L. Magnusen, '"Those Who Dance in Such a Way:" Linking Gesture and Judgement in the Danse Macabre des Femmes', in *Reflections on Medieval and Renaissance Thought*, ed. by Darci Hill (Cambridge: Cambridge Scholars Publishing, 2017), pp. 6–20 (p. 16).

'some stories point to the paralysed making use of specific instruments to make their way. These included walking sticks, crutches, or low footstools'.[6] Likewise, in his analysis of the functions of medieval misericords, James Tschen-Emmons indicates how crutches or walking sticks were used by elderly monks who 'could not stand well for long [...] to ease discomfort'.[7]

However, although these brief references recognise that ambulatory aids existed, none of them assume that the disability aids themselves might be worthy of study. Subsequently, all three of these scholars fail to consider the design, cost, or use of these walking aids in any detail. For example, whilst Magnusen discusses the woman's old age, poverty, and illness, her use of crutches is largely ignored except to label her the 'Woman on Crutches'; similarly, Laes offers no description or analysis of the walking aids he mentions, other than to state that they existed, and Tschen-Emmons does not consider how the walking aids used by elderly medieval monks might have been interpreted within contemporary religious understandings. This recognition that ambulatory aids existed, followed by a complete failure to focus on the objects themselves, is a pervasive problem within medieval scholarship and, subsequently, there has yet to be a study dedicated specifically to the discussion of medieval crutches, sticks, and trestles. I believe that there are two main reasons behind this failure to consider ambulatory aids as valuable objects of study. Firstly, there exists a belief that walking aids are transhistorical items that have remained unchanged and are

[6] Laes, pp. 197–198.
[7] James B. Tschen-Emmons, *Artefacts from Medieval Europe* (Santa Barbara: ABC-CLIO, 2015), p. 216.

therefore unworthy of study, and secondly that (more than any other kind of assistive technology discussed in this thesis) the majority of walking aids were destroyed or repurposed once they were no longer of use, leaving historians with very few surviving material examples.[8]

1. BELIEF THAT AMBULATORY AIDS ARE TRANSHISTORICAL

Although we have very briefly discussed the fact that assistive aids have frequently been considered to be transhistorical objects in the introduction to this thesis, walking aids appear to suffer from this attitude the most. As Metzler suggests,

> the notion, the grand narrative, of history – as a discipline – is about change: change of processes, change of modes of production, change of governments. Since the physically impaired, again like women, children, and the poor, have always been with us, it would seem they are by definition not subject to change, and therefore not a suitable subject for historical inquiry. The impaired have always been the disabled, too, in this view so why study them.[9]

Although Metzler is talking about the lack of attention paid to physical impairment more broadly in this passage, the same notion is very applicable to ambulatory aids.

[8] It should be noted that, although there are a range of objects that have changed very little over time and yet still remain a focus of historical research (a good example of which can be seen in the comparative collections of carpentry tools in the Pitt Rivers Museum, Oxford, which demonstrates how Roman carpentry tools are recognisably similar to modern hand-held carpentry tools), ambulatory aids have not received the same kinds of scholarly attention. As discussed in chapter one, I believe the reason for this is that ambulatory aids, such as walking sticks or Zimmer frames, are so ubiquitous within modern Western society that they have become invisible to the eye of the historian.

[9] Irina Metzler, 'Disability in the Middle Ages: Impairment at the Intersection of Historical Inquiry and Disability Studies', *History Compass*, 9:1 (2011), 45–60 (p. 46).

Of all the assistive technologies discussed in this thesis, ambulatory aids are the ones that appear to be the most physically similar to their modern counterparts. Even though modern crutches and walking sticks are usually made of more lightweight materials such as plastic and steel, rather than wood, there is only so far the basic design of a stick upon which to lean, a crutch to rest under the armpit, or a wheeled walking frame can be re-configured. As such, even though ambulatory aids have been acknowledged in medievalist scholarship, their historical significance has been frequently overlooked because scholars presume that because medieval walking aids looked and functioned very similarly to modern walking aids, they would also have been interpreted by contemporaries in the same way. However, as this chapter will demonstrate, this is not the case – different types of ambulatory aids acted as distinct signifiers within fifteenth- and sixteenth-century popular culture, each signifying specific ideas and attitudes. Consequently, by assuming later medieval walking aids to be transhistorical items, the use of these technologies as popularly understood signs has been ignored.

2. CRUTCH SPECIFIC AFTERLIVES

Just as medieval people did not attempt to preserve everyday household 'technologies' (such as plates, pins, or personal knives), they were equally content to re-use, repurpose, and ultimately dispose of wooden walking aids. Unlike the carts and barrows discussed in chapter three, ambulatory aids were not large items with multiple functions, nor were they expensive, mechanically cutting-edge items such as the prosthetic limbs discussed in chapter four, and neither did

they have the benefit of being a new, slightly novel, technology like the spectacles discussed in chapter five. As such, contemporaries did not maintain crutches and walking sticks once they were no longer of use.

There are a number of reasons why individual ambulatory aids may no longer have been needed. On the one hand they could have been damaged or literally worn out, requiring the purchase of new aids; whereas, on the other hand, the user's circumstances might have changed for either the better (i.e. they have recovered from their injuries or have received a miracle cure), or for the worse (i.e. their condition could have progressed, leaving them bedbound or requiring more advanced aids, or, in the case of elderly users, they might simply have passed away, leaving their crutches, sticks, and staffs behind). In each of these situations walking aids would have been treated much like other everyday items, and either handed down to family members who might need them, thrown away,[10] repurposed for their material components, or burned as fuel. Simone Kahlow comments on this suggesting that, *demnach sind viele Prothesen dem Toten gar nicht erst ins Grab gefolgt, sondern wurden möglicherweise dem Feuer als Brennholz übergeben oder verrotteten, sofern sie nicht im feuchten Milieu lagerten* [accordingly, many prostheses have not even followed the dead into the grave, but may have been passed to the fire as firewood or rotted if they were stored in a damp environment].[11]

[10] The only surviving example of medieval crutches that we have today were found in a cesspit belonging to St. Anne's Hospital in Magdeburg, Germany. These items will be discussed later in this chapter.

[11] Simone Kahlow, 'Prosthesen im Mittelalter – ein Überblick aus archäologischer Sicht', in *Homo debilis. Behinderte – Kranke – Versehrte in der Gesellschaft des Mittelalters*, ed. by Cordula Nolte (Korb: Didymos-Verlag, 2009), pp. 203–223 (p. 220).

Therefore, by considering ambulatory aids within the context of the Middle Ages (rather than presuming that they are unchanged, transhistorical items) and applying the socio-cultural model of disability (as discussed in the introduction to this thesis), this chapter will tackle the problems associated with studying material culture without material remains, whilst also considering the nuanced role that walking aids played as popularly understood signs and signifiers within the fifteenth and sixteenth centuries.

AMBULATORY AIDS AND THEIR USER GROUPS

Having surveyed a broad range of visual, material, and written sources, I have discovered that later medieval walking aids almost always fall into one of six categories: T-bar crutches, walking sticks, staffs, walking frames, hand-trestles, and hands-free crutches. However, up until now, no scholar has attempted to define the nuanced difference between different kinds of medieval walking aids and the people who made use of them. Instead, scholars often identify ambulatory aids as 'walking sticks', 'crutches', or 'staffs', without considering what these labels mean. Therefore, I have constructed a six-part classification of walking aids in order to prevent any confusion over the language used to describe these technologies and their user groups. By considering walking aids as distinct technologies (rather than as a single homogeneous group) this chapter draws new insights into the kinds of people who made use of these different technologies, as well as the ways in which these technologies were popularly represented.

However, it should be noted that, although medieval walking aids can be classified according to six clear categories, for the purposes of this chapter I have combined some of these groups in order to avoid unnecessary repetition. For example, I will discuss T-bar crutches and walking sticks together as they were generally constructed according to the same principles and were used by the same kinds of social groups. I will also analyse hand-trestles and hands-free crutches at the same time because, even though these are two distinct technologies, they were often used simultaneously.

1. T-BAR CRUTCHES AND WALKING STICKS

The most common type of walking aid found within medieval visual and textual sources are T-bar crutches and walking sticks. T-bar crutches were mid-height crutches with 'T' shaped tops, designed to rest under the armpits. Whilst a broad array of individuals have been depicted using them, they seem to have been largely associated with temporary needs, such as overcoming injuries or ailments. A good example of these crutches can be seen in image 1.13, which depicts a manuscript illumination from a fifteenth-century copy of the *Golden Legend*. At the left-hand side of this image, it is possible to see a man using two T-bar crutches (one under each armpit) to allow him to 'walk' without putting any weight on his left leg. Similarly, in image 1.4, we can see an elderly lady making similar use of two T-bar crutches. However, whilst these T-bar crutches are more commonly depicted as being used in pairs, they could also be used individually (as seen in image of a child using a T-bar crutch in image 1.6). Walking sticks, on

the other hand, would have only come up to their user's waist and would generally have been used individually, rather than in pairs. They could have either a 'T' shaped, curved, or pommel type head, which would have allowed their user to grip onto the top of the stick (rather than it resting under their armpit). An example of a walking stick can be seen in image 1.5, which (taken from a Netherlandish copy of Batholomaeus Anglicus's *De proprietatibus rerum* produced in 1482), demonstrates the seven ages of man (which will be discussed later in the chapter). The walking stick here is quite slender, suggesting that it was not designed with the intention of the man resting his whole weight upon it, but was instead used as a stabilising device when the man was walking.

The distinction between T-bar crutches and walking sticks is also evident in the language used to describe them. For example, in Old English, T-bar crutches were commonly referred to as *crycce*, stemming from the Old Low German *krukkja*, Old High German *chruckja*, and Old Norse *krykkja*, before the term developed into the more recognisable Middle English *cruchys* or *cruches*.[12] In the late-fourteenth and early-fifteenth centuries we also see crutches being referred to as 'potents' in English. This term has a particularly interesting etymology as it originates from the Old French *potence*, meaning 'crutch', which developed out of the medieval Latin *potentia*, meaning 'power'. This linguistic relationship between the Latin word for power and medieval vernacular term for crutch provides an insight into how contemporaries viewed these items as a

[12] Oxford English Dictionary, *Crutch* (2010) <http://0-www.oed.com.wam.leeds.ac.uk/view/Entry/45320?rskey=Cn3fyl&result=1#eid> [accessed August 2017].

method by which someone's strength is restored. By using a crutch (i.e. a potent) an individual is no longer helpless or incapable of action (or, as one would say in medieval Latin, the individual is no longer *impotens*). Examples of this usage can be seen in a broad array of literature, such as Lydgate's *Siege of Thebes*: 'he taketh a potent, and on thre feet thus he goth ageyn' or the *Romance of the Rose*, 'so old she was that she ne wente a foot but it were by potente'.[13]

Walking sticks, however, were referred to using a much broader and less precise range of vocabulary. For example, in contemporary Latin sources they are labelled as *adminiculum* [prop, pole, support, aid], *bacillum* [small stick, walking stick], *baculum* [stick, walking stick, staff], *clava* [rough wooden stick, staff], *palus* [stake, pole, unsplit wood], and *tignum* [log, stick, piece of timber].[14] As such, it is much more difficult to establish the specific design of a walking stick in written source material than it is to identify a T-bar crutch. However, despite these differences in the language used to refer to T-bar crutches and walking sticks, they appear to have been used by predominantly by the same user groups – namely the sick and the wounded, and elderly individuals.

THE SICK AND WOUNDED

During the excavations at the hospital of St. Anne (Magdeburg, Germany) in 1960, archaeologists discovered thirty-eight crutches and walking sticks dating

[13] John Lydgate, *Siege of Thebes*, ed. by Paul Kegan Trench (London: Oxford University Press for the Early English Text Society Extra Series 108, 125, 1911), p. 716; William Thynne, *The Romaunt of the Rose: A Reprint of the First Printed Edition,* ed. by Frederick J. Furnivall (New York: Johnson Reprint Corp., 1967), p. 368.
[14] The British Academy, *The Dictionary of Latin from British Sources* (Turnhout: Brepolis, 1975–2013) – searchable online at <https://logeion.uchicago.edu/lexidium> [accessed March 2016].

from between the thirteenth to sixteenth centuries. This was a unique find and, to this day, is the only known archaeological discovery of walking sticks and crutches dating from the medieval period. These sticks (a sample of which are depicted in image 1.1) were made of willow and elm and ranged in size from 86cm to 124cm.[15] However, what is most interesting about these sticks in relation to this thesis, is the fact that they were found on the grounds of a medieval hospital, at the site of the hospital cesspit – allowing us to conclude that they had been intentionally thrown away. This raises several questions. Evidently, due to the sheer number of sticks and crutches, these items were used by the people residing at the hospital. Initially, I thought that the crutches might have been brought to the hospital by sick, infirm, or wounded individuals, before being left behind once they had either recovered from (or succumbed to) their conditions. However, whilst this might be the case for some of the items, the fact that the majority of these sticks were made of the same type of wood and according to the same simple design (there were, for example, no elaborately carved or decorated items), I would argue that it is more likely that these items were purchased by the hospital for the use of their residents. As these crutches would pass through the hands of multiple people, they would inevitably wear out or weaken over time, leaving the hospital to dispose of them and buy new replacements.

Another example of a crutch being used to overcome an injury can be seen in the remains of an individual who survived a femoral amputation that were discovered in 2010 at the site of the Saint-Martin church and the adjacent Saint

[15] Kahlow, p. 128.

Gudula chapel in the village of Moorsel (East Flanders, Belgium).[16] The individual was identified as a woman aged between nineteen and twenty-four, who had undergone the amputation of her right leg (above the knee) a long time before her death – as evidenced by traces of new bone growth obscuring the 'clean cut' surface of the original amputation.[17] Although no evidence of a prosthesis was found in the woman's grave, her skeleton strongly suggests that she made excessive use of a crutch after losing her leg. Her 'right humerus (upper arm) revealed a strong robusticity in the muscle attachment site of both the *musculus deletoideus* and the *pectoralis major*', which is not mirrored in her left arm.[18] The appearance of these marks upon the skeleton provide evidence of greater muscle use in the woman's right arm (the same side of her body as the affected leg), and are consistent with stress markers most commonly associated with the excessive use of a walking aid, such as an under-arm crutch.

The use of a crutch-like walking aid is further supported by the fact that the affected leg shows signs of atrophy and cortical thinning ('which suggests disuse osteopenia, a loss of bone density caused by long-term immobilisation of the limb'), whereas the left, unaffected leg, is much more robust.[19] This subsequently suggests that the right leg did not bear weight for many years

[16] The exhumation was dated to between 1051 and 1600 but is believed by Van Cant to date from the latter end of this date range. See Marit Van Cant, 'A Scrutiny of Osteological Analyses of Medieval Populations in the Rural Low Countries in Comparison with North-Western European Case Studies, Based on the Osteological Analysis of the Skeletal Remains from Moorsel (Belgium)' (Unpublished Master's Dissertation, Free University of Brussels, 2012).
[17] Marit Van Cant, 'Surviving Amputations: A Case of a Late Medieval Femoral Amputation in the Rural Community of Moorsel (Belgium)', in *Trauma in Medieval Society*, ed. by Wendy J. Turner and Christina Lee (Leiden: Brill, 2018), pp. 180–214 (p. 191).
[18] Van Cant, 'Surviving Amputations', p. 186.
[19] Van Cant, 'Surviving Amputations', p. 189.

before the woman's death, indicating that 'either no prosthesis was employed, or that not much weight (or no weight) was put through to any artificial leg'.[20] Therefore, based on skeletal evidence, it appears that this woman probably used a crutch for many years after her amputation.

However, unfortunately neither the crutches from the church of St. Anne or the Moorsel woman's skeleton offer any evidence as to how or by whom later medieval crutches might have been created. Nevertheless, the disposable nature of the items (as evidenced by the St. Anne crutches) suggests that they must have been relatively quick, easy and cheap to produce. A rare example of the production of walking sticks and crutches for the use of the wounded can be seen in Hernán Cortés' *Second Letter from Mexico*. Written in 1519, this account provides an insight into the construction of simple walking sticks or crutches. Whilst fleeing from a battle, Cortés states that 'when I saw how each day [...] we were weakening, I ordered crutches [...] to be made for the wounded and sick, whom we had hitherto carried on the haunches and backs of horses, so that they could stand and walk'.[21] Not only does this imply that crutches could be made relatively quickly, whilst on the move, and by men who may not have been skilled in carpentry, it also suggests the success of these items as mobility aids – allowing soldiers, who previously had to be carried on the backs of horses, to stand and walk for themselves. Once again, there is no visual description of the crutches themselves, so it is impossible to know whether they took the more advanced

[20] Van Cant, 'Surviving Amputations', p. 190.
[21] Hernán Cortés, *Letters from Mexico*, ed. by A. R. Pagden (New York: Grossman Publishers, 1971), p. 141.

form of T-bar crutches or were cruder walking sticks. However, various online bloggers and stickmaking professionals demonstrate that even a seemingly advanced walking stick with a T-bar top, can be made relatively simply using only wooden dowels, carving tools and knives.[22]

THE ELDERLY

The second group of people who were commonly associated with using walking sticks are the elderly. Medieval people 'thought of the ages of man in schematic terms', breaking the human lifecycle down into approximately seven phases (although in some cases, the lifecycle is broken down into as few as three phases or, as we can see in image 1.8, as many as ten).[23] One of these phases was always old age, which was defined by its cold and wet nature caused by the loss of natural bodily heat.[24] Old age was generally divided into two categories. Isidore of Seville, for example, divides old age into 'old age', referred to as *senectus,* ranging from approximately age fifty to age seventy-seven, and 'old old age', described as *senium*, which ranges from age seventy-seven until death.[25]

---

[22] British Stick Makers' Guild, *Competition Categories* (2016) <http://thebsg.org.uk/> [accessed 8th September 2017]; Brian Matte, *Carve a Staff/Walking Stick* (2009) <http://www.instructables.com/id/Whittle-a-Staff--Walking-Stick/> [accessed September 2017]; Ruth Tott, *How to Make a Walking Stick* (2015) <https://homefarmer.co.uk/how-to-make-a-walking-stick/> [accessed 8th September 2017].

[23] J. A. Burrow, *The Ages of Man: A Study in Medieval Writing and Thought* (New York: Clarendon Press, 1986), p. 2.

[24] In a four-stage lifecycle older people (i.e. *senectus*) were categorised as cold and dry (being linked to black bile and earth), whereas very elderly people (i.e. *senium*) were categorised as cold and wet (being linked to phlegm and water). Although there are inherent contradictions in some of this theory, it was generally accepted that as an individual's natural heat diminished, they retained more of their natural moisture, becoming colder and wetter as they aged. As such, 'the old person is primarily cold and dry, but secondarily he is cold and moist'. Shulamith Shahar, *Growing Old in the Middle Ages: 'Winter Clothes Us in Shadow and Pain'* (London: Routledge, 1996), p. 38.

[25] Daniel Schäfer, *Old Age and Disease in Early Modern Medicine* (London: Pickering & Chatto, 2011), p. 14.

Similarly, in his *Convivio*, Dante divides old age into *senettute*, ranging from age forty-five to age seventy, and *senio*, ranging from age seventy until death.[26] Consequently as one entered old age (and began to lose their humoural heat and bodily strength), they were more likely to suffer from mobility impairments and, as such, within the popular 'ages of man' trope, elderly people were almost always depicted as requiring some form of walking stick or crutch.

A good visual example of this can be seen in a fourteenth-century illumination of the 'Wheel of Ten Ages' (see image 1.8) found in the *De Lisle Hours* (produced 1310–c. 1320). Although this image is slightly unusual in that it divides the lifecycle into ten phases, rather than the more common seven, it has particularly clear depictions of what Isidore called *senectus* and *senium*. Located in the roundel in the top right-hand corner of the image, it is possible to see an elderly man, signified by the use of a stick, surrounded by the Latin inscription *sumo michi baculum: morti fere notus* [I take up my stick: having almost reached death]. Beneath him, there is an older man, this time more hunched over and juxtaposed with the figure of a child, bearing the inscription *decrepitati deditus mors erit michi esse* [having been handed over to decrepitude, death will be with me]. However, it is the use of the crutch within these images which concern this chapter.

The image of the older man holding a tall stick in the senex roundel might be considered as representative of the medieval visual trope that characterised

[26] Dante Alighieri, *Convivio: A Critical Edition in English*, trans. by Andrew Frisardi (Cambridge: Cambridge University Press, 2017), 4.23. For further examples of the division of old age, see Shulamith Shahar, 'Who Were Old in the Middle Ages?', *Social History of Medicine*, 6 (1993), 313–41.

old age through its connection with limited mobility and the consequent requirement of a walking aid. However, although grasping the stick, the upright stature of the man does not seem to be indicate bodily impairment (unlike the image beneath, which depicts a grey bearded man hunched over a much shorter stick). This raises the question as to whether the pictorial motif of the stick or staff is always indicative of bodily impairment. It is likely that medieval audiences could have seen the representation of a crutch as a single signpost within a wider body of symbols. Combined with other factors – such as the first man's assertive stance and beardless face, or the second man's hunched posture and beard – the viewer could (and still can) infer what role the stick or crutch is playing in relation to the individual using it.

Ultimately, although medieval audiences would have been able to infer meaning from these images and the walking aids depicted, this would not have been solely drawn from the specificities of the crutches shown. Individuals would not simply have looked at the walking aids in isolation. For example, they would have been able to tell an image of a pilgrim (which we will discuss later in this chapter) from an elderly person through a combination of associated factors. Pilgrims, for example, were often depicted as wearing wide brimmed hats, adorned with a scallop shell (associated with St. James and the shrine of Santiago de Compostela). Elderly men, on the other hand, were not usually depicted with these icons, but would instead have large beards, long robes, and often, but not always, a hunched posture.

Consequently, by drawing connections between walking aids and a series of other established visual tropes, it would have been possible for a medieval viewer to distinguish between sticks used as disability aids, staffs of office, or general walking aids. In this sense, a person's use of a walking aid becomes an important part of their visual identity – marking them out as a specific kind of person (be that an elderly person, a pilgrim, a beggar, or a sick person) within a network of differences. As such, medieval ambulatory aids adhere closely to Max More's definition of 'transhumanism' as an extension or enhancement of the body used in the construction of one's identity.[27]

A second, and more controversial, example of an elderly person using a walking aid can be seen in the case of St. Godric of Finchale (1065–1170), a medieval hermit and popular saint (although he was never formally canonised). In his old age, St. Godric was said to have used a *baculo tripes* in order to help him move into and out of his Oratory.[28] Metzler convincingly argues that this contraption appears to be more 'sophisticated [...] than an ordinary set of crutches' – as the addition of *tripes* as an adjective suggests that the walking aid used by Godric somehow differed from ordinary walking sticks. However, Metzler's translation of the *vitae* and the consequent conclusions she draws, seem to deviate from the original Latin. Translating *baculo tripes* as 'triple stick', Metzler concludes that Godric's aid must have been similar to a device depicted

[27] Max More, 'Transhumanism: Towards a Futurist Philosophy', *Extropy*, 6:1 (1990), 6–12 (p. 6).
[28] Original Latin reads: *Adeo quidem seniles ejus artus aetatis prolixae multitude detriverat, quod ipse solus etiam pedes, vel sustentante baculo tripes, de mansiuncula Oratorii sui egredi vel ingredi non volebat*, in J. Stevenson (ed.), *Libellus de Vita et Miraculis S. Godrici, Heremitae de Finchale, auctore Reginaldo Monacho Dunelmensi* (Durham: Surtees Society, 1845), pp. 186–87.

'in illuminated manuscripts [...] used by infants as a baby-walker' – which seems highly unlikely before the linguistics of this account are even considered (as will be discussed below).[29] *Tripes* (constructed from the Latin *tria* [three] and *pes* [foot]) translates as three-footed, making *baculo tripes* a three-footed stick, rather than a 'triple stick' as Metzler initially indicates. Therefore, it seems more plausible that Godric's walking aid was a more simple device than Mezler's more sophisticated scaled-up baby-walker, looking less like a modern Zimmer-frame, and more like a tripod walking stick (as depicted in image 1.7).

2. STAFFS

The second ambulatory aid which will be discussed in this chapter is the 'staff'. Linguistically emerging from the Old English *stæf*, Old Frisian *stef*, and Middle High German *stap*, the Middle English *stafe* came to almost exclusively represent a tall stick which was, approximately, the same height as its user. The designs for these staffs could vary in decoration (with some being very simple wooden sticks, whilst others were carved or painted). For example, the staff presented in image 1.9 is more elaborately carved – featuring a rounded pommel-style top, as well as a second rounded carving further down the staff; whereas the staff depicted in the sixth rondel of the *De Lisle Hours'* 'Wheel of Ten Ages' (seen in image 1.8 and discussed above), is little more than a wooden stick, with no aesthetic concessions having been made.

[29] Irina Metzler, *Disability in Medieval Europe: Thinking about Physical Impairment in the High Middle Ages, c. 1100–1400* (Abingdon: Routledge, 2006), p. 174.

Nevertheless, despite these differences in decoration, medieval staffs shared two fundamental features. Firstly, they were created out of wood (making them both lightweight and durable) and secondly, the foot of a staff was usually capped with a metal pin called a stabdorne. This was intended to protect the wooden base of the staff from rotting or splintering, whilst also providing a small amount of extra grip as the staff was pushed against the ground.[30] A surviving example of a stabdorne still attached to a wooden staff, can be seen in the Worcester pilgrim's staff (photographed in image 1.12). As we can see from the photograph, this stabdorne is double pronged, allowing it to function very similarly to the spiked points found on the end of twenty-first-century trekking and skiing poles.

Also like trekking and skiing poles, later medieval staffs functioned within the material world by providing support to people who were walking long distances and/or over difficult terrain. They provided their users with support to the knees when walking down hill, encouraged an upright posture to aid breathing, helped the user to maintain balance on uneven ground, and acted as a makeshift weapon for fending off potential bears, wolves, or stubborn brambles. However, despite this, they would not have given the user the same level of support as a pair of crutches (which an individual could use with a single, or raised leg), or a shorter stick, which one could exert a downwards pressure on, whilst holding the 'handle' at waist height. Therefore, it appears that staffs were

[30] Cathrin Hähn, 'Mobility Limitations and Assistive Aids in the Merovingian Burial Record', in *New Approaches to Disease, Disability and Medicine in Medieval Europe*, ed. by Erin Connelly and Stefanie Künzel (Oxford: Archaeopress Publishing Ltd., 2018), pp. 31–42 (p. 38).

largely used as walking aids by able-bodied travellers – which is perhaps why they are most frequently depicted as being used by pilgrims.

PILGRIMS

Along with a broad brimmed hat (which often bore a scallop shell as a sign of one's pilgrimage to Compostela) and a satchel (which contained the traveller's necessities), a staff was an integral part of a pilgrim's attire.[31] This staff had both symbolic functions (as it would likely have been blessed at a local church before an individual set off on pilgrimage and identified its user as a pilgrim), as well as practical functions.[32] For example, in order to demonstrate one's spiritual humility, it was common for a pilgrim to travel on foot. As such, their staff could be used as a walking aid, intended to ease the difficulties of traversing long stretches of rough, rural terrain. An example of this can be seen in image 1.9. In this image, an able-bodied pilgrim uses her staff to clear away the undergrowth blocking her pathway. We can see that, although the way in front of her remains blocked by grass, trees, and dirt, the path along which she has come has been well cleared. Consequently, we can assume that her staff has been an effective tool in assisting the woman on her pilgrimage (even though she is not physically impaired). However, despite the fact that the majority of individuals depicted as using pilgrim's staffs are able-bodied, one of the main motivations for pilgrimage was to seek a cure for an illness. As such, it is not impossible that a pilgrim travelling with a staff might also have been using it to overcome an impairment.

---

[31] Diana Webb, *Medieval European Pilgrimage, c. 700–c. 1500* (Basingstoke: Palgrave, 2002), p. 154.
[32] Diana Webb, *Pilgrims and Pilgrimage in the Medieval West* (London: I. B. Tauris, 2001), p. 149.

An extremely rare example of a complete surviving fifteenth-century pilgrim's staff was discovered at Worchester Cathedral in 1986, approximately 90cm below the modern floor level.[33] Located in what would have been the aisle outside the choir, against the wall, the stick was accompanied by a very well-preserved skeleton of an elderly man, who still had fragmentary skin and fabric on his bones and was wearing knee high leather boots. Unfortunately, the skull (and any possibly evidence of a pilgrim's hat or badges) had been lost due to the construction of a pipe trench at the turn of the twentieth century.[34] The staff itself, which measures 155cm in length and 3cm in diameter, was made from a large piece of ash cut 'on a radial axis' and dyed with an expensive, dark purple kermes dye. At the top of the staff there was a cockleshell, pierced with a hole, and at the bottom there was a 6cm long, double pronged, wrought iron spike.[35] Initially each of these elements appears unsurprising; however, when analysed together and in greater detail, this burial reveals a great deal about medieval attitudes towards the visual culture of pilgrimage and, in particular, the pilgrim's staff.

Firstly, skeletal analysis suggests that the man was probably over sixty years old when he died, and suffered from advanced arthritis, which caused 'joints to fuse together in parts of the spine, coccyx and sternum'.[36] This condition would likely have led to significant levels of bodily impairment

---

[33] James A. Spriggs, 'The Worcester Pilgrim Project', in *Conservation Today*, ed. by Victoria Todd (Hertford: UCIK, 1998), p. 112 (p. 112).
[34] Christopher Daniell, *Death and Burial in Medieval England, 1066–1550* (London: Routledge, 1997), p. 167.
[35] Helen Lubin, *Worcester Cathedral Publications 1: The Worcester Pilgrim* (Worcester: West Mercian Archaeological Consultants, 1990), p. 14.
[36] Lubin, pp. 9–10.

including the development of a hunched back, the inability to turn his torso, and difficulty breathing. This degeneration meant that he would have struggled to have walked long distances in advanced age and therefore he was unlikely to have been an active pilgrim at the time of death. Furthermore, his body appears to have been dressed in pilgrim's attire after death, as his knee-high pilgrim's boots have been split down the back to make it easier for an individual to dress his deceased body (as boots sliced down the back like this would have been impossible, or at least deeply impractical, to wear in life as they would have offered no support or protection).[37] The soles of these boots demonstrate very little sign of wear, suggesting that they were purchased specifically for the man to be buried in. His staff is also in excellent condition. The stabdorne, as depicted in image 1.12, is still very sharp and the purple dye is still detectable upon the staff itself – as such, I would argue that, like the man's boots, this too was buried unused. Why then would this man have been buried with such new and expensive items if he were not at active pilgrim at the time of his death?

I believe that the reasons behind the Worcester pilgrim burial stem from the use of the pilgrim's staff as a popularly understood signifier of piety, as well as transhumanist notions of how one's sense of self can be extended beyond the corporeal body. Regardless of whether the man had been on pilgrimage himself, the pilgrim's staff was a popularly recognised signifier of piety, humility, and devotion. Therefore, if the man (or his family) wanted to convey that his personal beliefs, actions, or identity aligned with these ideals, they could do so by burying

[37] Daniell, p. 167.

him dressed in a way that would evoke these signifiers in contemporary viewers. A very similar example to this can be seen in the case of Hans von Mittlehausen (a medieval knight who was buried with his mechanised prosthesis in order to preserve his conception of masculinity and identity in death), although this will be discussed in greater detail in chapter four.

3. WALKING FRAMES

Moving away from the stick-based walking aids we have discussed so far, this chapter will now consider walking frames and their largely infant user-group. As it is possible to see from images 1.15–1.17, there were two main designs for walking frames. The first of these (as depicted in image 1.15), is formed from a three-dimensional trapezoid or cube shaped frame made from wood, with four small wheels – each of which is attached to one of the bottom four corners of the frame. The frame has open side panels (likely intended to reduce the overall weight of the device) but, as far as one can tell from visual depictions, there was no way of opening and closing the structure so that the user could step inside themselves. Instead, it appears that the only way to use the walking frame would have been to crawl through one of the side panels, or to be lifted in from above. However, despite the difficulties associated with getting into the device, it appears to have been designed with its specific user's height in mind, as the top square of the frame comes up to the user's waist, so that it can be comfortably pushed without having to stretch upwards or lean downwards.

The second design for walking frames was based on a triangular, rather than cubic, frame shape. As a result, the user could not stand inside the frame,

but would instead push it from behind. On the one hand, this meant that there was less of a 'safety net' to catch the user if they stumbled or fell, but, on the other hand, it offered greater opportunity for independence as the user did not have to crawl or ask to be lifted in and out of the device. Depending on the structure of the frame, this device featured either four small wheels (as seen in image 1.16), or three small wheels (as depicted in image 1.17), all of which were located on the base of the device. Much like the first design, it appears that these triangular walking frames were designed according to their user's height, so that they could be comfortably pushed from the waist.[38]

It should be noted that, although these walking frames have wheels, I have chosen to include them here (rather than the following chapter which focusses on wheeled technology) as they more closely align with the definition of an ambulatory aid as a device which allows its user to propel themselves forwards in a bipedal motion (as outlined above), rather than as a wheeled transportation device in which an individual sits and is pulled or pushed by assistants or animals. Nevertheless, some of chapter three's discussion about how a wheeled device might operate in the medieval urban environment is also relevant here. For example, walking frames (much like Philip II's upright wheelchair) would have struggled to function outdoors. Their small wheels required a smooth, flat floor for the device to be pushed along without getting caught on the bumps and

[38] The perspective at play in image 1.15 makes it quite difficult to tell if the walking frame is being pushed from the waist (as it appears towards the front of the image) or from the shoulder (as it appears towards the back of the image). However, as all of the other representations of walking frames depict them being as tall as the user's waist, I believe that the potentially unusual height of the frame in image 1.15 is a result of the unusual perspective of the image.

dips found on a pressed dirt or cobbled street. It is unsurprising then, that images 1.15, 1.16, and 1.17 all demonstrate the walking frames as being used on an indoor, tiled floor as, outside of this setting, they would have been unwieldy and largely useless. However, I will say no more on the operation of wheeled technology here, as this is discussed in full in chapter three.

CHILDREN

Throughout the Middle Ages, the walking frame is most commonly depicted as being used by children who are learning how to walk. In this sense, these walking frames cannot be considered 'disability' aids (as the inability of an infant to walk was considered to be a part of 'ordinary' human growth, rather than as a bodily impairment); however, they still belong firmly within the category of later medieval ambulatory aids. Although we have no surviving examples of these devices, they appear frequently within two popular visual tropes – that of the Ages of Man, and in representations of the Holy Family.

An example of this can be seen in image 1.5, in which a child (representing the second 'age' of the lifecycle) is depicted as using a walking frame. This image repeats the motif of the 'stick' throughout the several ages of life – demonstrating a sense of both change and consistency throughout the lifecycle. For example, the infant child is walking across the front of the image with their walking frame, the slightly older child is running in from the left hand side of the image riding a hobby horse (constructed of a wooden stick attached to a carved horse's head), the adolescent, in the back right of the image, displays a sword sheathed at his side, which (although a weapon) still closely resembles the shape and concept of

the other sticks in the image, and finally, the elderly man, seated on a raised platform at the back of the scene, hold a large staff across his lap. Another image in which sticks, weapons, and children's toys are intended to mirror each other across the lifecycle can be seen in image 1.5 (which also depicts the seven ages of man). Here, we can see how the young child is playing with a stick and a ball, the adolescent is holding a tall spear, and the elderly man is leaning upon a walking stick.

Both images 1.5 and 1.15 were created for and depict wealthy individuals. As such, Shulamith Shahar has suggested that this appearance of walking frames in high-status imagery 'indicates that [walking frames] were only used in prosperous families'.[39] Whilst Shahar's argument makes sense in reference to the majority of images of baby-walkers, it does not translate to images of the Holy Family in which either the young Christ child or young Virgin Mary is presented as using a baby-walker. For example, in image 1.6 (taken from the *Hours of Catherine of Cleves*, produced c. 1440), we can see baby Jesus learning how to walk whilst Mary sits weaving at a loom and Joseph sands down a piece of wood. In this illumination, the Holy Family, although respectably dressed, were clearly not as high status as the individuals depicted in images 1.5 and 1.15. Consequently, following Shahar's argument, I believe that this baby-walker has been included in the illumination of the Holy Family due to its iconographical significance (rather than the 'reality' of a lower-status family owning such a device). By representing Jesus as using a baby-walker, he is humanised and made relatable to the elite

[39] Shulamith Shahar, *Childhood in the Middle Ages* (New York: Routledge, 1992), p. 92.

audience who would have read the *Hours of Catherine of Cleves* and recognised the image of a child in a baby-walker as something familiar to them.

However, it should be noted that, although there are many visual representations of infants using these frames to learn how to walk, the same kind of technology does not appear to have been employed as a disability aid for older children who had already learned to walk before developing mobility impairments. If children acquired impairments after having learned to walk, they would have been expected to use the same ambulatory aids as adults. An example of this can be seen in the miracle collection of Pope Urban V (1310–1370), who performed posthumous healings in the late-fourteenth and early-fifteenth centuries. Here, we see an example of a seven year old child who (prior to receiving a miracle cure) had been described by his father as *nullo modo posset ambulari, nec cum baculis nec sine baculis* [unable to walk, either with crutches or without them].[40] This sentence insinuates that the child had, at some point, attempted to use crutches – only to learn that he was unable to use them.

Similarly, these kinds of walking frames do not appear to have been used by adults. This is, at first, a little surprising, as the structure of medieval walking frames so closely mirrors the kinds of Zimmer frames and 'walkers' that are associated with elderly people today. As can be seen in images 1.19 and 1.20, modern day walkers are visually very similar to medieval walking frames. Although made of steel and plastic, rather than wood, they are constructed

[40] Translation taken from Jenni Kuuliala, *Childhood Disability and Social Interaction in the Middle Ages: Constructions of Impairments in Thirteenth- and Fourteenth-Century Canonization Processes* (Turnhout: Brepols, 2016), p. 48. For the original Latin see Anon, *Actes anciens et documents concernant le Bienheureux Urbain V papae*, ed. by Joseph Hyyacinthe Albanès and Ulysses Chevalier (Paris: Picard, 1897), pp. 301–302.

according to the same cubic or triangular designs and have either three or four wheels upon which they can be pushed. However, there are two key differences between these modern walking frames, aimed for use by elderly individuals, and medieval baby-walkers.

The first key difference is that these medieval cubic walking frames appear to have been sealed units that a child would have to either crawl into (through a gap in the frame) or be lifted into by an adult. Whilst it is possible that an elderly person might have clambered into one of these frames, it is very unlikely (especially if we are to assume that they are using the frame as a result of mobility impairments). In fact, the absurdity of an adult using one of these frames is highlighted by Hieronymus Bosch in a detail from his *Triptych of the Temptation of St. Anthony*, produced in the Netherlands c. 1501 (see image 1.19). In this detail, Bosch depicts the user of the walking frame as being an adult, humanoid figure who has no arms (which would make it significantly difficult to use this aid as it required its user to push it along with their hands). The fact that the creature using the frame has no hands (rendering the walker useless) leads me to believe that Bosch also intended the age of the creature to be significant – suggesting that only in a topsy-turvy interpretation of the world might an adult be seen using a closed-framed baby-walker.

Nevertheless, that is not to say that some adults and elderly individuals did not use a scaled-up version of the more open, triangular-shaped walking frames (as depicted in image 1.17), as these did not require a person to either climb or be lifted into the frame. We can see an example of this in image 1.18,

found in the margins of the *Hours of François de Guise*. Much like the baby walker depicted in image 1.17, the 'Zimmer frame' in image 1.18 features three small wooden wheels secured to a waist height triangular frame; although, unlike 1.17, this image depicts an elderly woman (rather than a child) using the device.

However, whilst children were more likely to use their frames inside to learn how to walk short distances on a smooth indoor surface, elderly people would have had more cause to travel outside and over longer distances (walking, for example, from their house to the marketplace). This subsequently results in the second key difference between these medieval devices and the modern tri-wheel walker depicted in image 1.20 – that, unlike some modern Zimmer frames that are fitted with breaks and some degree of suspension to tackle outdoor environments, these medieval walkers would have proved relatively useless in the life of someone who needed support across a broader range of terrains. Therefore, whilst it would not have been impossible for elderly individuals to make use of these devices, I do not believe that these scaled-up baby walkers would have been a popular mobility aid amongst adults – unless they were amongst a minority of people spending a significant amount of time moving around open, smooth-floored, indoor spaces.

Why then, if it would have been unlikely (or in the least uncommon) for adults to make use of these devices, do we find visual examples which seem to suggest the opposite? I believe that in these cases, the walking frame is used as a visual metaphor for childlike behaviour. For instance, image 1.19 (which is taken from a c. 1390 German tapestry composed of twenty-four medallions depicting scenes of courtly love) shows a young man using a triangular-shaped walking

frame to approach a young woman. The young man is not, as far as we can tell, physically impaired. Instead, as Metzler points out, the man has been 'struck down by lovesickness and therefore rendered 'like an infant''.[41] The inclusion of the walking frame here is not intended to be representative of reality, but is instead included to highlight how the man's romantic feelings have reduced him to child-like behaviour. The walking frame depicted in image 1.18 fulfils a similar function. Although this image is less satirical, the fact that the elderly woman is using a walking frame references the contemporary belief that old age was a 'second childhood', in which frailty and helplessness robbed an individual of their independence. As Shakespeare poetically states in *As You Like It* (written c. 1599), the final phase of life 'is second childishness and mere oblivion; [/] sans teeth, sans eyes, sans taste, sans everything'.[42] As such, the walking frame in image 1.18 highlights the woman's advanced age, and may have brought to mind the notion of old age as a second childhood for contemporary viewers.[43]

4. HAND-TRESTLES AND HANDS-FREE CRUTCHES

The last, and arguably most problematic, category of ambulatory aids consists of small, four-legged stool-like hand-trestles which were often coupled with either a 'hands free crutch' or lower leg 'sheath' to keep the impaired limb off the ground. These hand-trestles are the 'odd ones out' within this typology of walking aids, because, quite simply, they do not help their user to walk. Instead they assist in

[41] Metzler, *Disability in Medieval Europe,* p. 174.
[42] Shakespeare, William, *The Oxford Shakespeare: As You Like It*, ed. by Alan Brissenden (Oxford: Oxford University Press, 2008), 7.163–166.
[43] I would like to thank my viva examiner, Irina Metzler, for drawing these images of adults using walking frames to my attention.

dragging the body along the ground, and are most often depicted as being used by beggars. This raises the question as to whether these aids ought to be included within a discussion of ambulatory aids or if they should be considered along the lines of prostheses. It could even be argued that they are a hybrid, transitional form of mobility aid, that does not fit any particular definition, and is subsequently deserving of a category of its own. However, as their primary function enables their user to obtain a sense of forward propulsion (as discussed in the introduction to this chapter) and they are frequently depicted in use with walking sticks and T-bar crutches, they will be treated as ambulatory aids and dealt with here.

BEGGARS

Due to the vast numbers of medieval people living in poverty, it is likely that the sight of beggars was a common one within the urban environment. However, due to their reduced, liminal status, there is no surviving evidence created by beggars themselves. The economically poor had very little in the way of material goods, and would likely have traded what they did have, handing belongings down for secondary (and perhaps tertiary) use.[44] Consequently, to access the daily lives and lived experiences of the poor, this chapter must rely on the images, literary sources and legal codes generated by wealthier, able-bodied individuals. This disparity between the authors of source material causes difficulties in the late Middle Ages, as it is during this period that representations of beggars become

[44] Austin, p. 21.

increasingly politicised. Frustratingly, Tom Nichols suggests that it is not until the sixteenth century that beggars 'became an established artistic subject', which anyone who has so much as looked at earlier material will be able to see is blatantly untrue.[45] However, although beggars have been depicted in the visual arts for hundreds of years, their function begins to change during the late Middle Ages, with the inclusion of beggars in artwork becoming less of an unbiased observation, and more of a commentary on the differences between different kinds of poor people

The urban centres of the late Middle Ages contained large numbers of impoverished individuals, which were generally categorised into two groups – the 'worthy' poor (i.e. those who were deserving of charity) and the 'unworthy' poor (i.e. those who were undeserving of receiving charity).[46] The worthy poor included orphans, widows, sick people, and members of the elite who had fallen from their estate. The unworthy poor were those associated with being workshy and idle, who were perfectly capable of achieving employment, but chose to spend their time begging and receiving alms instead.[47] Writing in the twelfth century, Huguccio (d. 1210) added a third category of 'those who endured poverty for their love of God', which enabled Dominican and Franciscan Friars who had undertaken voluntary poverty for Christ's sake to be included in this discussion.[48]

---

[45] Tom Nichols, *The Art of Poverty: Irony and Ideal in Sixteenth-Century Beggar Imagery* (Manchester: Manchester University Press, 2007), p. xvii.
[46] Gerhard Jaritz, 'Poverty Constructions and Material Culture', in *The Sign Language of Poverty: International Round Table-Discussion Krems an Der Donau October 10 and 11, 2006*, ed. by Gerhard Jaritz (Vienna: Austrian Academy of Sciences Press, 2007), pp. 7–18 (p. 5).
[47] Jaritz, p. 8.
[48] Bonnie L. Pattison, *Poverty in the Theology of John Calvin* (Eugene, OR: Pickwick Publications, 2006), p. 48.

These categorisations of impoverished individuals subsequently provided a guide for wealthier individuals who sought to give alms to the poor as to who was deserving of their aid. As Pattison explains, the worthy poor acted as 'a means of sanctification', by allowing elite individuals to demonstrate their Christian values through the provision of charity. For example, 'the rich were to give to the poor, and the poor were to humbly receive their gifts and pray for the souls of the rich. In this relationship the giver displayed the Christian virtue of charity, whilst the receiver displayed the virtue of humility'.[49]

For the purposes of this thesis, the most relevant group of impoverished people in the Middle Ages are the sick poor (including individuals with visible bodily impairments). As a result of limited income, lack of access to healthcare, and poor diet, the economically disadvantaged were more likely to succumb to conditions (i.e. disease, sickness, sores, and broken bones) that 'reduced those suffering from them to a state of permanent physical disability'.[50] As a result, it was not uncommon for poverty to lead to bodily impairment in the later Middle Ages. However, this relationship between poverty and impairment could also operate in reverse (i.e. bodily impairment leading to poverty) as, for many manual labourers and craftsmen, a physical impairment could inhibit their ability to work, leading to a loss of income. This, in turn, could lead to an inability to

[49] Pattison, pp. 48-49.
[50] Michel Mollat, *The Poor in the Middle Ages*, trans. by Arthur Goldhammer (New Haven: Yale University Press, 1986), pp. 4–12; Ephraim Shoham-Steiner, 'Poverty and Disability: A Medieval Jewish Perspective', in *The Sign Language of Poverty: International Round Table-Discussion Krems an Der Donau October 10 and 11, 2006*, ed. by Gerhard Jaritz (Vienna: Austrian Academy of Sciences Press, 2007), pp. 75–94 (p. 77); David Austin, 'The Presence of Poverty: Archaeologies of Difference and Their Meaning', in *The Sign Language of Poverty: International Round Table-Discussion Krems an Der Donau October 10 and 11, 2006*, ed. by Gerhard Jaritz (Vienna: Austrian Academy of Sciences Press, 2007), pp. 19–42 (pp. 21, 36).

afford medical care or an adequate diet, which may result in further health complications.[51] Due to this inextricable link between poverty and sickness/impairment, it became common for visual representations of the worthy poor to include lower-status ambulatory aids as a signifier of their bodily infirmity and the legitimacy of their need for charitable assistance. It is in these visual examples that we most frequently see hand-trestles and hands-free crutches being depicted.

A good example of hand-trestles, leg sheathes, and hands-free crutches being used as signifiers of a genuine need for assistance can be found in the visual trope associated with St. Martin and the Beggar. Born in Pannonia in the fourth century, St. Martin dedicated his life to the service of God, despite being forced into a military career at the age of fifteen.[52] Even as a solider, he showed his good nature by 'aiding those who were in trouble, by giving help to the wretched, by supporting the needy, [and] by clothing the naked, while reserving nothing for himself from his military pay except what was necessary for his daily sustenance.'[53] However, the part of St. Martin's life that is most frequently depicted in visual representations of the saint is the story concerning the division of his cloak. According to St. Martin's hagiographers, on one particularly cold day, the saint came across a beggar at the gates of Amiens, France. Although he had nothing but his military clothes and weapons, Martin was keen to assist the man where other people had not, and so sliced his cape in half with his sword -

[51] Mollat, pp. 4–12.
[52] Sulpicius Severus, 'Life of St. Martin of Tours', in *Medieval Saints: A Reader*, ed. by Mary-Ann Stouck (Peterborough, Ont.: Broadview Press, 1999), pp. 139-141 (p. 139).
[53] Severus, p. 139.

giving one part to the beggar and keeping the other part for himself.[54] The following night, Christ revealed himself to Martin in a dream, explaining that it had been he who was disguised as the beggar. He thanked Martin for his charity and told him that he should 'recognise [the Lord's] robe as his own.'[55]

An example of the 'cape-splitting scene' can be seen in image 1.22 in which we can see a beggar using a four-footed hand trestle in his left hand, whilst he reaches out to receive half of St. Martin's cape with the other. His left foot appears to have been amputated and, as a result, he wears a wooden sheath on his left shin. This would have kept his wounded limb from dragging along in the dirt behind him. Similarly, in image 1.23, we see the beggar using a slightly more robust 'hands-free crutch'. This aid supports the man's impaired limb by holding the leg at a ninety-degree angle in a wooden 'trough' that has two fabric straps to secure the leg into place. The fact that these items are being used by Christ (disguised as a beggar) demonstrates not only the importance of practicing the Christian value of charity, but also the perceived relationship between impoverished individuals and bodily impairment. There is no mention of the beggar being disabled or requiring assistive technology in St. Martin's hagiography and yet medieval artists chose to depict the beggar in this way in order to demonstrate his need and subsequent 'worthiness'. This suggests that, by the time these images were produced, the relationship between begging, impairment, and the use of hand-trestles and hands-free crutches was well established within the popular mindset.

[54] Severus, p. 141.
[55] Severus, p. 141.

However, as well as offering an insight into contemporary attitudes towards poverty, charity, and disability, these images of St. Martin and the Beggar also reveal a great deal about the construction and use of hand-trestles and hands-free crutches. The aids depicted in these images are typical of non-mechanised prostheses in three ways. Firstly, they are used to support a lower limb and do not require the full amputation of the limb in order to function (although in the case of the beggar in image 1.23 the foot has been amputated); secondly, they are much simpler than mechanised limbs (such as those discussed in chapter four) and do not appear to include any aesthetic considerations; and finally, they are made predominantly of wood and linen, which would have been much more affordable and lightweight than alternative materials but, as the introduction to this thesis demonstrates, would not have survived archaeologically. Slightly taller examples of these hands-free crutches also appear in Hieronymus Bosch's *Beggars and Cripples* (produced c. 1520–c. 1540) depicted in image 1.24. Unlike the crutches depicted in the representations of St. Martin and the beggar, these devices would have allowed their user to stand more upright.

Unfortunately, despite these visual depictions of St. Martin and the Beggar depicting a positive relationship between impairment and poverty, the notion that disability constituted a 'worthy' beggar, led to a fear of unworthy beggars faking bodily impairment to receive alms. Therefore, as we progress into the sixteenth century, disabled beggars began to be associated with trickery and cunning. An example of this can be seen in Martin Luther's *Book of Vagabonds*

(or *Liber Vagatorum*) in which Luther warns his readers against begging *klenkners* [cripples]. He explains that 'there are beggars who sit at the church-doors [...] gathering with sore and broken legs; one has no foot, another no shank, a third no hand or arm'.[56] Initially one might assume that this level of impairment and destitution rendered these beggars worthy of charity; however, Luther goes on to state that 'every third word one of them speaks is a lie, and the people who give alms to him are cheated'.[57] He describes these 'crippled' beggars as fakes, suggesting that 'many a one ties a leg up or besmears an arm with salves, or walks on crutches, and all the while as little ails him as other men'. He even recalls a rumour of a beggar who cut the leg off a thief hung at the gallows before 'he put the dead leg on and tied his own leg up', in an attempt to fake impairment and receive charity.[58] As a result of these fears (whether founded or not) impaired beggars became an increasingly popular symbol of trickery and deceit.

***

Overall, this chapter has demonstrated that, although their structure and appearance have remained relatively consistent over time (sometimes changing only in terms of the material from which they are constructed) ambulatory aids should not be considered transhistorical items unworthy of study. As we have seen, different kinds of walking aids carried different connotations within the medieval mindset. For example, crutches, sticks and walking frames were most

[56] Martin Luther, *The Book of Vagabonds and Beggars*, trans. by John Camden Hotten (London: John Camden Hotten, 1860), p. 13.
[57] Luther, p. 13.
[58] Luther, p. 13–14.

commonly associated with individuals in need of care (such as the elderly, wounded, or sick people, or children learning to walk), whereas lower-status aids, such as hand trestles, became associated with poverty, and the need for charitable assistance. By considering the popularly understood signifiers associated with different kinds of ambulatory aids, we are better able to construct medieval attitudes towards bodily impairment, status, and the lifecycle – a theme which we will continue to investigate through an analysis of wheeled mobility aids in the following chapter.

Chapter Three

CHAIRS, CARTS AND BARROWS: WHEELED TECHNOLOGY

As the introduction to this thesis has outlined, perhaps the best-known representation of impairment in twenty-first-century society is the wheelchair. This, as we have seen, is largely due to its use as the International Symbol of Access (ISA), depicted in image 2.1. However, the popularity of this symbol is also due to contemporary stereotypes of 'dis/abled' individuals as dependent, restricted, or incapable and the view that impairment must be something visible and 'limiting'. This conception of disability consequently aligns very closely with the sign of a wheelchair, whose signifiers have signified notions of confinement or helplessness (as outlined in figure 2).[1] Of course, this is an 'able-bodied' representation of wheelchair use, and (on the whole) not how many people who use wheelchairs would seek to portray themselves. As such, there have been several movements seeking to adapt the ISA in order to challenge these contemporary stereotypes and present wheelchair users as active, independent people who are not overshadowed by their use of assistive technology.

One of the most successful examples of these movements can be seen in the Accessible Icon Project – a guerrilla design movement that is campaigning to change the design of the ISA to a new pictogram which, whilst still depicting an individual using a wheelchair, is not static. Instead, the person is depicted in the act of propelling their wheelchair forwards (as seen in image 2.2). In this way, the

[1] The signifiers and signified associated with the ISA are discussed in greater detail in the introduction to this thesis.

Accessible Icon Project's proposed pictogram intends to re-shape public perceptions of disabled people as dynamic and autonomous, rather than reliant on others and restricted by their impairment.[2] Similarly, in 2019 the Toy Like Me campaign sought to 'separate disability from tired hospital, baddie, and geek associations and instead create a new more celebratory and fun aesthetic by giving fairies, guide dogs, and wizards wheelchairs'. It had reason to celebrate when their efforts to increase representations of impairment in children's toys were rewarded with Mattel's release of two 'Barbie Fashionista' dolls using wheelchairs and ramps.[3]

Consequently, one would assume that these current debates over the representation of wheelchair users (coupled with the prevalence of the wheelchair as a sign within contemporary visual and popular culture) would have encouraged scholars to investigate the historical origins of the wheelchair – and yet, this does not seem to be the case. Research into the history of the wheelchair is, in fact, very limited and aside from Herman L. Kamenetz's 'A Brief History of the Wheelchair' (published in 1969) there have yet to be any other articles or monographs relating specifically to the changing developments, functions, or representations of the wheelchair as an assistive aid in the Middle Ages.[4] There are some broader surveys of disability and assistive technology that address the development of the wheelchair as a part of a wider narrative; however, these

[2] For more on the work of the Accessible Icon Project, see Sara Hendren, *An Icon is a Verb: About the Project* (2016) <http://accessibleicon.org/#an-icon-is-a-verb> [accessed November 2019].
[3] A Toy Like Me, *Our Story* (2019) <https://www.toylikeme.org/about-us/our-story/> [accessed November 2019].
[4] Herman L. Kamenetz, 'A Brief History of the Wheelchair', *Journal of the History of Medicine and Allied Sciences*, 24:2 (1969), 205–210.

works usually subscribe to the 'dark ages' myth (discussed in chapter one) by glossing over the majority of the Middle Ages in favour of seventeenth- and eighteenth-century developments. For example, in her investigation into the history of the chair, Anne Massey suggests that 'chairs designed for invalids date back much earlier [than the twentieth century]', making a very brief reference to Philip II of Spain's gout chair (which dates from c. 1595 and will be discussed at greater length below), before moving on to talk about later innovations in the development of wheelchairs – namely the emergence of John Dawson's 'Bath Chair' in c. 1783.[5] Very similarly, in her *Designing Disability*, Elizabeth Guffey cites Philip II of Spain's chair as the earliest known example of a wheelchair (though her investigation of this object is much more thorough and convincing than that of Massey), before jumping straight to the seventeenth-century development of the 'Merlin Chair' and then on to a discussion of Dawson's Bath Chair.[6]

Whilst one can understand why the seventeenth and eighteenth centuries provide such a draw for those scholars investigating a potted history of assistive technology (as there is a much wider and more easily accessible range of evidence for the development and use of wheeled chairs in this period), it still seems unusual that scholars have not yet made a concerted effort to consider the use of similar devices in the fifteenth and sixteenth centuries. Perhaps the only person to have attempted any discussion of medieval wheelchairs is Irina Metzler in her

[5] Anne Massey, *Chair* (London: Reaktion Books, 2011), p. 135.
[6] Elizabeth Guffey, *Designing Disability: Symbols, Space and Society* (London: Bloomsbury, 2018), p. 135.

article, 'Have Crutch, Will Travel'.[7] This article, which, as seen above, outlines the different methods of travel used by disabled people in the Middle Ages, devotes several pages to vehicular transportation. Here, Metzler draws predominantly on evidence found in miracle narratives in order to discuss the use of carts and carriages, wheelbarrows, and wheeled chairs by orthopaedically impaired individuals. However, even when paying particular attention to the Middle Ages and evaluating a range of source material (unlike the aforementioned scholars who unwittingly perpetuated the dark ages myth), Metzler is still forced to conclude that 'wheelchairs as we know them were not in evidence until the [late] sixteenth century'.[8]

What, then, does the absence of the wheelchair from historical investigations into disability, impairment, and assistive technology tell us? Should we take this dearth of evidence to suggest that wheelchairs did not exist in the Middle Ages? Or have historians simply failed to find evidence for the use wheelchairs? By drawing upon a range of interdisciplinary source material, this chapter will contribute to the limited conversation surrounding the history of the wheelchair by asking whether such an assistive aid did indeed exist? If so, who used it, and how was it used? And, if not, were any other wheeled technologies employed in its place? Using Saussure's concept of the 'Signifier + Signified = Sign', this chapter will also analyse several visual representations of wheeled mobility aids so that we can better understand how these devices functioned

[7] Irina Metzler, 'Have Crutch, Will Travel: Disabled People on the Move in Medieval Europe', in *Travels and Mobilities in the Middle Ages: From the Atlantic to the Black Sea*, ed. by Marianne O'Doherty and Felicitas Schmeider (Turnhout: Brepols, 2015), pp. 91–117.
[8] Metzler, 'Have Crutch, Will Travel', p. 104.

within popular culture (much like the ISA does today) and assess what this might reveal about contemporary attitudes towards ageing and gender.[9]

WHY WERE THERE SO FEW WHEELCHAIRS?

As Irina Metzler suggests, the ability to construct an upright wheelchair was not 'beyond the technical means of the later thirteenth century' (or, in the case of this thesis, the fifteenth and sixteenth centuries).[10] Although medieval craftspeople would not have had access to the same lightweight materials that are used in the creation of twenty-first-century wheelchairs (such as plastic and aluminium), it would have been possible (albeit more cumbersome) to create a similar structure out of wood, iron, and cloth. As we have already seen in chapter two, medieval people were perfectly capable of making wheeled walking frames (used by infants learning how to walk). It is not, therefore, so great a leap to imagine frames similar to these being re-scaled and fitted with both a seat and a backrest, in order to create a perfectly functional assistant-controlled wheeled-chair. However, despite there being the materials, techniques, and practical skills necessary for the construction of upright wheelchairs, they remain conspicuously absent from the source material. In fact, despite extensive research, I have only managed to find one clear example of an upright wheelchair from the very end of our period – Philip II of Spain's (1527–1598) gout chair. Although this chair belonged to a Spanish king, I have included it in this thesis as it was designed by

[9] It should be noted that, due to its northern European focus, this thesis will not consider the wicker wheelchairs depicted in fifteenth-century Italian Thebaid paintings (e.g. in Fra Angelico's c.1420 *Thebaid*, currently located in the Uffizi Gallery, Florence, Inv. 1890 no. 447).
[10] Metzler, 'Have Crutch, Will Travel', pp. 101–107.

Jehan Lhermite (1560–1622). Lhermite was a respected humanist who was raised and educated in Antwerp, and only arrived in Spain in 1587 (after which time he became a tutor to the young Philip III at the court of King Philip II).[11] As such, although this chair had a Spanish owner and was used in Spanish palaces, I feel as though it can be considered within the Northern European focus of this thesis due to the Belgian origin and education of its designer.

As we can see in image 2.3 (which details the original design for the chair taken from Lhermite's sketchbook), this chair contains many design features specifically included to ease the discomfort associated with Philip II's gout. For example, it includes an adjustable footrest, hinged arms, and a moveable backrest (padded with horsehair) which could be set in various positions – from upright to reclining – as a result of a mechanical ratchet system.[12] However, perhaps most importantly for this chapter is the fact that each leg of the chair was fitted with a wheel, enabling the chair (and its occupant) to be easily moved. Due to the location of these wheels (at the end of the chair legs) and their small size, it is possible to conclude that, whilst sitting in this chair, Philip would not have been able to manoeuvre himself. As such, he would have been forced to rely on a series of attendants to push the chair for him.

As Sapey, Stewart, and Donaldson suggest, an attendant controlled wheelchair, such as that used by Philip II, 'not only conveys an image of

[11] Although he was known for being highly educated and observant, there is nothing to suggest that Lhermite was involved in the physical construction of this chair. It is more likely that his plans were realised by a craftsman. This relationship between a learned designer and artisan with more practical skills is a theme we will see throughout this thesis – especially in the construction of mechanised prostheses (discussed in chapter four).
[12] Guffey, p. 24.

dependency, but it creates it due to a design which makes it impossible for the wheelchair user to propel him/herself'.[13] For lower status individuals, this kind of reliance on other people would not only have been restrictive, but would also have been considered deeply emasculating.[14] As we will see below, being transported in a wheeled device demonstrated a reliant and delicate nature and therefore came to be associated with femininity. Subsequently, the active alternatives of walking or riding were considered to be more appropriate for men. However, these negative connotations associated with the masculine use of wheeled transportation devices do not seem to have applied to Philip II. As a king, Philip's ability to employ individuals specifically for the purpose of pushing him around is likely to have been seen as a display of his wealth and power (rather than a demonstration of his limitations), although, it should be noted that individuals outside of Philip's court are unlikely to have seen him using the chair.

Despite Philip's chair providing a fascinating example of an early wheelchair, there appears to be no other evidence (be that documentary, literary, visual, or material) for the construction or use of upright wheelchairs in the later Middle Ages. However, the very fact that we have designs for Philip II's chair demonstrates that these aids could be (and on very limited occasions, were) made. Why then, did chairs such as that used by Philip II not exist earlier and on a larger scale?

[13] Bob Sapey, John Stewart and Glenis Donaldson, 'Increases in Wheelchair Use and Perceptions of Disablement', in *Disability and Technology: Key Papers from Disability and Society*, ed. by Alan Roulstone, Alison Sheldon and Jennifer Harris (London: Routledge, 2015), pp. 97–113 (p. 104).
[14] The gendered implications of using wheeled technology will be discussed in much greater detail below.

1. URBAN ENVIRONMENT

Perhaps the main reason behind the absence of upright wheelchairs in the Middle Ages is because they would not have been able to function effectively within the contemporary urban environment. The success of wheelchairs in the twenty-first century is largely reliant on the inclusion of accessible architecture and design features within both public and private spaces. In fact, the issues of mobility and independent access are key debates within disability politics, and there is a growing awareness that 'disabled people, in their everyday lives, are having to confront hostile built environments'.[15] As a result, urban planners are increasingly made to think about how they might make built environments more accessible – whether through the installation of ramps, the placement of cash-machines at a wheelchair-friendly height, inclusion of functional and size-appropriate changing rooms and bathrooms in public places, and the diversification of public transport (to name but a few things).

This consideration of individuals who use assistive technology within urban planning or landscaping practices is commonly referred to as 'disability-scaping', and is very closely associated with the social model of disability in the sense that 'impairments' need not become 'disabilities' if we work to design a more materially inclusive society. Consequently, as a result of this more active examination of the ways in which individuals who use assistive technologies might operate within specific built environments (resulting in the removal of physical barriers to movement), the wheelchair is able to function successfully

[15] Rob Imrie, *Disability and the City: International Perspectives* (London: Paul Chapman Publishing, 1996), p. 1.

within contemporary urban environments. Accessible streets, the removal of staircases, size-appropriate elevators, and automatic doors all reduce the restrictions placed on wheelchair uses, allowing for greater independence and the prevalence of the wheelchair as a mobility aid.[16]

However, during the fifteenth and sixteenth centuries many of these accessible features (and the means to create these accessible features, such as the invention of electricity or the kind of infrared technology employed in motion sensors) did not exist and, as a result, it would have been much more difficult to operate an upright wheelchair. For example, in most urban spaces, streets would have been made of either pressed dirt, gravel, or, in rarer urban cases, cobbles.[17] All three of these materials would have made it difficult to use a wheelchair, such as that owned by Philip II, as the four small wheels would have either become stuck in-between stones in a cobbled pathway or, due to the pressure on the wheels caused by the weight of the heavy wooden chair frame (as well as the person sitting on it), the wheels would very likely have sunk into a dirt floor, rendering the chair immobile. The only reason Philip II's wheelchair was able to function successfully is because he resided in the royal palace of El Escorial. It is possible to see from contemporary floorplans of this palace that Philip II's royal lodgings would have had a number of wide, open areas and smooth, tiled floors that would have made it possible for his wheelchair to be pushed around.[18] As

[16] For more on this see United Nations Economic and Social Commission for Western Asia, *Accessibility for the Disabled – A Design Manual for a Barrier Free Environment* (2015) <http://www.un.org/esa/socdev/enable/designm/index.html> [accessed December 2015].
[17] Paul B. Newman, *Travel and Trade in the Middle Ages* (Jefferson: McFarland & Company, Inc., 2011), pp. 44–45.
[18] El Escorial Online, *Architecture* (2016) <https://el-escorial.com/el-escorial-architecture/> [accessed 12th June 2016].

Guffey points out, El Escorial was one of 'the only places to provide flat and polished floors ample enough to allow dragging the behemoth through rooms'.[19]

Unfortunately, most people living and working in a later medieval urban environment did not have access to the kind of smooth floors and open plan architecture found in Phillip II's Spanish palace, and were instead confronted with uneven floors, narrow streets, and staircases.[20] Consequently, even though upright wheelchairs were not beyond the technological means of the fifteenth and sixteenth centuries, the urban environment was (on the whole) ill-suited to their needs. As a result, they were far less ubiquitous than we might have first assumed.

2. COST AND MATERIALS

A second reason for the absence of upright wheelchairs in the later Middle Ages is the expense of such an item. In a society where disability aids often took the form of adapted or repurposed everyday objects (as this chapter will demonstrate), the luxury of being able to purchase and use a custom-made wheelchair would only have been available to the wealthy. If we are to look at Philip II's chair as an example, we can see that a range of materials are required for its construction. Whilst the frame of the chair could have been produced relatively cheaply out of wood, the expertise needed to design and construct the mechanisms used to raise and lower both the backrest and footrest would have significantly increased the cost of the chair. Similarly, the addition of horsehair

[19] Guffey, p. 24.
[20] Metzler, 'Have Crutch, Will Travel', p. 105.

padding in the seat and backrest (despite making the chair more comfortable to use for extended periods of time) would have also made the chair more expensive to produce. Finally, although it is difficult to tell from Lhermite's drawings what materials the four wheels might have been made from, we can presume that it was either iron or wood – both of which would have been expensive for different reasons. Iron wheels would have been better wearing and would have allowed the chair to travel more smoothly across flat surfaces, but they would have made a much louder rattling noise when in use, and would have been initially more expensive to produce. Wooden wheels, on the other hand, would have been much quieter, but would have worn down much more quickly than their iron counterparts, requiring replacement over time and resulting in recurring maintenance costs for the chair.[21]

However, it is not just the cost of the materials, expertise, and artisanal labour that would have rendered upright wheelchairs an expensive, luxury item, but also the conditions required for them to be operated successfully. As we have seen in the case of Philip II, upright wheelchairs could not be self-propelled.[22] Therefore, any individual hoping to use an assistive aid such as this would not only have to pay for the expensive construction of the item, but would also have to employ a member of staff (or multiple members of staff) to push the device

[21] As we have seen in chapter two, walking frames (used by infants) had wooden, rather than iron wheels. This could be because they were not used as frequently or for as extended a period of time as upright wheelchairs, but it could also have been for the sake of their parents who did not want to hear iron wheels clattering on a tiled floor!

[22] As the introduction to this thesis briefly explained, we do not see any evidence of self-propelled wheelchairs until 1655, when Stephen Farffler (1633–1689) invented a 'manumotive carriage' – which has since been accepted as the earliest example of a self-propelled wheelchair (see image 2.4).

around. Although manpower costs were lower in the Middle Ages than they are today, this would still have been considered a luxury expense. If we are to follow Jusserand's calculations, in the fourteenth century, it would have cost approximately six shillings a year to employ an unskilled 'boy' servant (and this does not cover the costs of feeding, housing and clothing the servant).[23] At the same time, an average labourer would have earnt a maximum of two pounds (or forty shillings) a year.[24] Therefore, the ability to 'run' a wheeled-chair (in terms of employing an assistant to push it) would have cost approximately fifteen percent of an average labourer's annual wage – an amount that, for most, would have been deemed completely unaffordable and, as such, it would only have been significantly wealthy individuals who would have been able to afford this kind of expense.

Consequently, even though upright wheelchairs could be commissioned and constructed and individuals could be hired for the purpose of pushing them around, the high cost of these two factors (coupled with the fact that wheelchairs would have been deeply impractical for use within the medieval urban environment) is likely to have prevented all but the most wealthy from considering wheelchairs to be a useful (or viable) assistive aid in the later Middle Ages. Nevertheless, just because wheelchairs that resemble the upright structures that we might recognise today do not appear to have existed in any meaningful sense, does not mean that medieval people did not make use of other wheeled

[23] J. J. Jusserand, *English Wayfaring Life in the Fourteenth Century*, trans. by Lucy Smith (New York: Putnam's Sons, 1931), pp. 116–117.
[24] Christopher Dyer, *Standards of Living in the Later Middle Ages* (Cambridge: Cambridge University Press, 1989), p. 29.

aids in their place. The rest of this chapter will therefore consider medieval alternatives to wheelchairs, asking how other wheeled technologies were adapted for the use of individuals with impairments.

ALTERNATIVES TO WHEELCHAIRS

In the fifteenth and sixteenth centuries, the majority of wheeled disability aids were made of pre-existing devices that had been either repurposed or adapted for the needs of an impaired individual – as Metzler suggests, mobility of the disabled 'relied on improvisation, making the most of already existing transportation methods [...] and adapting them for the specific needs of the impaired'.[25] However, as we have discussed, these redesigned everyday objects are often absent from the archaeological record as they 'would possibly not be preserved when made of wood, or not recognised in their function [as disability aids] when found'.[26] As such, the second part of this chapter will rely largely on visual source material that depicts everyday technologies (namely carts, carriages, and wheelbarrows) being used for the transportation of the impaired, injured, or infirm.

1. CARTS AND CARRIAGES

There are several different types of carts and carriages used in the Middle Ages – each associated with a different function or user group. Before I begin a

[25] Metzler, 'Have Crutch, Will Travel', p. 107.
[26] Cathrin Hähn, 'Mobility Limitations and Assistive Aids in the Merovingian Burial Record', in *New Approaches to Disease, Disability and Medicine in Medieval Europe*, ed. by Erin Connelly and Stefanie Künzel (Oxford: Archaeopress Publishing Ltd., 2018), pp. 31–42 (p. 33).

discussion of medieval carts and carriages it is important to distinguish between the different kinds and the contemporary language used to define them. Firstly, within medieval Latin documents, there is a distinction drawn between two-wheeled carts (referred to as *biga*, *cisium*, or *caretta*), and four-wheeled wagons (referred to as *carrus* or *plaustrum*). This distinction also exists in Middle English in which *char* or *chare* are used to refer to a two-wheeled cart, before the word *wain* is adopted in the sixteenth century to refer to a four-wheeled wagon (that is usually, although not always, drawn by a horse). Contemporary French and German terminology is a little more indiscriminate, with *chariot* and *charrette* being used interchangeably in French, and *kobelwagon* being used to refer to both carts and wagons in German.[27] Unlike the vernacular languages, medieval Latin also uses different words to describe those carts or wagons used for the transport of people as opposed to the transport of goods. For example, whilst *caretta* might be used to refer to a two-wheeled cart carrying goods such as building materials or organic produce, *currus* would be used to refer to a very similar two-wheeled cart that was instead used for the transportation of people.[28]

As medieval contemporaries distinguished between two-wheeled vehicles and four-wheeled vehicles, this chapter will also do the same for the sake of clarity. I will therefore be referring to two-wheeled vehicles as carts (following the Latin *caretta*) and four (or more) wheeled vehicles as carriages (following the Latin *carrus*). Let us begin, then, by looking at a typical example of each of these

[27] Stuart Piggott, *Wagon, Chariot and Carriage: Symbol and Status in the History of Transport* (London: Thames and Hudson, 1992), p. 139, 149.
[28] Julian Munby, 'From Carriage to Coach: What Happened?', in *The Art, Science, and Technology of Medieval Travel*, ed. by Robert Odell Bork and Andrea Kann (Aldershot: Ashgate, 2008), pp. 41–54 (p. 43).

devices in order to assess how they might have been used for the transportation of disabled individuals.

THE MEDIEVAL CARRIAGE

As Munby points out, the medieval carriage was 'essentially a timber construction with key elements of iron'.[29] It moved on four wheels (made either of wood, iron, or a combination of the two) that were held together by a timber undercarriage. Carriages usually had a roof, often made of cloth, which was supported by a series of hoops and rails within the carriage. In order to allow fluid movement of the carriage, including the ability to turn around corners, most carriages also supported two 'arms' (often referred to as 'hounds') which were 'clasped by the front axle and bolster and formed a triangle with the slider bar resting under the perch [long wooden poles which connected the front and back axles], which moved sideways as the vehicle turned'.[30] Finally, carriages often aimed to reduce any jolting and vibration through the inclusion of 'suspension by metal chains or leather straps from the four lower corners of the box body'.[31] A good example of this kind of structure is represented in image 2.5. The way in which the fabric over the roof of the carriage has been depicted fluttering backwards (presumably so the viewer can see the noble woman riding in the carriage more clearly) also allows us a view of the way in which the carriage has been constructed. For example, we can see how the roof of the carriage was designed to hold up a cover, how the undercarriage connects to the two 'hounds' (which in turn are strapped

[29] Munby, p. 42.
[30] Munby, p. 43.
[31] Piggott, p. 150.

to one of the horses pulling the carriage), and finally we can see the four large spoked wheels and the timber undercarriage to which they are connected.

However, although this image offers an excellent insight into the construction of a medieval carriage, it should be noted that it is actually a lot more simple in decoration than other more elaborate carriages of the period – the wooden framework is largely exposed, there appears to be little in the carriage which might ease the rider's comfort (such as a bench, cushions, or soft furnishings), and it is only designed to (comfortably) fit one person. This is starkly contrasted with the earliest surviving example of a medieval carriage, seen in image 2.6. Currently located at the Veste Coburg, Germany, this carriage is believed to have been purchased by Princess Dorothea of Denmark (1546–1617) for her marriage in 1561 to Duke William the Younger of Brunswick-Lüneburg (1535–1592).[32] It is especially elaborate in design – boasting finely carved wooden panels, heraldic decorations, and a four poster canopy (topped with a rounded roof to mirror popular carriage designs of the time). However, aside from these aesthetic considerations, the carriage itself is constructed very similarly to that of image 2.5 – it has four wheels, attached to a rectangular timber frame, from which two 'hounds' protrude for the purposes of drawing and steering the carriage. A final (non-structural) element that each of these carriages share is that they were both used by elite women.

As Stuart Piggott suggests, the use of medieval carriages carried highly gendered connotations as these devices were seen to be most 'appropriate for the

[32] Munby, p. 52.

conveyance of ladies', whereas knights and noble men were expected to ride upon horses.[33] Although we have a lot of evidence for women riding horses in the context of hunting or leisure activities, there existed a distinction between riding for hobbies and riding as a method of travel. As such, horses were not considered an appropriate method of transport for women undertaking long journeys. I believe that there are two main reasons behind these gendered elements of travel by carriage. Firstly, medieval women (especially noble women) were believed to be emotionally and physically more delicate than men – as Joan Cadden explains,

> ...the notion that women are soft and smooth and weak had to do with the inability of their bodies to produce semen and at the same time with a more general incapacity, with the sense that women do lead and should lead a more sedentary life, and with the idea that women lack the vehemence which men possess.[34]

This attitude is mirrored by Christine de Pizan (1364–1430), a poet and author at the court of King Charles VI of France. She states that, although women have 'freer and sharper minds' than their male counterparts, they also have 'have more delicate bodies than men, [which are] weaker and less able'.[35] Consequently, whilst it would have been expected that noble women ought to travel in as 'much comfort as could be gained on the road', as this was befitting their physical needs, it would have been deeply emasculating for a healthy noble man to travel in a carriage (or, as we will see later in this chapter, in a cart or a wheelbarrow) as this

[33] Piggott, p. 123.
[34] Joan Cadden, *Meanings of Sex Difference in the Middle Ages: Medicine, Science, and Culture* (Cambridge: Cambridge University Press, 1993), p. 172.
[35] Christine de Pizan, *The Book of the City of Ladies*, trans. by Earl Jeffrey Richards (New York: Persea Books, 1982), p. 63.

would have demonstrated a sense of delicacy or fragility associated with feminine behaviour.[36]

Secondly, I would argue that travelling by carriage was so popular amongst elite women because it was a convenient way to display one's wealth and status. A highly decorated carriage was one of the most expensive and ostentatious way to travel in the Middle Ages. Not only would the carriage itself have been extremely expensive to produce, but the owner of such a mobility aid would also have to employ a driver, as well as purchasing and maintaining one or more horses to pull the carriage. On top of these 'basic' requirements for construction, one could increase the opulence of their carriage even further by decorating it with elegantly carved woodwork (as seen in the case of Princess Dorothea's carriage, discussed above), expensive fabrics, and elaborate paintwork. An example of his can be seen at the coronation of Richard III of England in 1483, in which Queen Anne's ladies rode in three carriages 'the first covered with crimson cloth of gold, the second with velvet crimson, the third with crimson damask'.[37]

THE MEDIEVAL CART

The medieval cart, on the other hand, was a much lower-status method of transportation. They were smaller in size, had only two wheels, and could be pulled by oxen – meaning that lower-status individuals did not have to invest in a horse for the specific purpose of pulling a cart. That said, carts had no means of suspension, and therefore would have been much bumpier and more

[36] Piggott, p. 142.
[37] Anne F. Sutton, P. W. Hammond (eds.), *The Coronation of Richard III: The Extant Documents* (New York: St. Martin's Press, 1983), pp. 214–215.

uncomfortable to drive.[38] Interestingly though, unlike carriages (which were clearly designed for people to ride in) it is very uncommon to see an example of a person riding *in* a cart. Whilst it appears to have been perfectly acceptable to 'drive' a cart laden with hay bales, barrels, timber, etc., to ride in a cart as a passenger appears to have been a popularly understood sign of sinful or criminal behaviour.

An example of this can be seen in Chrétien de Troyes's (1130–1191) *Lancelot, le Chevalier de la Charrette*, written at the French court of Champagne c. 1182. As one might assume from the poem's title, Lancelot's willingness to undermine his own reputation and masculinity to rescue Guinevere by riding in a cart, is a central theme of the story – offering us an insight into contemporary attitudes towards the use of carts as a mobility aid. The poem explains that, whilst on a May Day ride with ten knights, Guinevere is kidnapped by Sir Melliagaunce and taken back to his castle. She sends a note to Lancelot asking him to help her, and he sets off on horseback to find her. However, a short way into his journey, Lancelot's horse is killed by Melliagaunce's archers, leaving the knight with no form of transportation on which he can travel to Guinevere's aid. The relationship between a knight and his steed was a very important, symbiotic relationship – so much so, that the knight and his horse might be considered a human-animal cyborg assemblage according to Haraway's definition of the cyborg body. Therefore, by losing his horse, Lancelot is represented as having lost an element of his knightly, masculine identity. With no horse to ride on, Lancelot

[38] Jeffrey R. Wigelsworth, *Science and Technology in Medieval European Life* (London: Greenwood Press, 2006), pp. 45–46.

is forced to take up the offer of a passing dwarf, who allows Lancelot to ride along with him in the back of his cart (as depicted in image 2.7).[39] However, due to the reputation of carts as devices used to transport criminals, Lancelot 'Followed along behind [/] For several steps, not climbing [/] Right up', for fear that travelling by cart might damage his knightly reputation.[40] Nevertheless, after his brief hesitation, Lancelot's love for Guinevere convinces him to put aside his 'sense of shame' and he quickly jumps into the cart.[41]

This poem reveals a great deal about medieval attitudes towards riding in carts; however, as I have discussed in relation to images, it is important to recognise that literary examples such as this are embedded in a much broader cultural context and do not provide an uncomplicated window onto the past. For example, as Furtado and Veloso explain, *The Knight of the Cart* 'is far from being a straightforward knightly adventure'.[42] Instead, 'Chrétien seems to have used diverse sources to compose his plot', drawing upon the ancient Greek tradition of the 'tests of the hero'.[43] Nevertheless, as we can see from lines 332–339, being driven around in a cart was associated with criminality and infamy, and was intended to shame and humiliate (similarly, as the poem says, to being placed in a pillory – line 322).

---

[39] Visual representations of this scene (such as that in image 2.7) are one of the few places in which we see medieval depictions of dwarfs. Unfortunately, there is no time to discuss this further in this thesis, although I would encourage future scholars to consider depictions of dwarfism in later medieval visual culture.
[40] Chrétien de Troyes, *Lancelot: The Knight of the Cart*, trans. by Burton Raffel (New Haven: Yale University Press, 1997), pp. 11–13 (ll. 361-363).
[41] Chrétien de Troyes, *Lancelot: The Knight of the Cart*, l. 375.
[42] Antonio L. Furtado, Paulo A. S. Veloso, 'Folklore and Myth in "The Knight of the Cart"', *Arthuriana*, 6:2 (1996), 28–43 (p. 28).
[43] Furtado, Veloso, p. 28, 32.

Examples of this relationship between shame, criminality, and the cart can also be seen in visual source material. For example, image 2.9 (taken from *The Smithfield Decretals* – a fourteenth-century manuscript that is famous for its marginal illustrations that were believed to have been produced in London c. 1340) depicts a white dog who is bound at the wrists and being transported to his place of execution in a cart pulled by rabbits. This image brings together the popular trope of the 'world upside down' (i.e. the rabbits hunting the dog, rather than vice versa) with the trope that depicts riding in a cart as something negative and shameful. This same visual trope is applied to Lancelot in image 2.8, which shows a fragment of a Flemish copy of *Guiron le Courtois* (a French Arthurian romance), dating from c. 1500. This image shows Lancelot being treated very much like a criminal. He has been stripped of his armour (which further damages his knightly identity), and his hands are bound together and tied to his lap. Whilst none of these measures are mentioned in the poem, their inclusion within visual material further emphasises Lancelot's loss of status. As Duggan explains, by riding in the cart, Lancelot sacrifices his honour and 'gives himself over entirely into the service of the lady whom he loves, to the detriment of knightly ideals and reputation'.[44] Despite having already lost his horse, he decides that the potential loss of status associated with riding in a carriage is a price he was willing to pay to save Guinevere.[45]

---

[44] Joseph J. Duggan, 'Afterword', in Chrétien de Troyes, *Lancelot: The Knight of the Cart*, trans. by Burton Raffel (New Haven: Yale University Press, 1997), pp. 255–239 (p. 228).

[45] Interestingly, later in the poem, Lancelot attempts to kill himself by jumping out of a window. He is pulled back by Gawain who asks why he would commit 'such folly' (line 573). Guinevere responds by stating that, now that he has ridden in the cart, 'death would be better than life / for all life holds is shame' (lines 580–581). Lancelot's desire for death over a loss of his knightly status is very similar to Götz von Berlichingen's plea for death after he loses an arm in battle and feels

I believe this association between being transported in a cart and criminal, or sinful, behaviour is also mirrored in the popular late medieval visual trope of devils or demons pushing souls to hell in a wheelbarrow. Examples of this trope can be seen in images 2.9 (which shows a composite demon pushing a flaming barrow-load full of naked people across the page) and 2.10 (which depicts two demons, one of whom is playing the bagpipes, as they push and pull three men in a barrow).[46] Although both of these images, and the visual trope more broadly, depicts a wheelbarrow (rather than a two-wheeled cart), I believe that this is most likely a result of the common confusion amongst contemporary authors about the language used to describe wheelbarrows and carts. As we have already seen, there were multiple different terms used for different sorts of wagons, carriages, and carts and it was not uncommon for some aspects of this vocabulary to overlap with that used to describe wheelbarrows (which we will discuss in relation to Agricola's *De Re Metallica* below). As such, it was not uncommon for wheelbarrows and carts to get mixed up linguistically, which I believe (in the case of carts used for the transportation of criminals and barrows used for the transportation of sinful souls) also extended to visual culture.

USING CARTS AND CARRIAGES TO ASSIST THE IMPAIRED

On the whole, carts and carriages were less popular in the transportation of the infirm and impaired than one might imagine. Carriages, as we have seen, would

that he can no longer fulfil the duties of a knight. The case study of Götz von Berlichingen and his construction of elite masculinity will be discussed in greater detail in chapter four.

[46] Note that, in image 2.12, the demon pushing the barrow is sporting a very clear example of the hands-free crutches discussed in chapter two.

have been much too expensive and ceremonial to be used in the transportation of disabled or infirm individuals. Although carts appear somewhat more frequently, their lack of suspension, coupled with the 'poorly constructed and poorly maintained' state of urban roads, would have resulted in an especially uncomfortable journey.[47] However, despite there being some use of carriages to transport disabled people, in later medieval visual culture it is still possible to see the act of riding in a carriage (even if the passenger is impaired) being mocked – suggesting that, even if one was injured or disabled, carts were still considered a stigmatised form of transport.

An example of this can be seen in image 2.12, taken from Laurent de Premierfait's (c. 1370–1418) fifteenth-century translation of Boccaccio's (1313–1375) *De Casibus Virorum Illustribus* (retitled *Des Cas des nobles hommes et femmes*). This illustration depicts the dying Darius III (c. 380–330 BCE) laid out in a four-wheeled carriage pulled by two horses. Darius was the last king of the Achaemenid Empire of Persia before it was seized by Alexander the Great c. 330 BCE. According to one Alexandrian legend, as Alexander was closing in on Darius, he was wounded by one of his own men, Bessus, and left to die. Shortly after he was found by Alexander's men, either dead or dying (depending upon one's translation), in a wagon.[48] Although the wagon features in Alexandrian legend, the fact that the fifteenth-century illuminator of image 2.12 decided to interpret this 'wagon' as a four-wheeled, bedded carriage allowed this image to carry more significance than just a death scene. By representing Darius as dying

[47] Newman, p. 43.
[48] Pierre Briant, *Darius in the Shadow of Alexander*, trans. by Jane Marie Todd (Cambridge, MA: Harvard University Press, 2015), p. 395.

in this carriage, dressed in lavish blue and gold robes, the manuscript illumination draws upon the visual signifiers typically associated with feminine transport (i.e. travelling by carriage, reclining, in expensive clothes – as we have seen in image 2.5). These signifiers would have been popularly understood by a medieval viewer, who would have been able to interpret them as signifying that Darius (like a noble lady) was weak and effeminate. This is in keeping with contemporary retellings of Alexandrian legend, which present Darius as a lazy and decadent antithesis of medieval knightly ideals.

A similar example of an impaired person being mocked for their use of a cart can be seen in image 2.13, illuminated as a part of the Alexander manuscript (MS Bodley 264) by Jehan de Grise in 1344.[49] This image shows a man riding, reclining in an open carriage that is pulled by a horse. In isolation, he does not necessarily appear to be impaired or subject to mockery. However, if we are to read the scene from left to right, we can see that he is being drawn towards three amputees fighting with their T-bar crutches and hand trestles. These fighting men are included as a source of physical humour because, as a result of their impairments, they are unable to fight effectively and are reduced to crawling or hopping around whilst they hit each other with sticks. The man in the carriage is raising his left hand, as though in greeting, as he approaches the fight, which I

[49] Although this manuscript dates from a little before the chronological remit of this thesis, I would justify my use of it for two reasons. Firstly, it is recorded as having been bought by an English man named Lord Rivers, the brother-in-law of King Edward IV of England, in 1466, demonstrating that it was still in circulation during our period; and secondly, I agree with Lilian Randall that it presents 'a veritable Summa of the iconographic repertory evolved during the preceding half-century' and therefore offers a broad and valuable insight into the origins of visual tropes which maintained or grew in popularity throughout the fifteenth and sixteenth centuries. See Lilian M. C. Randall, *Images in the Margins of the Gothic Manuscript* (Berkeley: University of California Press, 1966), pp. 14–15.

believe signifies that he is both impaired and intending to join the other men. Therefore, although the man in the cart is not presented as a figure of fun in and of himself, his relationship with the amputees further across the page, coupled with the iconographical significance of carts, leads me to believe that this man is both impaired and subject to mockery as a result of his chosen disability aid.

***

Overall, although carts and carriages were occasionally used to transport impaired individuals over long distances in search of a miracle cure, their use as disability aids within urban centres is very limited. I believe there are three main reasons for this. Firstly, both carts and carriages were expensive, bulky items. Although carts would have been more accessible to lower-status individuals than a carriage, they would still have required a horse or oxen to draw them (and these animals would have to be housed or tethered once an individual reached their destination). Secondly, travel would have been uncomfortable. Both carts and carriages were at least partially open to the elements and, although carriages had some form of suspension, carts did not. This, coupled with the fact that roads would have been made or dirt, gravel, or cobbles, would have made travel by cart unpleasant – especially if the passenger was already in pain. Finally, the use of carts and carriages carried very specific cultural signifiers in the later Middle Ages. Carts could be associated with criminality, whilst carriages might be deemed effeminate – which might have dissuaded certain members of the community from using them and risking a subsequent effect on their reputation.

As a result, wheelbarrows emerged as a popular alternative to carts and carriages – as they were affordable, less bulky, and easier to manoeuvre (and store) within an urban environment. Consequently, the last section of this chapter will now turn to a discussion of wheelbarrows, who used them, and how they operated as a signifier within medieval visual culture.

2. WHEELBARROWS

Although scholars have traced the origins of the wheelbarrow back to China in the first century BCE, the earliest evidence of their existence in northern Europe comes from the building accounts of Henry III of England (which list the purchase of eight wheelbarrows from Canterbury to be used in building works at Dover).[50] Consequently, it is believed that the idea of the wheelbarrow must have entered the West from either Byzantium or the Islamic world in the late-twelfth or early-thirteenth century, before wheelbarrows reached their height of use (be that for the transportation of construction materials, produce, or people) in fifteenth-century medieval Europe.

Unfortunately, much like the wooden crutches discussed in chapter two, late medieval wheelbarrows do not, on the whole, tend to survive archaeologically due to both the decomposition rates of organic material and the likelihood of contemporaries to repurpose the wood from which a wheelbarrow was made. In fact, there are only two known wheelbarrows to have survived from

[50] H. M. Colvin, *Building Accounts of Henry III* (Oxford: Oxford University Press, 1971), p. 56. The original Latin reads: *Item pro viii civeris rotantibus emptis apud Cantuarium* [Item for eight wheelbarrows bought at Canterbury]. The language used to describe wheelbarrows will be discussed later in this chapter.

later medieval Europe, which were discovered during archaeological excavations of the Ingolstadt fortress in Bavaria. These wheelbarrows (one of which is depicted in image 2.14) were found in 2014 and 2017 by two teams of archaeologists, ProArch Prospektion and Archeologie GmbH, who were investigating the foundations of the Inglostadt fortress. As we can see, the wheelbarrows were relatively small and simple in construction, featuring a single wheel at the front and two handles at the back. It is believed that the wheelbarrow was likely to have had leather straps on the side (restored in image 2.14), which could have been used 'to distribute some of the jolting that porters would experience while pushing a wooden wheeled barrow across a littered construction site'.[51]

Soon after the discovery of these items, the Bavarian State Office for Monument Conservation conducted a dendrochronological study of several wooden samples from the wheelbarrows, finding that both objects were made from beechwood and dated from the 1530s (making these the earliest and most completely preserved specimens in medieval Europe). As the construction of the Inglostadt fortress began in 1537, it is therefore likely that these barrows were made specifically for the purpose of manoeuvring construction materials during the building of the fortress. Due to the discovery of mineral build-up inside the wheelbarrows, it is believed that these construction materials consisted mainly of

[51] Andrea L. Matthies, 'The Medieval Wheelbarrow', *Technology and Culture*, 32:2 (1991), 356–364 (p. 360).

mortar or lime (rather than heavy stones or bricks, which would have caused greater evidence of wear to be seen on the beechwood).[52]

However, aside from these two material examples, there is little archaeological evidence for the construction or use of medieval wheelbarrows. Unfortunately, they can also be very difficult to identify in written source material as they were often mislabelled or referred to by multiple different names. As Matthies suggests,

> Complicating our assessment of the archival references is the confusing terminology associated with the wheelbarrow. While the English 14th-century [sic] term, "wheelberghes" remains comprehensible, the Latin is somewhat less so: "*civera rotaria*", "*civera rotantibus*", or "*senofactoriis rotalibus*".[53]

This more recognisable use of the term 'wheelberghes' in vernacular English appears to have much earlier origins than the fourteenth century. It first appears in the *Nominale sive verbale* – a bilingual French/English word-list which, although produced c. 1340, is thought to be a copy of an earlier thirteenth-century text. In his introduction to the text, Skeat supposes that 'it may be that a large number of the terms included tell us nothing new [...] but there must be many other equivalent expressions that are remarkable or rare' – and the record for wheelbarrow certainly falls into the later category. Provided under the sub-category of 'Natural Noises and Actions of Men and Women', the *Nominale sive*

[52] Stadt Inglostadt, *The First Wheelbarrow of the Old Schanzer* (2018) <https://www.ingolstadt.de/Home/Die-erste-Schubkarre-der-alten-Schanzer.php?object=tx,2789.5&ModID=7&FID=3052.11343.1&NavID=2789.411> [accessed January 2020].
[53] Matthies, p. 356.

verbale lists '*et un coueret en bruter* – and the crepul in the wilbarewe'.[54] Not only is this inclusion interesting as it establishes the connection between wheelbarrows and the transportation of impaired individuals (as we will discuss later in this chapter), but it also facilitates an insight into the French term *bruter*, which is derived from the Middle French *brouette* and the Latin *birotium*, both of which mean 'little cart'.

Another common term that Matthies fails to consider, is the Latin *cenovectorium*, which first appears in the twelfth century and means 'barrow'. Much like the term *civera* (sometimes also spelled *civeria*), it is not unusual to see adjectives being added to the term *cenovectorium* to demonstrate the kind of 'barrow' in question (for example, a handbarrow would be referred to as a *cenovectorium manual*, and a wheelbarrow as a *cenovectorium rotatum*).[55]

A good example of this confusion over the appropriate language required to describe a wheelbarrow can be seen in Georgius Agricola's *De Re Metallia* (written c. 1550 but published posthumously in 1556 due to a delay in the production of its accompanying woodcuts). In this work Agricola (1494–1555), a German humanist and physician, provides a scholarly discussion of all that is involved in mining – including (in Book VI) a description of the construction and use of the tools used by miners.[56] It is during this examination of mining tools that Agricola first mentions the Latin *cisium*, which (as we have seen) translates

[54] Walter Skeat (ed.), 'Nominale sive verbale', *Transactions of the Philological Society,* 25:3 (1906), 1–50 (p. 9/l.218).
[55] For further discussion of the etymology of the term 'wheelbarrow' see M. J. T. Lewis, 'The Origins of the Wheelbarrow', *Technology and Culture*, 35:3 (1994), 453–475 (pp. 459–463).
[56] Georgius Agricola, *De Re Metallica*, trans. by Herbert Clark Hoover and Lou Henry Hoover (London: The Mining Magazine, 1912).

as a two-wheeled vehicle. I initially found this quite confusing as the woodcut which accompanies the description very clearly shows two wheelbarrows – both of which only have one wheel (as can be seen in image 2.15). Although Agricola did not create the woodcuts himself, he was said to have been heavily involved in their design, stating that,

> *etenim venas, instrumenta, vasa, canals, machinas, fornaces, non modo descripsi, sed etiam mercede conduxi pictores ad carum effigies exprimendas: ne re, quae verbis significantur, ignotae aut huius aetatis hominibus aut posteris percipiendi difficulatem afferent* [with regard to the veins, tools, vessels, sluices, machines, and furnaces, I have not only described them, but have also hired illustrators to delineate their forms, lest descriptions which are conveyed by words should either not be understood by men of our own times, or should cause difficulty to posterity].[57]

If Agricola was so invested in the inclusion of woodcuts within his work to assist his readers' understanding, one would assume that he would have ensured that they closely matched the objects and instruments he had described.

However, after my initial confusion, I found that Agricola addresses this discrepancy himself in the preface to his *De Re Metallica*, where he explains that he has alluded to several objects by old names,

> *quale est cissium. Etenim cum Nonius Marcellus scribat, vehiculi biroti genus esse: eo vocabulo nominare consue ui paruum vehiculum, cui unic est rotula: quae nomina si quis non probaverit, is rebus istis aut imponat magis propia, aut proserat veterum literis vsitata* [such as the *Cisium*; for when Nonius Marcellus wrote, this was the name of a two-wheeled vehicle, but I have adopted it for a small vehicle which has only one wheel; and if anyone does not approve of these names, let him either

[57] Translation taken from *De Re Metallica*, trans. by Hoover and Hoover, p. xxx. For original Latin see Georgius Agricola, *De Re Metallica* (Basel: Apud Hieron Frobenium et Nicolaum Episcopium, 1556) – found on the final page of the unpaginated *Epistola*.

> find more appropriate ones for these things, or discover the words used in the writings of the Ancients].[58]

Consequently, Agricola demonstrates the contemporary difficulties associated with finding satisfactory language to describe wheelbarrows, highlighting why it is important for us (as twenty-first-century scholars) to consider the wider context of written source material if we are to ensure that the item being discussed is, in fact, a wheelbarrow and not some other form of wheeled device.

Visual source material, on the other hand, offers a much stronger body of evidence for the existence of wheelbarrows (confirming the value of the visual approach of this thesis), demonstrating that there were two main types of wheelbarrows in the Middle Ages that were adapted in multiple different ways. The first style 'clearly derives from the handbarrows or stretchers that filled early construction sites' as it has open sides and a flat base.[59] However, unlike a handbarrow (which had handles at both the front and back and required two people to lift) this first style of wheelbarrow replaces the front handles with an axle and wheel. The barrow's load is prevented from falling off by a rack, which is positioned behind the wheel. An example of this kind of wheelbarrow can be seen in image 2.16, which depicts a detail from the margins of a fifteenth-century Flemish Book of Hours. Here we can see a woman pushing what appears to be sheaves of grass on an open sided wheelbarrow – one can clearly make out the two handles (held by the woman), the rack against which the sheaves will rest

[58] Translation taken from *De Re Metallica*, trans. by Hoover and Hoover, p. xxx. For original Latin see Agricola – found on the final page of the unpaginated *Epistola*.
[59] Matthies, p. 358.

when the barrow is tilted upwards, and the singular frontal wheel. This style appears to have been most commonly modified through the inclusion of a wicker basket placed on the flat surface of the barrow, which acted in place of side panels to secure loose loads.

Although this open sided wheelbarrow does not appear to have been a popular choice for the transportation of people (due to the lack of stabilising and security features) there is one particularly famous visual source in which an individual is depicted as being transported on an open-style barrow (see image 2.20). Found in margins of the *Luttrel Psalter*, fol. 186v, this image shows an impaired individual receiving alms as he is pushed in a wheelbarrow. Unlike image 2.16, the *Luttrel Psalter* barrow does not feature a rack behind the wheel and, as such, it is little more than a wheeled stretcher – depending very much on balance and flat ground for the individual using it to stay seated and onboard.

The second kind of wheelbarrow is based around a box-like structure. This device has two handles (allowing it to be pushed by a single individual) and four side panels, which were intended to prevent the load from falling out when the barrow was in motion. It is most commonly found with one wheel located at the front and centre of the barrow. However, unlike the first design, this secondary wheelbarrow features a straight (rather than curved) base. An example of this kind of wheelbarrow can be seen in the margins of a fifteenth-century Austrian *cantionale* (i.e. a book containing sacred songs, similar to a hymn book), reproduced in image 2.17. Here we can see that, unlike the flat-based wheelbarrow seen in image 2.16, the barrow depicted in image 2.17 has raised sides and a flat base, giving it more of a box-shaped structure.

Although these two types of wheelbarrows demonstrate the basic designs around which all medieval wheelbarrows were created, they could be adapted in a number of ways. For example, they were occasionally depicted as having two wheels instead of one (as seen in images 2.17, which demonstrates how two wheels could be attached to the open based style of wheelbarrow, and image 2.19, which demonstrates how two wheels could be attached to a box-type barrow).[60] However, these devices should not be mistaken for two-wheeled carts, as they were much smaller in size, were generally intended to be pushed (rather than pulled), and did not have long enough handles to facilitate attaching the device to a horse. Both forms of wheelbarrows could also be adapted through the inclusion of 'feet' which would 'reduce the stooping required to pick up the handles'.[61] These feet would also have helped to stabilise the wheelbarrow's load once it was set down, making it less likely for items to fall out and providing better balance if the barrow was set down on uneven ground. As we have seen in relation to the Inglostadt barrow, medieval wheelbarrows could also be adapted through the use of leather or woven straps which could be hung over the user's shoulders to redistribute some of the pressure (caused by the weight of the wheelbarrow's load) from their arms. However, although wheelbarrows come in many different shapes and sizes, those used as mobility aids have several features in common that suggest they were used for human passengers, rather than for construction, mining or agricultural purposes. Consequently, the next section of

[60] Note also the improvised man to the right of the wheelbarrow in image 2.19, who is demonstrating lovely examples of both a peg-leg crutch (attached to a leg-sheath) and a pair of t-bar crutches – as discussed in chapter two.
[61] Matthies, p. 359.

this chapter will consider the ways in which medieval wheelbarrows could be adapted for the purposes of transporting people.

TURNING A WHEELBARROW INTO A DISABILITY AID

Compared to the carts and carriages discussed above, later medieval wheelbarrows were relatively cheap to purchase and maintain. Throughout the fourteenth century, the average cost of a one-wheeled barrow was 10d., which given that the regular wage for a labourer at this time was approximately 2d.–2½d. per day, meant that a 'wheelbarrow would pay for itself [...] within three or four days'.[62] Also, by having an axle with an adjoining wheel, and separate wooden panels which made up the 'box', it would have been possible for a labourer with limited carpentry skills to replace individual elements of the wheelbarrow in accordance with general wear and tear, preventing the need to buy a whole new barrow if the existing one was only partially damaged. Therefore, although 10d. would still have been a significant initial expense for labouring people, the ability to adapt and maintain a wheelbarrow, coupled with the low running costs, would have made it a more financially realistic alternative to a cart or a carriage (as these would have been much more expensive initially and would also have required the upkeep and housing of the animals used to pull them). As such, wheelbarrows became a popular choice of wheeled mobility aid for lower status individuals.

However, in order to make wheelbarrows suitable for the transportation of humans, it was usual to adapt them by adding certain features that we do not

[62] Matthies, p. 357.

usually see in the design of barrows used for the movement of inanimate objects. For example, adapted wheelbarrows almost always take the form of the four-sided box-style barrow. Whilst this structure would contain the passenger, allowing them to hold onto the sides of the barrow whilst it was being pushed, a box-like design would also provide the structure necessary to construct a backrest within the barrow, against which the passenger could lean. This kind of backrest is demonstrated in image 2.33, where it appears raised and carved almost like a modern headboard, with a pillow placed against it for extra comfort. This wheelbarrow is also unique in its inclusion of a lap bar, which would have added a further level of security for the person riding inside. Another distinguishing feature of these wheelbarrows is that they all have stabilising wheels or feet to keep the base of the barrow flat once it is set down. In images 2.32 and 2.33 these stabilisers take the form of feet and in images 2.21 and 2.22 they take the form of two extra stabilising wheels.

These adaptations appear even more clearly when compared to images of wheelbarrows being used for traditional purposes. Firstly, there is an obvious difference in size. As we can see in images 2.16 and 2.19, wheelbarrows used for the purposes of construction were much smaller than those designed for people. This small size would have made wheelbarrows quicker and easier to manoeuvre within tight and busy spaces, such as construction sites, but would have been completely impractical for the conveyance of a person. Secondly, as we can see in image 2.16, wheelbarrows used for agricultural labour had bases that were much closer to the ground than those used as disability aids. Whilst this would have meant that the person pushing the barrow would not have had to lift it so high,

thereby easing some of the burden of the weight, this structure would have been more likely to buckle under the weight of a person and the proximity of the base to the floor would make for a bumpy, uncomfortable ride. Finally, although both kinds of wheelbarrows feature stabilizing feet or wheels, it appears that wheelbarrows intended as mobility aids almost always have these features (except for one example seen in image 2.32), whereas traditional wheelbarrows only have them in certain examples. This suggests that the stability of a barrow was much more important when it was being used as a disability aid – perhaps because the passenger had to climb inside themselves and, once inside, was capable of moving about – making the wheelbarrow more unsteady than those which carried static objects.

Although these images are examples of manuscript marginalia and (as discussed in the introduction) should not be treated as unfiltered windows onto the past, their design is mirrored in the *De Re Metallica*. Here, Agricola describes the construction of a miner's wheelbarrow as follows,

> *Asseres duo longi circiter quinque pedes, alti unum, lati duos digitos eliguntur: quorum partes primae futurae ad unius pedis lon[g]itudinem, postremae ad duum pedum inferius excinduntur, mediæ remanent integræ. Deinde primæ excauantur, ut in earum foraminibus circularibus axiculi capita circumagi possint. Mediæ uerò bis perforantur & prope imum, ut capitula duarum trabecularum, in quas imponuntur asseres, recipiant: & in medio, ut capitula duorum asserum transuersariorum: atque claui, in his capitibus foras eminentibus infixi, totam firmant compagem. Ex postremis asserum longorum partibus siunt manubria: quorum capitula inferius sunt reflexa, ut firmius manibus teneri possint. Sed rotula, quia unica, neque modiolum habet, neque circum axiculum uersatur, uerum cum ipso circumuertitur* [Two planks are chosen about five feet long, one foot wide, and two digits thick; of each of these the lower side is cut away at the front for a length of one foot, and at back for a length of two feet, while the middle is left whole. Then in the front parts are bored circular holes, in

> order that the ends of an axle may revolve in them. The intermediate parts of the planks are perforated twice near the bottom, so as to receive the heads of two end-boards, while keys fixed in these projecting heads strengthen the whole structure. The handles are made out of the extreme ends of the long planks, and they turn downward at the ends that they may be grasped more firmly in the hands. The small wheel, of which there is only one, neither has a nave nor does it revolve around the axle, but turns with it].[63]

However, whilst this extract reflects the kinds of wheelbarrows depicted in images 2.16 and 2.19, it offers no mention of the stabilisers, extra wheels, back rests or lap bars which are visible in representations of wheelbarrows being used to transport people. Consequently, it appears that, even though they may at first seem visually similar, there are a number of subtle amendments which were made to the traditional wheelbarrow in order to create a more vehicular device suitable for the conveyance of people.

HENPECKED HUSBANDS AND DISOBEDIENT WIVES: USING WHEELBARROWS AS DISABILITY AIDS

There are several examples of wheelbarrows being used for the transportation of different kinds of injured or impaired people that pre-date the periodisation of this thesis. For example, the *Nominale sive verbale* (discussed briefly above), lists '*et un coueret en bruter* – and the crepul in the wilbarewe'.[64] As this appears to be the earliest example of the word wheelbarrow appearing in English, it is especially interesting that it is being identified as an object for transporting a

[63] Translation taken from: *De Re Metallica*, trans. by Hoover and Hoover, p. 155.
For the original Latin see Georgius Agricola, p. 113.
[64] Walter Skeat (ed.), 'Nominale sive verbale', *Transactions of the Philological Society,* 25:3 (1906), 1–50 (p. 9/l.218).

'crepul' rather than agricultural produce or construction materials. A contemporaneous example of this can be seen in the margins of the *Luttrell Psalter* (see image 2.20), as discussed above. As we have seen, this image depicts an impaired individual begging for alms whilst being transported in an open-sided wheelbarrow. However, whilst it is evident that the individual has some form of physical impairment, there has been a great deal of debate about the age of the individual and the condition from which they were suffering. Irina Metzler, for example, refers to the individual as an 'impaired man', whereas Janet Backhouse argues that the figure is 'possibly a child, with deformed hands and feet', and *Feminae* (the Medieval Women and Gender Index) argue that the person is a male child whose 'hands and feet are deformed as a result of birth defects or leprosy'.[65] Whatever the individual's condition, it is clear that they were suffering from a debilitating form of physical impairment and could subsequently be categorised as a 'crepul in a wilbarewe' – much like the individual listed in the *Nominale sive verbale*. As such, it appears that, by the time the *Nominale sive verbale* was produced, there was an established tradition of transporting impaired people in this way.

However, whilst the individual in the *Luttrell Psalter* and the 'crepul' in the *Nominale sive verbale* are clearly characterised by bodily deformation, the person most frequently depicted as being transported in a wheelbarrow in later medieval visual culture is the elderly woman whose only visible 'impairment' is

[65] Metzler, *Disability in Medieval Europe*, p. 171; Janet Backhouse, *Medieval Rural Life in the Luttrell Psalter* (Toronto: University of Toronto Press, 2000), p. 40; Feminae, *Disabled Beggar Child* (2012) <http://inpress.lib.uiowa.edu/Feminae/DetailsPage.aspx?Feminae_ID=41155> [accessed September 2020].

her advanced age. An example of this visual trope appears in a misericord carving from Ripon Cathedral (images 2.23–2.25), which is believed to have been created between 1489 and 1494 by the Ripon School of carvers, headed by the influential William Bromflet.[66] The Ripon School of carvers were active across the North of England at this time and, as a result, it is also possible to see adaptations of this 'woman in a wheelbarrow' motif appearing in their work at both Beverley Minster (see image 2.30) and Durham Castle Chapel (see image 2.31). However, despite the penchant for this image on northern English misericords, it is largely accepted that the Ripon carving was copied from an engraving by the German artist Master BxG – an extremely popular print maker, whose work was 'pillaged for motifs' by various craftsmen working in different media.[67] Due to the development of the printing press and the increased production of incunabula in the fifteenth and sixteenth centuries, prints could be produced and disseminated much more quickly amongst artists than the patterns which had previously been shared through the transfer of manuscripts and sketchbooks. Therefore, as a result of the clear resemblance between BxG's engraving and the Ripon misericord, Purvis has been able to confirm that this print cannot have reached Ripon any later than 1494 (the year in which the choir stalls were completed).

Located at the physical edges of the cathedral (that is, not against a wall, but, when in use, facing downwards towards the floor), misericords were a place frequently associated with subversion and satire. Taken from the Latin

[66] William Bromflet was 'Mayor of Ripon in 1511, worked in Bridlington in 1519 and was employed extensively in Ripon Cathedral around 1520–21.' Christa Grössinger, *The World Upside Down: English Misericords* (London: Harvey Miller, 1996), p. 24.
[67] Grössinger, p. 21.

misericordia and meaning 'mercy seat', misericords are folding chairs that were introduced to assist monks and canons who were too weak to stand up during the Divine Offices.[68] The seats could be lifted into an 'up' position, revealing a ledge upon which the monks could lean, giving them 'the appearance of standing while really sitting'.[69] The first known mention of misericords is in William of Hirsau's (1030–1091) *Constitutiones,* which explain how misericords were fitted on the seats of the upper rows of the quire and were only to be used by the old and feeble monks who, as elderly people, might also have been allowed to use crutches to enable them to stand.[70]

The fact that this object could, in itself, be considered a disability aid is interesting in relation to this thesis, especially in view of the image underneath the seat. The way in which the carving depicts an elderly and infirm woman using a barrow as a disability aid, could appear to render the misericord as self-referential, seeing how, as an object, it was created to assist the elderly and infirm. However, it seems too much of a leap to suggest that the image was generated as a sympathetic nod to the elderly canons. The visual trope of a woman in a wheelbarrow carries too many negative, satirical connotations for this to be the case and the image of the woman in the wheelbarrow was just one of many visual designs found upon misericords. Consequently, I agree with Camille's argument that the main reason misericord images were permitted within the inner sanctum of the cathedral was because of their position.

[68] Camille, p. 93.
[69] Grössinger, p. 11.
[70] Grössinger, p. 11.

Carved by lay craftsmen and displayed in the choir (one of the most sacred places in the cathedral due to its proximity to the altar and the blessed sacrament), misericords functioned 'in the margins' of cathedral architecture, and in this sense played a very similar role within the cathedral setting as manuscript marginalia played within a Book of Hours. Camille argues that misericords gave the clergy the power to erase representations of subversive material from sight by the simple act of sitting down. By physically sitting on the misericords (pushing them from an 'up' position into a 'down' position) the canon's bottoms obliterated and censored these dissident images. As a result, 'these carvings were literally debased and made subservient to those "above" them' – thereby symbolically restoring control to ecclesiastical authorities over secular insubordination.[71] Due to their position within such a restricted area of the church and the fact that these carvings would be completely obscured when the seats were in use, it is likely that these misericord carvings would only have been seen by the craftsmen who constructed them and the members of the clergy who used them. This chapter will now consider why Master BxG's motif of a woman in a wheelbarrow was favoured by the Ripon School, and what meanings or functions were attributed to it within the ecclesiastical context of Ripon Cathedral, Beverly Minster, and Durham Castle Cathedral.

Both the engraving (as seen in image 2.22) and the Ripon misericord (depicted in images 2.24–2.26) show an elderly woman being pushed in a three-wheeled barrow by a bearded man, whilst holding an object in each of her hands.

[71] Michael Camille, *Image on the Edge: The Margins of Medieval Art* (Cambridge, MA: Harvard University Press, 1992), p. 94.

In one hand she holds either a singular twig or a bundle. While these twigs might have simply represented a broom (a symbol associated with the housewife), I believe that they also signified the woman's old age and 'barren' infertility as, like the woman, the twigs are bare and no longer leafy or in bloom. The object she is holding in her left hand is less clear and has generated some dispute amongst scholars. In his *Catalogue of English Misericords*, Remnant suggested that the woman is holding out a bag, perhaps of food or money – a sentiment which has since been shared in Ripon Cathedral guidebooks. However, I would disagree and argue that she is in fact holding a bottle.[72] Images 2.26–2.28 show a selection of fifteenth-century German drinking flasks and canteens. Both the physical flasks, engraving, and carvings share the same flat, round shape, with a circular centre and a funnelled spout for drinking from. Consequently, it seems more likely that the woman is holding a drinking vessel, which is important as this presents the woman as dishonest and drunk, perhaps referencing the motif of the inebriated ale-wife.[73]

This image's satirical implications do not just affect the woman – they also target the figure of the 'hen-pecked husband' and other obedient, emasculated men. The fact that the man in the Ripon misericord is still submitting to the woman by pushing her in the wheelbarrow (despite her age and drunkenness), paints him as being weak and easily dominated, and thus he becomes an object of

[72] G. L. Remnant, *A Catalogue of Misericords in Great Britain* (Oxford: Clarendon Press, 1969), p. 183.

[73] For more on the trope of the ale-wife and the relationship between women and alcohol, see: Judith M. Bennett, *Ale, Beer and Brewsters in England: Women's Work in a Changing World, 1300–1600* (New York: Oxford University Press, 1996); A. Lynn Martin, 'Old People, Alcohol and Identity in Europe, 1300–1700', in *Food, Drink and Identity: Eating and Drinking in Europe since the Middle Ages*, ed. by Peter Scholliers (Oxford: Berg, 2011), pp. 119–37.

scorn. Whilst this seems to contradict the ideas that we have discussed in relation to Lancelot and Philip II of Spain, as one would assume that by riding in the wheelbarrow it would be the woman (and not her male attendant) who suffered a loss of agency, the context here is different. The person in the wheelbarrow is woman which, as we have seen while discussing the high-status female use of carriages, would have been more acceptable due to a woman's naturally delicate composition. However, the trope of the woman in the wheelbarrow is an example of the 'world-upside-down' motif and was therefore intended to subvert these popularly understood signifiers. Here, the old woman is drinking and beating her male attendant (who is likely to be her husband), demonstrating that she does not behave according to the expectations of her gender. Her attendant is also behaving incorrectly because (although he should not be riding in the wheelbarrow himself, as this would undermine his masculinity), it should be him who has the most agency in the situation.

The only example of a man being pushed in a wheelchair by woman can be seen in a mid-fifteenth-century fresco depicting the Fountain of Youth at the Castello della Manta in northern Italy (seen in image 2.32). This fresco was inspired by the French romance *Le Chevalier Errant*, which was written by Tomasso di Saluzzo (1356-1416) who owned the Castello della Manta and was intended to be entirely satirical in nature. Although this fresco is very large and depicts multiple scenes, the detail with which this chapter is interested shows an elderly man who is sitting in a wheelbarrow whilst chastising his wife for stopping to drink (when she should be pulling him towards the Fountain of Youth instead). Despite the fact that, by riding in the wheelbarrow, the man is

already depicted as a figure of emasculation and mockery, the image further demonstrates his lack of agency by pairing him with an unruly, disobedient wife. Participating in an exchange, he 'admonishes her to stop drinking' and yet she ignores his demands with a sassy retort of her own.[74] This is demonstrated in the text accompanying the image, which reads:

> Man: *Se tu ne laisse l botegla je te dunray desus l'oregla* [If you don't leave the bottle, I'll hit you on the ear].
> Woman: *Ja ne sera de ma bocha ostea si sera ma goria bien arossea* [It will not be removed from my mouth until my throat is well watered].[75]

Although this woman is not physically dominating the man through the use of violence (in fact, it is he who brandishes a stick), she still holds the power. As a result of his physical impairment, age, and limited mobility, it is unlikely that the man would be able to carry out his threat of beating the woman around the ear. His frailty also renders the old man dependent upon the woman's assistance to get him to the Fountain of Youth. As a result of these two factors, the elderly woman is able to ignore the man's complaints and to continue drinking until she is sated. Despite his threats and demands, it is she (and not he) who has the most control in the relationship, and she is therefore satirised as an unfeminine, disobedient woman.

---

[74] Metzler, 'Have Crutch, Will Travel', p. 104.
[75] Although one might expect the text on this fresco to be written in contemporary Italian, given its location in Manta, Italy, the images were inspired by Tomasso di Saluzzo's *Le Chevalier Errant*, which was written in French.

This unbalanced, 'topsy-turvy', power dynamic between man and woman can also be seen in the clothes these figures are represented as wearing in the Master BxG engraving. The woman's clothing, whilst not an example of high-fashion, is neat, respectable and in good condition. The man's clothing, on the other hand, is completely tattered – he has holes in his breeches, his shirt sleeves are shredded, and his heel is protruding from a hole in the back of his shoe. It is possible, therefore, to suggest that this is another hint at the disparity between the man and the woman. Perhaps this alludes to a wife who has bled her husband dry through her immoral habits and drinking, and consequently functioned as a warning against marriage. However, it could equally suggest that only a foolish man would become subservient to an overbearing wife. Unfortunately, it is difficult to tell if there is a difference between the man's and woman's attire on the Ripon misericord. As one can see from the bundle of twigs, elements of this carving have been damaged since its creation. Consequently, it is impossible to say whether the Ripon misericord also presented the man in tattered clothes when it was first made and, as a result, I cannot suggest that the same correlation between the woman's drinking habit and the man's clothes exist in this case.

Nevertheless, the representation of the domineering woman is very present and arguably more aggressive in the Beverley and Durham misericords. Although neither of these women carry a bottle and the barrows have only one wheel instead of three, the women appear to have a much more belligerent attitude. At Beverley the woman is aggressively reaching out and pulling the man's hair (as seen in image 2.30) and at Durham the woman has birch twigs raised above her head ready to strike the man pushing the barrow (see image

2.31). As the man in these misericords is clean shaven, it seems unlikely that he is the woman's husband. In fact, there is nothing specific in any of the misericords or the engraving to suggest that the woman in the wheelbarrow is defined as the man's wife. Although that argument is perfectly plausible, she could equally be his mother, aunt, sister, or any female relative. What matters for this thesis is that she appears to hold the power in the relationship, and is being mocked by her drinking habit and position in the wheelbarrow – thereby warning the ecclesiastical male viewers against any form of relationship with an unprofitable woman.

This representation of a woman who used brute force to bring men under her control is reminiscent of other visual tropes of the era, such as Phyllis riding Aristotle, or the 'Battle for the Breeches' – both of which warn of, and satirize, the bad wife or aggressive woman.[76] As a result, it appears that within the world of medieval satire, even when women are depicted as having the upper hand, they are actually being mocked by male viewers and carvers for their lack of femininity and the impossibility of a woman ever ruling over a man outside of the topsy-turvy margins.

[76] Examples of Phyllis riding Aristotle can be seen in both literature and visual culture through the Central and Late Middle Ages. See Henri d'Andeli's *Lai d'Aristote* (written c. 1220) or Hans Baldung Grien's woodcut representations of the scene (produced c. 1515). The Battle for the Breeches, on the other hand, appears mostly in visual culture as it relies on the visual pun of a man and his wife fighting over a literal pair of trousers to assert domestic dominance. A thorough discussion of this topic can be seen in Martha Moffitt Peacock, 'Proverbial Reframing: Rebuking and Revering Women in Trousers', *The Journal of the Walters Art Gallery*, 57 (1999), 13–34.

FOUNTAIN OF YOUTH ICONOGRAPHY

Images of women being wheeled in barrows can also be seen in other Fountain of Youth iconography in which elderly men and women are depicted as arriving at and entering the fountain of youth, before emerging youthful and rejuvenated. Image 2.32 is a particularly interesting example of this iconography, as it represents elderly people approaching the fountain using a range of different mobility aids. Unlike the images of elderly women in wheelbarrows seen on the misericord carvings, this image provides more evidence to suggest that the woman being transported to the Fountain of Youth is actually suffering from bodily impairments. Not only is her posture more passive (she is hunched over, facing away from the man), but she can also be seen to be clutching her right arm as though she is in pain. Equally, the lack of interaction between the woman and the man pushing the barrow places the characters in a more even relationship. This suggests that the artist's depiction of the mobility aid was an attempt to portray the ways in which the feeble and elderly used wheelbarrows to overcome their impairments, rather than as a satirical device used to ridicule the woman and her submissive husband.

However, that is not to say that all representations of the Fountain of Youth are without gendered implications. To a passing viewer, Cranach's *Fountain of Youth* appears much like any other example of this visual trope, with elderly people approaching the Fountain and frolicking in the waters, before having their youth and youthful appetites restored. Yet, if the viewer is to inspect the image more closely, reading it from left to right, it becomes noticeable that it is only women who are being brought to the Fountain of Youth and bathed in its

waters. There is a total absence of men within the Fountain of Youth itself. Consequently, this image represents a male distaste for the aged and impaired female body, which is forced to change and once again become young and physically able in order to be considered desirable. The elderly male body on the other hand is presented as more enduring and more acceptable. Therefore, this more subtly negative image of elderly women (who require the assistance of vehicular mobility aids), points to the medieval attitudes surrounding not only the female, but also the impaired body.[77]

***

Consequently then, despite there being a significant lack in scholarship pertaining to the medieval history of wheelchairs, this chapter has demonstrated that, whilst upright wheelchairs did not exist in any ubiquitous sense in the Middle Ages, this should not be taken to mean that wheeled technologies were not employed as a disability aids by chronically impaired and temporarily injured members of society. Subsequently, I would conclude that, if the definition of a wheelchair is an object in which a person sits and is pushed, then wheelchairs certainly did exist in the later medieval period, they just did not look the same as they do today.

Unfortunately, there is very little material survival of wheeled-chairs from the fifteenth and sixteenth centuries. Nevertheless, this chapter has shown that it is still possible to study material culture without archaeological evidence,

[77] Rachael Gillibrand, "Sans Everything': Late Medieval Representations of the Aged Female Body' (University of Leeds: Unpublished MA Dissertation, 2015), p. 44.

provided that academics are prepared to draw upon interdisciplinary areas of analysis. Through a close reading of Agricola's *De Re Metallica*, combined with an analysis of marginalia, misericord carvings, and classical paintings, this chapter has brought together text, art and sculpture in the absence of material objects, in order to access a previously overlooked period in the history of the wheelchair. By applying Saussure's conception of signs, signifiers, and signified to a series of sources, this chapter has also considered how broader questions about medieval attitudes towards gender, age, and status were reflected in the use of wheeled mobility aids.

Chapter Four

MECHANISED PROSTHESES: ARTIFICE AND AUGMENTATION

Prostheses, in the broadest sense of the term, can be defined as any artificial device used to augment the body, impaired or otherwise. Taken from the Ancient Greek *προστίθημι* (prostíthēmi), meaning 'I add', the Latin *prosthesis* came to refer to the addition of a letter or syllable at the start of a word.[1] An example of this can be seen in Sherry and Erasmus's 1550 *Treatise of Schemes and Tropes*, where it is suggested that a prosthesis is 'the putting to, eyther of letter or sillable at the begynnyng of a worde'.[2] It was not until the eighteenth century that the term 'prosthesis' was defined in relation to bodily augmentation. Prior to this, 'prostheses' would not have been known as such, but were instead referred to as either a direct description of the object (e.g. 'iron hand') or as 'artificial' limbs. The first English recording of 'prostheses' as an umbrella term for artificial limbs can be found in the 1706 edition of *The New World of Words*, which states that:

> in surgery prosthesis is taken for that which fills up what is wanting [...] also the making of artificial legs and arms, when the natural ones are lost.[3]

This definition is useful as it describes prostheses not only in terms of artificial limbs but also as anything which meets a lack. In line with this definition, many

---

[1] Oxford English Dictionary, *Prosthesis* (2007) <http://0-www.oed.com.wam.leeds.ac.uk/view/Entry/153069?redirectedFrom=prosthesis&> [accessed August 2018].

[2] Richard Sherry, Desiderius Erasmus, *A Treatise of Schemes [and] Tropes Very Profytable for the Better Understanding of Good Authors, Gathered out of the Best Grammarians [and] Oratours by Rychard Sherry Londoner* (London: Iohn Day, 1550), sig. Bv^{v}.

[3] John Kersey (ed.), *The New World of Words; or, Universal English Dictionary*, Sixth Edition (London: Printed for J. Phillips, at the King's-Arms in St Paul's Church Yard, 1706), unpaginated, see 'prostheses' entry.

of the aids discussed in this thesis (e.g. crutches, wheeled-chairs and, as we will see in the following chapter, spectacles) could be labelled as prostheses as, even if they did not replace a missing limb, they stood in for 'what is wanting' by enabling their users to overcome the difficulties imposed by impairments.[4]

However, this chapter intends to tackle the prostheses referred to by the latter half of *The New World of Words* definition – 'the making of artificial legs and arms'.[5] What separates these artificial limbs from the crutches, staffs, chairs, and carts discussed earlier is that they always require the absence of a body part in order to be used successfully. Whilst crutches or wheeled-chairs could be used with or without a missing limb, the aids presented in this chapter are designed to take the place of a lost limb, rather than acting as a support for existing, impaired appendages. This subtle difference in definition is important as, unlike the assistive aids discussed in chapters two and three, mechanised prostheses did not only help to restore one's mobility and/or dexterity but also performed a crucial (and often overlooked) social function by constructing an illusion of a complete body. By acting as a mechanical reproduction of a lost limb, fifteenth- and sixteenth-century prostheses provided a solution for some of the cosmetic anxieties surrounding limb loss and bodily integrity, helping to disguise an individual's impairment in a way in which the other aids discussed in this thesis do not.

Throughout the fifteenth and sixteenth centuries, the relationship between an individual's body, sense of self, and their use of prosthetic technology

[4] Kersey, see 'prostheses' entry.
[5] Kersey, see 'prostheses' entry.

was complex and multifaceted. As this thesis has already demonstrated (through the association of hand trestles and unworthy beggars or the relationship between unruly women and the use of wheeled-chairs), the type of assistive technology that a person elected to use was often reflective of their social status, wealth, or gender within popular thought. Mechanised prosthetic limbs were no different. The materials used in their design, the complexity of craftsmanship necessary for their construction, and their level of subtlety or 'artifice', generated expectations about the status and behaviour of their users.

Today, people who use prosthetic devices are held up as 'posthuman exemplars', branded as 'super-humans' (as evidenced in the London 2012 Paralympic advertising material), or likened to the technologically augmented characters of popular science fiction franchises.[6] We have also seen a recent shift in attitudes towards the cosmetic role of prosthetic technology, with an increasing number of individuals seeking personalised 'fashion prostheses' that intend to highlight and celebrate (rather than disguise) one's impairment. As Sherri Edge points out, 'for some prosthesis users, the goal of blending in isn't nearly as appealing as standing out with a hand that looks like it came out of *Star Wars* or *I, Robot*'.[7] Similarly, amputee artists and musicians, such as Viktoria Modesta (the self-labelled 'bionic artist') and Sophie de Oliveira Barata (founder of the 'Alternative Limb Project'), are aiming to blur the lines between prostheses

[6] For more information on the London 2012 Paralympic advertising campaign and the re-use of the 'We are the Superhumans' campaign for the 2016 Rio Paralympics, see Campaign Live, *Campaign of the Year 2016: Channel 4 'We're the Superhumans'* (2016) <https://www.campaignlive.co.uk/article/campaign-year-2016-channel-4-were-superhumans/1418721> [accessed August 2018].
[7] Sherri Edge, *Going Cyborg: Advanced Prosthetic Technologies take the Spotlight* (2016) <https://opedge.com/Articles/ViewArticle/2016-10_01?spanish=False> [accessed August 2018].

and art in order to 'explore themes of body image, modification, evolution and transhumanism', demonstrating the extent to which prostheses can reimagine bodily aesthetics through the blending of flesh and technology.[8] Of course, not everybody would like (or can afford) these high-end 'fashion prostheses' and, as a result, many people still opt for more comfortable, low-cost artificial limbs, or another type of assistive aid altogether. Nevertheless, the increasing availability of 3D printing, alongside the developing trend for 'stand out' prostheses on social media (as evidenced by hashtags such as #postdisability, #prostheticart and #bodyarchitect), has generated new interest in the relationship between technology, 'art', and the body.[9] As such, the use of artificial limbs and assistive technology has become an important topic of discussion within cyborg theory and transhumanist discourse, with scholars considering the question of human/machine hybridity, the transformation of the body, and the limits of corporeal boundaries.[10]

Consequently, this chapter will draw upon the contemporary notions of transhumanism and cyborg theory, in order that it might consider the functional properties of mechanised prostheses (including their design, construction and capabilities), as well as their ideological importance and cosmetic features. However, before we move on to a discussion of the construction and

---

[8] Alternative Limb Project, *The Alternative Limb Project: About* (2018) <http://www.thealternativelimbproject.com/about/the-alternative-limb-project/> [accessed August 2018].

[9] An example of this relationship between art, prostheses and one's sense of self can be seen in the design of the 'Hero Arm' by Open Bionics – the 'world's first clinically tested, medically certified, and FDA registered 3D-printed bionic arm'. These limbs seek to bring together affordability, design and comfort to create a prosthesis which serves both aesthetic and functional purposes. See Open Bionics, *Hero Arm* (2019) <https://openbionics.com/hero-arm/> [accessed March 2019].

[10] For a more detailed discussion of the concepts of transhumanism and cyborg theory, please see the introduction to this thesis.

functionality of later medieval prostheses, let us first consider the surviving artefacts themselves.

THE SURVIVING ARTEFACTS

Today, there are approximately twenty-six documented fifteenth- and sixteenth-century prosthetic limbs found in collections across Europe (although, as this number does not include items in private or uncatalogued collections, I expect the actual number of extant objects to be much higher). However, we must not take the high survival rate of these items to mean that they were widespread or ubiquitous within contemporary society – rather that, because these items were made of iron, their level of preservation is generally much higher than that of assistive aids made out of wood. Also, due to the comparative rarity and luxury of these items, they were much more likely to have been preserved or re-purposed once they were no longer in use – for example, they might have been sold, handed down as family heirlooms, or displayed above/buried within elite tombs.

I have included a table (figure 3, below) which outlines all of the surviving fifteenth- and sixteenth-century European prostheses at the time of writing. By listing all of the surviving artefacts alongside one another, it quickly becomes apparent that there is a disproportionate ratio of surviving upper body to lower body prostheses. Although we have fifteen antebrachial (or forearm) prostheses and eight brachial-antebrachial (whole arm) prostheses, and an equal number of twelve right upper limb prostheses and twelve left upper limb prostheses, we only have one surviving lower leg prosthesis.

Figure 3: Surviving Fifteenth- & Sixteenth-Century Mechanised Prostheses

Item	Date	Description	Provenance	Location
Stibbert Hand (A)	15th Century	Left-hand prosthesis w. rigid thumb and individually moving fingers.	Unknown	Stibbert Museum, Florence, Italy (Inv. No. 3816)
Stibbert Hand (B)	15th Century	Right-hand prosthesis w. rigid thumb and a single fingerblock, believed to be the oldest mechanised Iron Hand.	Unknown	Stibbert Museum, Florence, Italy (Inv. No. 3817)
Kaiserliches Hand	15th Century	Left-arm prosthesis, w. mechanised elbow joint and individually moving fingers. Thumb is missing.	German	Kaiserliches Museum, Berlin, Germany
Ulrich Wagner Hand (see images 3.8–3.9)	1476	Right-hand prosthesis w. a single fingerblock. Made by the watchmaker and locksmith Ulrich Wagner for the knight Ulrich Wyss.	Swiss	Musée d'art et d'histoire de Friborg, Friborg, Switzerland (Inv. No. MAHF7611)
Milan (*Mailänder*) Arm Prosthesis	Early 16th Century	Right-arm prosthesis w. rigid thumb, a single fingerblock, and mechanised elbow joint.	Unknown	Museo Poldi Pezzoli, Milan, Italy (Inv. No. 945)
Alt-Ruppiner Hand (see image 3.11)	c. 1500	Left-hand prosthesis w. moveable thumb, two fingerblocks, and a fenestrated forearm.	German	Museum Neuruppin, Neuruppin, Germany
First Jagshäusser Hand (see image 3.13)	c. 1505[11]	Right-hand prosthesis w. moveable thumb and two fingerblocks. Attributed to Götz von Berlichingen.	German	Schlossmuseum von Jagsthausen, Jagsthausen, Germany
Grüninger Hand (see images 3.23–3.24)	c. 1505–c. 1515	Right-arm prosthesis, w. rigid thumb, two fingerblocks and a mechanised elbow joint.	German	Deutsches Historisches Museum, Berlin, Germany (Inv. No. AK 2016/26)

[11] Although this is the most frequently cited date for this arm it should be treated with caution. I believe it would be more accurate to date this hand to the first half of the sixteenth century. My reasons for this are discussed below.

Second Jagshäusser Hand (see image 3.12)	c. 1530	Right-hand prosthesis, w. individually moveable fingers in all joints and rotating wrist. Attributed to Götz von Berlichingen.	German	Schlossmuseum von Jagsthausen, Jagsthausen, Germany
Eisfelder Hand (see image 3.3)	c. 1547	Left-hand prosthesis w. rigid thumb and two fingerblocks.	German	Museen Thüringen, Thuringia, Germany (Inv. No. 307)
Balbronner Hand (see image 3.10)	c. 1560	Left-arm prosthesis w. individually movable fingers in all joints, and a mechanised elbow joint.	German	Musée Historique, Strasbourg, France (Inv. No. MH 4052a–b)
Nürnberger Hand (see images 3.18–3.20)	c. 1580	Left-hand prosthesis w. moveable thumb, two fingerblocks, and a fenestrated forearm.	German	F.W. Paul Collection, Berlin
Stibbert Hand (C) (see image 3.4)	16th Century	Right-hand prosthesis w. double jointed moveable thumb. Back of the hand is decorated with floral-inspired cut-outs.	Unknown	Stibbert Museum, Florence, Italy (Inv. No. 3818)
Stibbert Hand (D)	16th Century	Right-arm prosthesis w. rigid thumb, individually moveable fingers, and a mechanised elbow joint.	Unknown	Stibbert Museum, Florence, Italy (Inv. No. 3819)
Stibbert Leg (see image 3.2)	16th Century	Left-leg Prosthesis, designed for use on horseback.	Unknown	Stibbert Museum, Florence, Italy (Inv. No. 3820)
Ingolstadt Hand	16th Century	Small sized left-hand prosthesis w. fixed thumb, and individually moveable fingers.	Unknown	Bayerisches Armeemuseum, Ingolstadt, Germany (Inv. No. A 6495)
Skokloster-Hand	Late 16th Century	Right-hand prosthesis w. moveable thumb, two fingerblocks, and fenestrated forearm. Attributed to Olof Sverkersson Elfkarl.	Swedish	Skokloster Castle, Skokloster, Sweden (Inv. No. 12286)

Harmonic Collection Hand (A)	16th Century	Left-arm prosthesis, with individually moveable fingers, a fenestrated arm piece, and mechanised elbow. Missing its thumb and ring-finger.	Unknown	Science Museum, London, England (Obj. No. A121470)
Harmonic Collection Hand (B)	16th Century	Right-arm prosthesis w. fixed thumb, individually moveable fingers, and a mechanised elbow joint.	Unknown	Science Museum, London, England (Obj. No. A121449)
Iron Hand	16th Century	Left-hand prosthesis w. moveable thumb.	Unknown	Science Museum, London, England (Obj. No. A634417)
Iron Hand	16th Century	Left-hand prosthesis w. double jointed thumb and individually moveable fingers.	Unknown	Oxford University Museum of Natural History, Oxford, England (Inv. No. 43156)
Iron Hand	16th Century	Left-hand prosthesis w. fenestrated forearm, featuring a single fingerblock mechanism	German	Fitzwilliam Museum, Cambridge, England (M.22-1938)
Iron Hand	16th Century	Left-hand prosthesis w. individually moveable fingers.	German	Fitzwilliam Museum, Cambridge, England (M.23-1938)
Artificial Hand (see images 3.21–3.22)	16th Century	Left-hand prosthesis w. moveable thumb, individually moveable fingers, and a large nail through the palm (possibly for securing reins).	German	British Museum, London, England (Inv. No. 1870,1013.38)
Cotehele Hand	16th Century	Left-arm prosthesis w. moveable thumb and individually moveable fingers.	Unknown	Cotehele House, St. Dominic, England (Inv. No. 347324)
Prothèse de la Main	16th Century	Right-hand prosthesis, constructed according to Paré's designs.	French	Musée d'Histoire de la Médecine, Paris, France.

Taken at face value, this seems unusual as one would assume that those who were injured to the point of requiring an amputation would have been just as likely to lose a leg as they were to lose an arm. Ambroise Paré, who will be discussed further below, even designed plans for the construction of mechanised leg prostheses (as seen in image 3.1), suggesting that there must have been at least some demand for lower limb prostheses. Why then have we only unearthed prosthetic hands and not their lower-limb counterparts? Although the introduction to this thesis demonstrates that archaeological finds do not necessarily reflect the construction or consumption of an item, I believe that the lack of mechanised prosthetic legs is a rare case which does.

LOWER-LIMB PROSTHESES

As we have seen in chapter two of this thesis, crutches, walking sticks, and peg-legs (often fitted with braces and harnesses to support an injured leg), appear to have been very popular amongst individuals suffering from lower-limb amputations, injuries, or other mobility issues. Although representations of these largely wooden, non-mechanised devices became visual signifiers of poverty, begging, and old age, the ubiquity of these ambulatory aids within medieval artwork hints at the pervasiveness of lower limb injuries within fifteenth- and sixteenth-century society. Why then, if lower limb injuries were as common as they appear in the source material, do we have so few surviving examples of mechanised leg prostheses?

To use a mechanised lower-limb prosthesis one would have to have had their leg fully amputated so that the stump of the amputated leg would fit cleanly

into the prosthesis, creating the appearance of a complete, healthy limb.[12] However, although we see several examples of foot amputations within both the archaeological record and medieval visual sources, it appears to have been uncommon for individuals to undergo full amputations of the leg itself (especially femoral, or above the knee, amputations).[13] Marit Van Cant suggests that this lack of leg amputations stems from an 'extremely high' mortality rate, as 'many patients died during the surgery [most likely as a result of the haemorrhaging of the femoral artery], or afterwards because of an infection'.[14] It is not until after 1750 that the archaeological record begins to show a more significant number of healed lower leg amputations.[15] Consequently, the number of individuals who would have survived a lower limb amputation (and would therefore have been able to wear a mechanised prosthesis) is likely to have been very small.

However, even if one did survive a lower limb amputation, we cannot assume that they would have been able to afford, or would have chosen to wear, a mechanised leg prosthesis. Unlike hands, which are required for their fine motor skills, the leg is primarily used for locomotion (although our toes are capable of exercising fine motor skills to hold items or pick items up, they are not, for the

[12] Mechanised leg prostheses did not have the same kind of supportive 'braces' for injured limbs as seen in wooden 'peg-leg' designs discussed in chapter two.
[13] The remains of a fifteenth-century individual who appears to have survived a foot amputation were found in the cemetery of a Dominican monastery in Odense, Denmark. The individual's foot was amputated approximately 10cm above the ankle. Due to the amputation being carried out in a surgical 'guillotine' manner, it is believed that the loss of the foot was performed as an intentional life-saving measure as a result of a complicated fracture or infection of the foot. For a full discussion of this see A. L. Jacobsen, 'A Cripple from the Late Middle Ages', *Ossa: International Journal of Skeletal Research*, 5 (1978), 17–24.
[14] Marit Van Cant, 'Surviving Amputations: A Case of a Late Medieval Femoral Amputation in the Rural Community of Moorsel (Belgium)', in *Trauma in Medieval Society*, ed. by Wendy J. Turner and Christina Lee (Leiden: Brill, 2018), pp. 180–214 (p. 199).
[15] Van Cant, 'Surviving Amputations', p. 199.

majority of people, frequently employed in that capacity). Subsequently, these biological and anatomical differences between the hand and the leg would have meant that, whilst upper limb prostheses required complex mechanisms in order to restore a sense of manual dexterity (as we will discuss in greater length below), lower limb prostheses would have only needed to bear weight in order to support locomotion. Take, for instance, the leg prosthesis designed by Ambroise Paré (1510–1590) in image 3.1. Aside from providing the ability to bend one's knee (which would, perhaps make the transition from standing to sitting, and vice versa, easier), the leg does not do anything that a traditional 'peg leg' could not also have done, and therefore would not have improved one's quality of living any more than a non-mechanised prosthesis. In fact, the leg might have been more limiting than a non-mechanised prosthesis, as the weight of the limb, caused by the armour-like encasement depicted in Paré's design, would have made the leg very heavy, uncomfortable to wear, and burdensome to walk with. As such, it is likely that the few individuals who survived a lower limb amputation would have substituted mechanised prostheses for more affordable and lightweight wooden alternatives.

However, if we are to assume that the weight, expense, and discomfort of mechanised prostheses outweighed their value as mobility aids, why did some people choose to have them commissioned at all? There is some possibility that mechanised leg prostheses could have been commissioned as a status symbol, in order to demonstrate an individual's wealth and appreciation of mechanical innovation; however, I believe that it is more likely that (in the rare cases in which they were commissioned) mechanised leg prostheses were intended to

serve a cosmetic function. An example of a mechanised leg prosthesis intended for cosmetic use can be seen in the Stibbert Leg (pictured in image 3.2). Although the leg has been dated to the sixteenth century, it's providence remains unknown (although, based on the leg's dating and the fact that it shares several design features with examples of surviving upper arm prostheses, e.g. fenestrated exterior and armoured joints, I would suggest that the leg is likely German in origin). On first inspection the leg seems highly impractical for day-to-day use – there is no flexibility in the ankle joint, the calf of the leg is too short when compared to a human leg of the same dimensions, and 'the suspension system (most of which has survived) would have made it impossible to attach the prosthesis to the stump and to the body in such a way that it would not drop off under its own weight at the slightest movement'.[16]

However, whilst the leg would not have been able to facilitate weight bearing locomotion, its features would have made it an ideal cosmetic accoutrement for an individual riding on horseback.[17] The fixed angle between the foot and the leg would have allowed the leg to rest securely in the stirrup and, as a result of the immobile ankle joint, the leg would not have moved around once fixed in position. The shortness of the calf would also have been much less apparent on horseback, enabling the limb to create an illusion of a leg without adding unnecessary weight. Finally, although the suspension would have made it difficult to attach the limb to a stump for the purposes of walking, it would have been ideal for use on horseback, compensating for the difference in movement

[16] Putti, p. 321.
[17] John R. Kirkup, *A History of Limb Amputation* (New York: Springer, 2007), p. 158.

between the leg, the horse, and the rider's body. Unlike its non-mechanised counterparts, the Stibbert Leg was also sculpted to look more like an anatomical leg in armour. If the leg's user was riding in full armour, the leg could be left 'undressed' and, from a distance, would blend in with the rider's attire. However, the anatomically accurate shape of the leg would also have enabled it to be just as easily 'dressed' in hose and a shoe if its owner was riding in plain clothes. Consequently, whilst this leg would have been almost impossible to use as a walking aid, it served a valuable cosmetic function when worn on horseback by enabling its user to present the illusion of a complete body.

Overall, I would argue that the reason for the lack of mechanised leg prostheses in the fifteenth and sixteenth centuries is because they did not provide enough of an improvement to one's daily life to warrant their high cost. Although the Stibbert Leg demonstrates the cosmetic possibilities of mechanised leg prostheses, the number of individuals who had both survived a leg amputation and had the financial resources to commission an expensive prosthesis specifically for the purpose of riding, would have been very small. On the whole, leg prostheses did not offer anything extra in terms of mobility that a non-mechanised prosthesis (such a as a crutch or peg-leg) could not, and consequently provided poor value for money for many potential users. As a result, I believe that there would not have been a great demand for mechanised leg prostheses, which, as we have seen, appears to be reflected in the deficit of surviving material or literary examples.

UPPER-LIMB PROSTHESES

Although still expensive items to purchase, mechanised arm prostheses provided much better value for money than mechanised leg prostheses. Not only did they fulfil a cosmetic role by creating the illusion of a whole body (especially if the prosthesis was painted to match the user's complexion or worn beneath a glove) but the ability to set the fingers and thumb in a range of different positions enabled mechanised hand prostheses to restore a significant level of manual dexterity. This movement of the fingers would consequently have made it possible for the wearer to hold objects, wield a weapon, or use a horse's reins (as will be discussed below) – a range and diversity of movement that would not have been possible with non-mechanised prosthesis.

An example of this diversity of movement can be seen in the Eisfelder Hand – a left-handed prosthesis of German origin dating from c. 1547. This hand is a typical example of what Liebhard Löffler refers to as a *Passive Kunsthände mit zwei paarigen Fingerblocken* [passive prosthesis which features two paired fingerblocks].[18] By 'fingerblocks' Löffler is referring to the external construction of the hand. The first 'fingerblock' is comprised of a fused index and middle finger, and the second 'fingerblock' is made up of the ring and little finger (also fused together). These 'blocks' are attached to a single internal axis supported by a mechanism of cogs, which allows the pairs of fingers to be manually bent inwards towards the palm of the hand in a series of increments that would automatically lock into place. On the back of the hand there is a small button that, when

[18] Liebhard Löffler, *Der Ersatz für die obere Extremität: die Entwicklung von den ersten Zeugnissen bis heute* (Stuttgart: Enke, 1984), p. 12.

pressed, will release this mechanism, 'resetting' the fingers and returning them to their original position. The thumb, however, is fixed and incapable of movement.[19] This 'two paired fingerblock' design was very popular in the construction of fifteenth- and sixteenth-century prostheses, as the fusion of the fingers into two blocks allowed the hand to be more sturdy and hardwearing than individually moveable fingers, whilst also facilitating a greater range of movement than if the fingers were all fused together in a single block. As will be discussed below, by allowing the fingers to be locked in several different positions it would have been possible to use this hand for basic, everyday tasks (such as closing the fingers around a tankard), as well as assisting with movement by using the hand as a form of leverage (e.g. pushing against a table or chair arm in order to move from sitting to standing).[20] However, as well as serving these important physical functions, the Eisfelder Hand (much like the Stibbert Leg, discussed above) served an important cosmetic function by creating the image of a complete body. Constructed to look like a gauntlet, the hand could be easily disguised in armour; it could also have been painted or covered with a glove if its owner sought to wear it alongside their day-to-day attire.

A similar example of an arm prosthesis design with both cosmetic and physical functions can be found in Stibbert Hand (C) – a right hand prosthesis dating from the sixteenth century. Much like the Eisfelder Hand, this prosthesis moved in accordance with the 'two fingerblock' mechanism (allowing the first

[19] Museum Eisfeld, *Eiserne Hand* (2018) <http://www.museen.thueringen.de/Objekt/DE-MUS-868915/lido/dc00001376> [accessed August 2018].
[20] The full range of physical capabilities that a prosthetic arm might have been capable of will be discussed later in this chapter.

and middle finger to be moved independently of the ring and little finger, and vice versa). However, rather than operating on a cog mechanism, this hand was moved through the use of a 'hook and lock' system, controlled by a button located on the left side of the hand, next to the thumb. As Putti points out:

> The mechanism of this prosthesis is designed to keep the fingers flexed when the button is moved proximally, and to allow them to be extended when moved distally. A small hook that can be worked by the healthy hand will lock the mechanism and hold the button in the first position; by grasping the stem of the control button, it prevents it moving distally, and thus prevents extension of the fingers.[21]

Unfortunately, the internal mechanism of the thumb is seized with rust, making it unclear as to how (if at all) the thumb was operated. However, based on the external appearance of the thumb, it appears to have been created with a joint located at the knuckle, allowing for the thumb to be bent inwards towards the palm by a similar mechanism to that of the fingerblocks. Like the Eisfelder Hand, the range of movement that this prosthesis was capable of would have enabled its user to undertake an amount of basic tasks. However, as well as being designed with attention to physical movement, Stibbert Hand (C) also shows evidence of aesthetic considerations. Whilst the back of the hand is fenestrated to reduce the overall weight of the prosthesis, these cut out areas are designed to resemble popular geometric patterns of the period. As such, it would have been possible to wear the hand as an aesthetic statement in and of itself, as well as having the opportunity to cover the prosthesis with a glove should its user wish to disguise it.

[21] Putti, p. 319.

Consequently, by fulfilling both functional and cosmetic purposes, mechanised arm prostheses proved themselves to be doubly useful and, as such, I would argue that (even though the amount of people who lost their arms and could afford to buy an item like this would have been few) the unique abilities and utility of a mechanised arm prosthesis would have meant that those who had the financial resources (and necessity) to purchase a mechanised arm prosthesis would have done so. As a result, there would have been more upper limb prostheses created than lower limb prostheses, which has consequently led to a larger number of extant material artefacts.

INTELLECTUAL AND ARTISANAL LABOUR: THE DESIGN AND CONSTRUCTION OF MECHANISED LIMBS

Now that we have familiarised ourselves with several surviving examples of later medieval mechanised prostheses and have addressed the disproportionate arm-to-leg ratio apparent among the surviving artefacts, this chapter will move onto a discussion of how (and by whom) these mechanised limbs were created. As we have briefly touched upon in the examples discussed above – i.e. the Eisfelder Hand (image 3.3) and Sibbert Hand (C) (image 3.4) – later medieval prosthetic technology demonstrates an impressive level of technological innovation. Often, the creation of fifteenth- and sixteenth-century prosthetic limbs is presented as the product of intellectual labour alone. The designer's plans for the internal mechanics are so cleverly constructed (and, in some cases, beautifully rendered in manuscripts) that the role of the craftspeople – the individuals who actually built these items – is often ignored or overlooked. In her book, *Medieval Robots*,

E. R. Truitt explains that a similar attitude existed in relation to medieval automata, arguing that 'automata were the products of both intellectual and artisanal labour', and that scholarship should present them as such.[22] As the mechanisms used in later medieval prostheses were often developed out of technology first seen in automata (as we will discuss below), the next section of this chapter will seek to investigate both the intellectual *and* artisanal contributions to the development of late medieval prostheses.

The medieval period had a 'volatile and conflicted' relationship with technology, viewing it as something which could both improve and distort the human experience of the world.[23] For example, Francis Bacon, writing at the very end of our period, viewed mechanical instruments as a way to overcome the limitations of the human body, but also as an 'uneven mirror' which 'distorts the rays of things'.[24] This concern over the uncanny or distortive nature of technology is clearly evidenced in relation to the arrival of automata in the medieval West. As Truitt suggests, when automata were first witnessed by Western authors, they could not 'give detailed descriptions of how automata were made', suggesting only that the creation of such devices 'required understanding the science of the stars, familiarity with natural objects imbued with marvellous properties as well as confident and intimate knowledge of their powers, or the ability to communicate with and control demons'.[25] The kinds of mechanical technologies

[22] E. R. Truitt, *Medieval Robots: Mechanism, Magic, Nature, and Art* (Pennsylvania: University of Pennsylvania Press, 2015), pp. 2, 41.
[23] Jessica Wolfe, *Humanism, Machinery, and Renaissance Literature* (Cambridge: Cambridge University Press, 2004), p. 1.
[24] Francis Bacon, *Novum Organum*, ed. and trans. by Peter Urbach and John Gibson (Chicago: Open Court Press, 1994), p. 23.
[25] Truitt, p. 52.

witnessed in automata (along with those who created them) were therefore treated with an equal measure of wonder and mistrust.

However, as well as engendering a sense of mistrust and caution in contemporaries, the arrival of artificer-constructed automata in Western Europe also influenced the development of mechanical technologies that were used in the creation of locks, clocks, and (as we will see) mechanised prostheses. As Truitt suggests, from the thirteenth century onwards, popular responses to the creation of automata 'shifted from the mysteries of nature and esoteric knowledge to a more egalitarian understanding of natural forces, employed by craftsmen who created with their hands'.[26] This steady de-stigmatisation of automata and the people who created them led to a greater exchange of mechanical knowledge amongst the members of different craft guilds. Therefore, by the fifteenth and sixteenth centuries, it is possible to see the kinds of technology which first appeared in automata being put to use in the construction of prosthetic limbs.

1. INTELLECTUAL LABOUR

An especially well-known contributor to the construction of these mechanised prostheses was Ambroise Paré (c. 1510–1590). Having gained experience training as a barber surgeon at the Hôtel Dieu, Paré began his career as a military surgeon in the French army, where he developed a range of less intrusive methods of treatment, including the use of cold plasters (instead of boiling oil) for firearm wounds, the use of specifically designed forceps for the removal of bullets,

[26] Truitt, p. 140.

crossbow bolts, and shrapnel from the body, and the introduction of ligatures (rather than boiling oil and cautery) to control haemorrhage in extremity amputations.[27] In 1552, Paré became surgeon to King Henry II of France, retaining this role under Francis II, Charles IX and, towards the end of his career, Henry III and Catherine de' Medici.[28]

In 1575, Paré published a collected volume of his medical treatises, outlining a career's worth of surgical innovations. These treatises proved popular within the sixteenth-century medical community and were regularly reissued in both the original French and in German, Belgian and English translations. However, perhaps the most relevant of these treatises for this thesis is the *Livre traictant des moyens et artifices d'adiouster ce qui defaut naturellement, ou par accident* [Book dealing with the means and artifices to repair naturally occurring defects or [those defects occurring] by accident]. As well as outlining several methods for treating impairments such as hunched backs or missing eyes, noses, or tongues, this text also features several designs for mechanical artificial limbs (including the rare example of a mechanised leg prosthesis discussed above).[29]

---

[27] Panna Sanga, Adolph H. Giesecke, et al., 'History of Trauma', in *Trauma: Emergency Resuscitation, Perioperative Anaesthesia, Surgical Management*, vol. 1, ed. by William C. Wilson, Christopher M. Grande and David B. Hoyt (Boca Raton: Taylor and Francis, 2007), pp. 1–24 (p. 9); Jesse E. Thompson, 'History of Vascular Surgery', in *Surgery: Basic Scientific and Clinical Evidence*, Second Edition, ed. by Jeffrey A. Norton, et. al. (New York: Springer, 2008), pp. 1299–1316 (p. 1299).

[28] Bibliothèque nationale de France, *Ambroise Paré (c. 1510–1590) Bibliographie Selective* (2009) <http://www.bnf.fr/documents/biblio_pare.pdf> [accessed February 2018].

[29] Ambroise Paré, 'Livre traictant des moyens et artifices d'adiouster ce qui defaut naturellement, ou par accident', in Ambrose Paré, *Les oeuvres d'Ambroise Paré* (A Lyon: Chez Pierre Rigaud, 1652), pp. 572–584; Kevin Stagg, 'Representing Physical Difference: The Materiality of the Monstrous', in *Social Histories Of Disability And Deformity: Bodies, Images and Experiences*, ed. by David M. Turner and Kevin Stagg (London: Routledge, 2006), pp. 19–38 (p. 21); David M. Turner, Alun Withey, 'Technologies of the Body: Polite Consumption and the Correction of Deformity in Eighteenth-Century England', *History*, 99:338 (2014), 775–796 (p. 4).

The twelfth chapter of this book, *Les moyens d'accommoder des mains, bras et jambes artificielles, au lieu de ceux qui auront esté coupez* [Ways to use artificial hands, arms and legs, in place of those that have been amputated] includes a series of diagrams detailing several upper limb prostheses including a hand, forearm, and upper arm (see images 3.5–3.7).[30]

These designs depict three different styles of arm and hand prostheses. The first, shown in image 3.5, demonstrates a hand prosthesis which appears to have functioned according to the two fingerblock mechanism popular in the mid-fifteenth century. As we can see from the internal design, the hand is structured around one large axle in the back of the hand, which controls two separate mechanisms (the first extending into the little and ring finger and the second extending into the middle and index finger). Each finger also has its own cog (attached to a secondary axle), which would have allowed the fingers to be automatically fixed in place – very similarly to the Eisfelder Hand discussed above. The second of Paré's diagrams (as seen in image 3.6) depicts a forearm prosthesis. Although this image does not offer any insight into the inner mechanics of the limb, it demonstrates the fabric elements of a mechanised prosthesis which usually do not survive on material artefacts. For example, we can see three (presumably leather) straps and buckles which could be fastened around the arm. These buckles enabled the prosthesis to be affixed either loosely or tightly to the arm. Whilst this might suggest that the limb could be bought 'off the rack' and adapted to fit the arm of the individual who purchased it, I would

[30] Ambrose Paré, 'Livre traictant des moyens et artifices', pp. 579–583.

argue that these limbs were not ubiquitous enough for it to have been financially viable for an artisan to create one on the off chance an individual stopped by looking for an artificial limb. Instead, I believe these adjustable straps show that the limb was worn over some kind of padding (which, depending on the individual's state of recovery, the occasion, or seasonal temperature might have been made of thinner or thicker material) to prevent the metal from rubbing against or digging into the flesh of the stump. The final of these three designs (seen in image 3.7) shows a full arm prosthesis with an articulated elbow. Much like image 3.6, this diagram focusses on the external features of the limb, so it is difficult to get a sense of how the internal mechanisms functioned. However, we do get an insight into the working of the elbow, which appears to have operated on a hook and lock mechanism. We can see how a rotating metal disc with jagged edges was used to angle the forearm up or down, before being locked in place by an external lever (protruding from the bicep), which would have had to have been operated by the individual's surviving hand.

However, although these diagrams offer interesting insights into the design of sixteenth-century prostheses, it is important to recognise that Paré was not the first person to have designed artificial limbs. In fact, as figure 3 demonstrates, there are multiple prosthetic limbs which pre-date Paré's diagrams, many of which are German (rather than French) in design. Therefore, I believe that Paré was not the first person to have designed mechanised prostheses, but rather that he was influenced by a much earlier German tradition. However, because his work was written down, illustrated, and translated into multiple vernacular European languages, he is often mistakenly credited with the

development of mechanised prostheses by scholars such as Hernigou, who suggests that it was 'Paré [who] had the idea to use the progress in robotics that occurred in his period to create prostheses that worked with the mechanical devices invented for robotic toys or clocks'.[31]

2. ARTISANAL LABOUR

Although Paré recoded the 'intellectual' designs for these mechanised prostheses, he (and, presumably, other surgeons and physicians like him) did not possess the skills necessary for the construction of such an item. As such, it was almost certainly 'individual craftsmen, who had the knowledge and skill necessary for building prostheses' that performed the practical construction of these aids.[32] However, as Truitt observed in relation to automata, the artisans behind the construction of mechanised items are often overlooked by historical scholarship.[33] The following section of this chapter will address this gap in the scholarship by considering two rare examples of named artisans who were commissioned to construct mechanised prostheses.

The first of these artisans is mentioned by Paré in his discussion of how he constructed the hand prosthesis depicted in image 3.5. He explains that, although he had the medical and anatomical understanding necessary to design the limb, he needed advice on how to construct the internal mechanisms. He states that

[31] Philippe Hernigou, 'Ambroise Paré IV: The Early History of Artificial Limbs (from Robotic to Prostheses)', *International Orthopaedics*, 37:6 (2013), 1195–1197 (p. 1196).
[32] Cathrin Hähn, 'Mobility Limitations and Assistive Aids in the Merovingian Burial Record', in *New Approaches to Disease, Disability and Medicine in Medieval Europe*, ed. by Erin Connelly and Stefanie Künzel (Oxford: Archaeopress Publishing Ltd., 2018), pp. 31–42 (p. 33).
[33] Truitt, p. 41.

> [...] *d'un nommé le petit Lorrain, Serrurier demeurant à Paris, homme de bon esprit, avec les noms et explication de chacune partie desdicts poutraicts, faites en propres termes, et mots de l'artisan: afin que chacun Serrurier ou Horlogeur les puisse bien entendre et faire bras ou jambes artificielles semblables* [[...] from a man named the little Lorrain, a locksmith [who was a] resident of Paris, a man of good wit, [I received] the names and explanations of each part of the prostheses, made in proper terms, and the words of the artisan: [so] that each Locksmith or Clockmaker can understand them and make similar artificial arms and legs].[34]

The fact that Paré asked Little Lorrain, a locksmith, to explain how the internal mechanics of the prostheses should be created *en propres termes, et mots de l'artisan* [in the proper terms, and the words of the artisan] is revealing. Not only is Paré willing to admit that he deferred to a craftsperson with the relevant expertise in the design of the mechanics, but he also chooses to have the internal mechanisms of the prostheses explained 'in the proper terms' (by which he presumably means technically or academically) as well as in a way that another *Serrurier ou Horlogeur* [locksmith or clockmaker] would be able to understand. This would subsequently allow wealthy individuals to commission local artisans to recreate Paré's robotic prostheses, thereby turning his book into a buyer's catalogue as well as a medical treatise.

A second example of a local craftsperson being commissioned to create a prosthetic limb can be seen in the 1479 accounting book of Solothurn, Switzerland, which lists:

> *Item. A maistre Ulrich Wagner maistre facteur dez reloges pour una main quil a fait a Ulrich maistre dez boitez ordonne par Messeigneurs ou luef de celle quil persist ou service de le ville en faisant les keygel 11fl* [Item. To Master Ulrich Wagner, watchmaker, for one hand that he has made. To Master Ulrich, from the coffers of the Lord, to the one

[34] Ambrose Paré, 'Livre traictant des moyens et artifices', p. 579.

> who persists in the service of the city by making the locks, eleven florins].[35]

Although only a short extract, this reference offers a lot of information about the kinds of craftspeople employed in the creation of mechanised prostheses.

Firstly, it explains that Ulrich Wagner was a watchmaker. This is especially interesting as the construction of mechanical devices, such as 'iron hands', was only made possible by previous advances in sophisticated clockworks. An especially notable example of these earlier advances can be seen in the work of Richard of Wallingford (1292–1336), an abbot at St. Albans Abbey, England, who designed an astronomical clock credited with being the most complex clock mechanism of its day.[36] The fact that Wagner was a watchmaker himself would have meant that he was able to 'stand upon the shoulders of giants' like Wallingford, and apply his knowledge of clock mechanisms to the construction of mechanised prostheses. However, Wagner was not just a watchmaker. He had already served the city in the production of their locks and, although not mentioned in the accounting book, Wagner is also credited with the construction of a *jacquemart* (a mechanised figure who strikes the hours of the day on a bell with a hammer) for the clock of the church tower of Freiburg city church – demonstrating his ability to construct automata as well as watches, clocks, and locks.[37] Coupled with his creation of a mechanised prosthesis, this confirms that

---

[35] Anon, *Seckelmeisterrechnung 148b* (1479), fol. 64. Staatsarchiv Solothurn, Switzerland. Cited in Raoul Blanchard, 'Ulrich Wagner: Eiserne Kunsthand des Buchsenmeisters, 1476', in Anon, *Blätter des Museum für Kunst und Geschichte Freiburg 2000–2002* (Freiburg: Museum für Kunst und Geschichte, 2002), unpaginated.

[36] For more on Wallingford see John North, *God's Clockmaker: Richard of Wallingford and the Invention of Time* (London: Hambledon Continuum, 2005).

[37] Marcel Strub, *Les monuments d'art et d'histoire du canton de Friborg. Tome II: La Ville de Friborg* (Basel: Birkhäuser, 1956), p. 94.

there were overlapping skillsets between artisans involved in watchmaking, locksmithing, the creation of automata, and the production of mechanised prostheses.

The Solothurn accounts also provide the only known evidence for the cost of a prosthesis – stating that Wagner was paid eleven florins for his work (the equivalent of approximately £2,263.12 in twenty-first-century pounds and pence).[38] We can assume that this amount covered both Wagner's labour costs as well as his materials, as the manuscript does not list any purchase of iron which might have been used in the construction of the hand. Unlike the walking sticks and wheelbarrows discussed in the previous chapters, mechanised prostheses would not, therefore, have been affordable to lower-status individuals, but would instead have attracted a more economically affluent, elite user group (as we will discuss in greater detail below).

Since its commission in 1479, the Ulrich Wagner hand has been well preserved and currently resides in the Musée d'art et d'histoire de Friborg, in Switzerland. As we can see from images 3.8 and 3.9, the hand is equipped with two mechanisms which allow it to function according to the single fingerblock mechanism – in which all four fingers are fused and can be moved inwards (as a single unit) in various increments towards the palm. There does not appear to be a push button to reset the fingers to an 'open' position, as we find in other models. Therefore, the prosthesis would have to be manually reset by pulling the

[38] National Archives, *Currency Converter* (2017) <http://www.nationalarchives.gov.uk/currency-converter/#currency-result> [accessed January 2020].

fingers back into an open position (suggesting that the wearer still had use of their left hand in order to do this).

Unfortunately, the accounting book reference does not state who the hand was being purchased for, although (through deduction) it is possible to work this out from other information listed in the manuscript. Much later in the Solothurn manuscript there is a calendar detailing any important or noteworthy events that had occurred in the region each year. One of the entries for 1476 lists:

> *dem büchsenmeister von Frÿburg, so vor Murten ein hand und zweÿ ripp usgeschossen sind* [the master gunner from Frÿburg, had one hand and two ribs shot at Murten].[39]

On the 22nd June 1476, Murten (more commonly referred to as Morat in present day English) was the site of a battle between the Swiss Confederation (under the leadership of Fribourg and Bern) and the army of the Duke of Burgundy.[40] The Fribourg documents for this period list two master gunners who had been injured. The first, Gabriel Tucher, was listed as having lost both his hands, whilst the second, Ulrich Wyss, was listed as only having lost one. As the prosthesis created by Wagner required the use of a surviving hand to manoeuvre the position of the fingers, I would therefore suggest that it was commissioned for Ulrich Wyss.

[39] Anon, *Seckelmeisterrechnung 148b* (1479), fol. 64. Staatsarchiv Solothurn, Switzerland.
[40] Mathijs Roelofsen, *An Iron Hand for a Master Gunner Injured in the Burgundian Wars* (2019) <https://martcult.hypotheses.org/331> [accessed January 2020].

HIGH-STATUS MASCULINITY AND THE USE OF MECHANISED PROSTHESES

Having considered the intellectual design and artisanal construction of mechanised prostheses, this chapter will now turn to a discussion of the predominantly high-status male use of these artificial limbs, before conducting a close analysis of the unique example of Götz von Berlichingen's first-person account of medieval warfare, limb-loss, and his use of a mechanised prosthesis. Although we do not know the precise provenance of many surviving fifteenth- and sixteenth-century mechanised prostheses, we are fortunate enough to have a small number of artefacts with confirmed (or strongly assumed) ownership. Perhaps the most famous of these are the two arm prostheses (depicted in images 3.12 and 3.13) which belonged to Götz von Berlichingen (1480–1562), a German knight who will be discussed more thoroughly below. However, like Götz, all the other prostheses for which we have confirmed ownership also belonged to high-status, often military, men.

An example of this can be seen in the Balbronner Hand (depicted in image 3.10). During a renovation of the Balbronn church choir in 1908, this lower left arm prosthesis was discovered in a grave belonging to a sixteenth-century knight named Hans von Mittelhausen, and his wife, Barbra Hiferi.[41] Although there is no surviving documentation from the excavation itself that could be used to

[41] Robert Forrer, 'Die Eiserne Hand von Balbronn (Elsaß)', in *Zeitschrift für historische Waffen- und Kostümkunde: Organ des Vereins für Historische Waffenkunde*, ed. by Erich Haenel (Dresden: Budarch, 1915), pp. 102–107 (p. 103).

ascertain which of the skeletons (if either) might have been missing an arm, Robert Forrer (a scholar contemporaneous to the excavation) stated that:

> *deutlich erkennt man, dass unserem Balbronner Junker nicht bloss die linke Hand, sondern auch der linke Vorderarm mitsamt dem Ellbogengelenk fehlte* [you can clearly see that our Balbronner Junker lacked not only the left hand, but also the left forearm and the elbow joint].[42]

Consequently, as Forrer is the only surviving source to record the state of the skeletal remains before their reburial, we can only assume that it was Hans, rather than his wife, who was the owner of the prosthesis found in the grave.

Unfortunately (as can be seen in image 3.10), Hans's prosthesis was only partially preserved, with the remains consisting of just the hand and elbow pieces. Much like the other 'iron hands' discussed in this chapter, the Balbronner Hand would have been fastened to the arm and shoulder with a series of leather straps, and would have provided movement in the fingers through a spring and ratchet mechanism.[43] However, despite these shared features, the Balbronner Hand is a unique example of an arm prosthesis with a fully articulated elbow. Mirroring the construction of sixteenth-century armour, the elbow joint is reinforced with iron discs on the exterior – internally, however, it features an iron bar, supported by a large (1.6cm x 4cm) gear, which would have made it possible to adjust the position of the arm *in verschieden spitze Winkel einzustellen* [in different acute angles].[44]

[42] Forrer, p. 104.
[43] Forrer, p. 104; Löffler, p. 56.
[44] Forrer, p. 104; Löffler, p. 56.

As we have discussed above, this kind of prosthesis (featuring individually moving fingers and a fully articulated elbow) would have been an expensive item to purchase, and consequently it is all the more significant that the arm was buried with Hans, rather than being kept as a family heirloom or resold. Whilst this could suggest that Hans's family were wealthy enough to afford the burial of an expensive item (which, given Hans's status as Junker is very likely), I believe that the burial of the prosthesis alongside Hans also reveals a strong connection between Hans's sense of identity (either privately, publicly, or both) and his use of prosthetic technology. As we will discuss below, artificial limbs played an important role in the construction (or reconstruction) of a knight's sense of masculinity and self-worth after having received an otherwise very debilitating injury. As such, the use of a prosthesis restored so much more than the ability to complete certain tasks – it restored a sense of elite male identity. By blurring the lines between technology, the corporeal body, and one's sense of self worth in this way, the relationship between a knight and his prosthetic limb adheres to the concepts of transhumanism and Haraway's 'cyborg theory'. In order to be buried alongside such an expensive item, Hans's prosthetic arm must have been seen (both by himself and by his contemporaries) as an integral part of his physicality and identity, rather than just an external piece of technology (in a similar sense to the Worchester Pilgrim's staff discussed in chapter two) – rendering Hans a clear example of a 'medieval cyborg'.

A similar example that, although its exact owner is unknown, appears to have belonged to a knight is the Alt-Ruppiner Hand. This prosthesis was discovered during the construction of a bridge over the Rhine (near Alt-Ruppin)

in 1836, alongside a spur, stirrup, several horseshoes, and a sword. Drawing upon this collection of finds, contemporary scholar, Hermann E. Fritze, suggested that the prosthesis most likely dated from the late-fifteenth century and belonged to a knight who had fallen (or whose body had been disposed of) into the river during battle.[45] Unfortunately, there does not appear to be any surviving record of whether these items were found alongside a skeleton. However, it is possible that the river water both 'enabled the transport of ions to and from [the] bones [...] playing a direct part in [the skeleton's] degradation', facilitated the 'survival of microorganisms which attack bone', and provided a home to aquatic scavengers which might have been responsible for the displacement of the skeleton – possibly explaining the (seeming) absence of human remains found at the site.[46] Whilst there has been some more recent debate over the exact dating of the prosthesis – with Löffler, for example, suggesting that it was probably constructed in the early-sixteenth (rather than late-fifteenth) century, before 1528 – the fact that the hand's construction and internal mechanisms mirror many other prostheses with confirmed dates (such as the iron hand constructed by Ulrich Wagner c. 1476 and Götz von Berlichingen's First Jagshäusser Hand, constructed c. 1510) situates the construction of the hand firmly around the turn of the sixteenth century.[47] For example, the hand features similar moulded fingernails and wrinkles to those seen on each of the Jagshäusser Hands, and is

[45] Carl Alexander Ferdinand Kluge, Hermann Eduard Fritze, *Arthroplastik Oder Die Sämmtlichen, Bisher Bekannt Gewordenen Künstlichen Hände Und Füsse, Zum Ersatz Dieser Verloren Gegangenen Gliedmassen: Mit 26 In Stein Gravirten Tafeln* (Lemgo: Verlag der Meyer'schon Hof-Buchhundlund, 1842), p. 123.
[46] Simon Mays, *The Archaeology of Human Bones* (New York: Routledge, 1998), p. 21.
[47] Löffler, p. 27.

made up of two fingerblocks that can be moved incrementally towards the palm, before being released back into their 'open position' by a push button located on the back of the hand.[48] As a result of the hand's similarities to other prostheses which were known to have belonged to knights, coupled with the fact that it was discovered alongside several other artefacts associated with knighthood, I believe that it can be strongly assumed that this hand also belonged to a knight.

Consequently, out of our twenty-four surviving mechanised prostheses, a quarter of these have been attributed to specific individuals of elite male, and often knightly, status.[49] Whilst it is possible that the remaining seventeen artefacts (for which the ownership is unknown) did not belong to a similar user group, the fact that these limbs demonstrate so many shared features (both mechanically and cosmetically), are constructed of the same materials (and are therefore likely to have been purchased at a comparable cost), and are capable, as we will see below, of fulfilling very similar tasks, leads me to believe that (although we cannot say for absolute certain) mechanised prosthetic technology was used almost exclusively by high-status military men. However, if we are to accept this to be true, why then were later medieval knights and high-status fighting men more likely to have owned mechanised prostheses than their lower status or female counterparts?

Firstly, I would argue that the reason for this knightly ownership of mechanised prostheses occurred as a result of the high cost of these items. As

[48] Löffler, p. 27.
[49] Ulrich Wyss's Eiserne Hand (discussed above); Hans von Mittelhausen's Balbronner Hand; and Götz von Berlichingen's two Jagshäusser Hands (discussed below); the unnamed knight's Alt-Ruppiner Hand; and the Skokloster Hand which has been attributed to Olof Sverkersson Elfkarl (secretary to Johan III of Sweden).

discussed above, the craftsmanship and materials required for the construction of these prostheses would have made them very expensive items, and consequently they could only have been commissioned and bought by wealthy individuals.

Secondly, of these high-status buyers, military men were more likely to have suffered the loss of a limb than elite women as a result of the dangers associated with later medieval warfare. As we have discussed above, the technology necessary to create mechanised prostheses had been around for centuries prior to their appearance in the fifteenth and sixteenth centuries. Therefore, it is arguable that something in this period changed which warranted the use of this technology in the development of mechanised prostheses; this, I would argue, was the introduction of gunpowder to the Western battlefield, which in turn led to new kinds of wounds caused by cannon shots and gun shots. Whilst we do not know a great deal about the majority of our surviving prostheses' owners, we know that at least one of them – Ulrich Wyss (discussed above) – was employed as a master gunner when he lost his hand, and would therefore have been dealing with artillery weapons and gunpowder on a regular basis.[50] Similarly, Götz von Berlichingen (in the only known example of a first person account of limb loss), detailed that he lost his arm as a result of a canon shot lodging in his vambrace.[51]

However, what is most important for this thesis is not that these men lost limbs whilst using artillery weapons, but that they survived.[52] As Robert

[50] Roelofsen, 'An Iron Hand for a Master Gunner'.
[51] Götz von Berlichingen, *Götz von Berlichingen: Autobiography of a Sixteenth-Century Knight*, trans. by Dirk Rottgardt (Leavenworth: The Nafziger Collection Inc., 2014), p. 21.
[52] See Hans von Gersdorff, *Feldbuch der Wundartzney* (Strassburg: J. Schott, 1517), p. 66.

Woosnam-Savage suggests, even though limb-loss as a result of gun and cannon fire was still relatively rare when compared to other injuries, 'when it did happen, even such a significant trauma could perhaps be survived' as a result of innovative new surgical techniques.[53] The first known written account of artillery injuries in a medical context can be found in Heinrich von Pfolspeundt's *Buch der Bündth-Ertznei* (1460) in which the author offers advice on the removal of gunpowder from wounds.[54] However, it was not until Hans von Gersdorff's *Feldbuch der Wundartzney* (1517) that amputations were first discussed in relation to battlefield surgery – suggesting that, by this point, amputation had become a more viable (and survivable) method of treatment for severe artillery wounds. Consequently, the fact that elite men not only faced an increased risk of receiving artillery injuries which necessitated amputation, but also had an increased likelihood of surviving these injuries, meant that (although limb-loss was not widespread by any stretch) there would have been more high-status men who, after being wounded on the battlefield, found themselves alive, rehabilitated, and in need of prosthetic technology.[55]

Therefore, I would argue that the reason for this generally high-status, male ownership of mechanised prostheses was because members of the knightly class were the most likely people to fall at the intersection of those who required

---

[53] Robert C. Woosnam-Savage, Kelly DeVries, 'Battle Trauma in Medieval Warfare: Wounds, Weapons and Armor', in *Wounds and Wound Repair in Medieval Culture*, ed. by Larissa Tracy and Kelly DeVries (Leiden: Brill, 2015), pp. 27–56 (p. 43).

[54] Leo M. Zimmerman, Ilza Veith, *Great Ideas in the History of Surgery* (San Francisco: Norman Publishing, 1993, p. 203).

[55] There are currently very few scholars working on the relationship between gunpowder weaponry, sixteenth-century battlefield injuries and their survival rates, and subsequent rehabilitation practices and use of assistive technology. As such, I believe that this would make a very valuable area of enquiry for future scholars to consider, but unfortunately not one that there is time to discuss further in this thesis.

mechanised prostheses (as a result of their exposure to violence and warfare), and those who could afford to commission and purchase these items. However, that is not to suggest that women avoided these items altogether (later in this chapter we will discuss the case of the Grüninger prosthesis which likely belonged to a woman), but rather that elite men were statistically more likely to find themselves in a situation where they might require a mechanised prosthesis. Of these elite, knightly men who made use of mechanised prostheses, the most famous is undoubtedly Götz von Berlichingen, who not only lost his arm and used a prosthesis, but also documented his experience in an autobiography. As such, this chapter will now turn to a case study of Götz von Berlichingen to better understand the relationship between limb-loss, masculinity, and the use of prostheses in the later Middle Ages.

1. GÖTZ, THE 'IRON HAND', VON BERLICHINGEN

Göttfried 'Götz' von Berlichingen (1480–1562) was a German knight who fought in the armies of Frederick I, Margrave of Brandenburg-Ansbach, and the Holy Roman Emperor, Maximillian I, before forming and leading his own company of mercenaries to fight in the German Peasants' War. As such, Götz has attained the status of 'national hero' in Germany – becoming the titular character of Goethe's *Götz von Berlichingen*,[56] as well as having several German military entities named

[56] Götz's life and deeds were immortalised by Johann Wolfgang von Goethe in his play, *Götz von Berlichingen*, which was based on a 1731 edition of the autobiography. Unfortunately, there is no space in this thesis to discuss the drama further, but if you wish to read more about Goethe's interpretation of Götz von Berlichingen's life, see Volker Neuhaus, 'Götz von Berlichingen', in *Goethe Handbuch*, ed. by Theo Buck (Stuttgart: J.B. Metzler, 1996), pp. 78–99.

after him.[57] However, despite his military success and later fame within eighteenth- and twentieth-century Germany, Götz is more broadly recognised for his use of a lower arm prosthesis (which survives to this day), and the fact that he documented his experience of this limb loss in his autobiography – *Mein Fehd und Handlungen* (1567). Consequently, Götz provides a rare (and possibly unique) example of a named individual with a form of bodily impairment, for whom we have documentary evidence, a first-person narrative, and surviving material artefacts relating to his life.

There is plenty of scholarship on Götz's life and military endeavours. For example, Kurt Andermann has published several articles which examine Götz's ancestry and relationships with his peers, F. W. G. Graf von Berlichingen-Rossach (one of Götz's descendants) has produced a history of the von Berlichingen family, Henry Cohn has discussed how Götz's *Memoirs* compare to other contemporary autobiographies, and, whilst not relating to the historical figure of Götz, there is a huge amount of literature on Goethe's literary representation of the knight.[58] However, despite this interest in Götz, his family, and his legacy, there are very few scholars who have considered Götz in relation to masculinity

[57] For example, the Waffen-SS 17th SS Panzergrenadier Division *Götz von Berlichingen* (active in WW2), as well as the *Götz von Berlichingen*, one of the armed merchant cruisers sent by the Kriegsmarine to Japan in WW2.

[58] See Kurt Andermann, 'Götz von Berlichingen und Franz von Sickingen. Zeitgenossen – Altersgenossen – Standesgenossen', *Zeitschrift für die Geschichte des Oberrheins*, 165 (2017), 141–161; Kurt Andermann, 'Berlichingen. Portrait der scheinbar bekanntesten Familie des fränkischen Ritteradels', *Zeitschrift für württembergische Landesgeschichte*, 73 (2014), 187–200; Kurt Andermann, 'Götz von Berlichingen (um 1480–1562). Adliger Grundherr und Reichsritter', in *Fränkische Lebensbilder 20,* ed. by Erich Schneider (Neustadt an der Aisch: Veröffentlichungen der Gesellschaft für fränkische Geschichte, Reihe 7A, Band 20, 2004), pp. 17–37; Henry J. Cohn, 'Götz von Berlichingen and the Art of Military Autobiography', in *War, Literature and the Arts in Sixteenth-Century Europe*, ed. by J. R. Mulryne and M. Shewring (London: Palgrave Macmillan, 1989), pp. 22–40.

and limb-loss in the sixteenth century. Some, such as Löffler and Putti, have mentioned Götz's 'iron hands' within a broader survey of surviving later medieval prostheses, and Günter Quasigroch has mirrored this approach by analysing the construction of Götz's prostheses for the journal *Waffen- und Kostümkunde*.[59] However, the only scholar who has used Götz as a case study for understanding later medieval attitudes towards impairment and infirmity is Bianca Frohne.[60]

Frohne suggests that Götz's autobiography is an example of a 'remasculation narrative' – described by David Gerber as:

> the familiar story of the disabled, and hence feminised, veteran, who overcomes the physical limitations and the rolelessness that disability is said to make inevitable through a feat of self-rehabilitation, whether by strength or endurance, politically or sexually, and in doing so becomes a *real* man once more.[61]

Frohne argues that, although this is a tale with suffering at its core, it does not linger on this helplessness. By structuring his memoirs into three sections (firstly documenting his rise to prominence, then discussing the loss of his hand and consequent struggle with 'infirmity' and his sense of self-worth, and finally talking about how he overcame his 'infirmity' and rose to prominence again) Götz specifically arranges his autobiography 'to highlight this very moment of self-rehabilitation'.[62] This argument fits quite closely with that of Cohn, who

---

[59] Günter Quasigroch, 'Die Handprothesen des fränkischen Reichsritters Götz von Berlichingen. 1. Fortsetzung: Die Ersthand', *Waffen- und Kostümkunde*, 24 (1982), 17–33.
[60] Bianca Frohne, 'Performing Dis/ability? Constructions of 'Infirmity' in Late Medieval and Early Modern Life Writing', in *Infirmity in Antiquity and the Middle Ages: Social and Cultural Approaches to Health, Weakness and Care*, ed. by Christian Krötzl, Katariina Mustakallio and Jenni Kuuliala (London: Routledge, 2016), pp. 51–65.
[61] David A. Gerber, 'Preface to the Enlarged and Revised Edition: The Continuing Relevance of the Study of Disabled Veterans', in *Disabled Veterans in History*, ed. by David A. Gerber (Ann Arbor: University of Michigan Press, 2012), pp. ix–xxiii (p. xiv).
[62] Frohne, p. 60.

(whilst discussing the purpose of military autobiographies) suggests that Götz's main purpose in writing his autobiography was to 'counter the misleading interpretation of his actions by those who envied or wished him ill'.[63] Whilst Cohn is predominately referring to Götz's military feuds, by demonstrating that he regained his knightly abilities and knightly masculinity after he had received his injury, Götz also prevents later individuals from conflating his temporary infirmity with permanent weakness and emasculation.

However, whilst Frohne's notion of a 'remasculation narrative' is invaluable for this chapter (and will be revisited below) her overall argument is concerned with how Götz represents 'infirmity' and masculinity in his memoirs, and how he subsequently shapes his own narrative to overcome that infirmity. This chapter will differ from Frohne's line of enquiry by considering Götz's use of prostheses more specifically, asking how (if at all) his use of an 'iron hand' is represented in his memoirs, and discussing whether this matches with our understandings of how his surviving prostheses operate. With that said, let us now take a closer look at Götz's autobiography in order to see how he represents his experience of limb-loss and use of prosthetic technology.

ACCIDENT AND INJURY

The beginning of Götz's autobiography is predominantly concerned with documenting his early achievements and overcoming his status as a junker (or lesser) knight. It is therefore only a third of the way into his autobiography that

[63] Cohn, p. 33.

Götz first mentions his injury. He explains that, during the siege of Landshut (a town in Bavaria in the south-east of modern German), he rode out towards the enemy lines with his sword in hand. However, as he raised his sword arm, ready to strike, he was hit by a cannon shot fired from a field culverin, which smashed into the hilt of his sword, shattering the pommel and leaving his arm 'dangling from a strip of skin'.[64] Although Götz is a little unclear as to what did the damage itself, it seems that the cannon shot shattered the metal of his vambrace, and the shards of the vambrace severed his arm. He recounts:

> *Das annder theill des knopffs, vnnd die stangenn am schwerthefft hett sich gebogenn, wahr aber doch nit entzwey, das ich gedenckh, die stanng, vnd das ander theill vom knopff, hab mir zwischen dem henntschuch vnd dem arm zeug, die hanndt herab geschlagen, also das der arm hindenn vnd vornn zerschmettert wahr. Vnnd wie ich so dar siehe, so hanngtt die hanndt noch ein wenig ann der hautt* [The other half of the pommel and the sword's crossguard were bent, but they were still in one piece, so I think the crossguard and the other half of the pommel must have struck off my hand in between my gloves and the armour of my arm, so that the forearm was smashed completely. And when I look at this, I see my hand dangling from a strip of skin].[65]

However, being an experienced knight of status, Götz does not let this incident faze him. Instead of panicking at the sight of his arm, he calmly turns around and returns to the military base camp, stating that:

> *So thett ich ebenn, alls wehr mir nichts darumb, vndt wanndt denn gaull algemach vmb, vnnd kham dannach vnngefangenn vonn denn feindenn hinweg zu meinem hauffenn* [I just pretended that it did not matter, calmly turned my horse, and nevertheless came away from the enemies to my troop without being captured].[66]

[64] Frohne, p. 58.
[65] Translation taken from Frohne, p. 58.
[66] Translation taken from *Götz von Berlichingen,* trans. by Dirk Rottgardt, p. 21.

To a modern reader, the fact that 'mild surprise is the only emotion which colours the scene', seems highly unusual – as one would think that the sight of one's arm dangling off would induce some kind of panic, shock, or pain.[67] However, Götz neither panics not does he not recall feeling any physical pain when he receives this devastating injury. Whilst one could attempt to retrospectively diagnose this painlessness as a side-effect of shock or high levels of adrenaline, it is more useful to consider what Götz's calm response and exclusion of pain reveals about his attitudes towards warfare and knightly masculinity.

As Metzler suggests, medieval literature portrays warfare as 'a clean, neatly defined activity with only two outcomes: instant death or captivity, but [...] no disabled soldiers returning home'.[68] However, Götz's situation (i.e. surviving a serious battlefield injury and subsequently having to live with an impairment) does not fall into either of these two outcomes. He is, therefore, forced to construct his own portrayal of warfare which adheres to his understandings of knightly behaviour, whilst also taking into consideration his experience of 'returning home' having received a potentially disabling injury. One way in which he might have chosen to do this could have been to ignore his injury altogether, excluding his experience of limb-loss from his autobiography, and instead focussing on his more traditionally masculine, knightly activities. However, due to Götz's well-established reputation for having worn an 'iron hand', this was not a possibility. It appears that, over the course of his life, his use of a prosthetic

[67] Frohne, p. 58.
[68] Irina Metzler, *A Social History of Disability in the Middle Ages: Cultural Considerations of Physical Impairment* (New York, Routledge, 2013), p. 41.

limb became closely meshed with his public identity and, subsequently, to exclude the origins of his impairment from his memoirs would have undermined the authority of the rest of his autobiography.[69] Consequently, as Götz cannot avoid discussing his accident, he uses this moment to demonstrate both his military status and masculine prowess (as he was injured whilst raising his sword arm to strike down an enemy), as well as his rationality and fortitude (by not allowing his injury to fluster him).

The clearest evidence of this can be seen in Götz's initial response to his injury. He states that, when he saw what had happened, he acted *als wehr mir nichts darumb* [as if I did not care].[70] The fact that he had to *act* that he was unconcerned about the nature of his injury implies that he immediately understood the gravity of his situation but chose to ignore this in order to calmly return to camp. This decision to feign apathy and behave as though he was unfazed by the damage caused to his arm, further demonstrates his bravery and masculine composure. In a moment when most people would have panicked, Götz manages to remain calm, collected, and rational; and, as Karras suggests, it was this 'idea of rationality and moderation that distinguished the man both from the woman and from the beast'.[71] Regardless of how he responded in the moment, by choosing to present his accident in this way Götz creates a narrative

[69] As we discussed in the introduction to this thesis, the 'meshing' or relationship between one's body, assistive technology, and sense of self, was just as pertinent in the fifteenth and sixteenth centuries as it is today.
[70] *Götz von Berlichingen,* trans. by Dirk Rottgardt, p. 21.
[71] Ruth Karras, *From Boys to Men: Formations of Masculinity in Late Medieval Europe* (Philadelphia: University of Pennsylvania Press, 2002), p. 108.

space in which he can operate as both a traditional masculine knight, as well as an individual with a bodily impairment.

CARE AND RECOVERY

However, whilst Götz offers a relatively detailed account of his accident, he offers almost no discussion of the medical treatment he received in its aftermath. As Frohne suggests, 'not once do we see Götz unconscious or being treated by a medical professional'.[72] He does not mention whether he had to have the 'dangling' arm severed, whether he received any pain relief, whether his limb was cauterised, or who carried out these procedures. Instead, Götz chooses to focus on two distinct elements of his recovery – firstly, the care he received from his friends and peers, and secondly, his feelings of suicide and relationship with God. Consequently, I believe that Götz chose to highlight these aspects of his recovery (rather than the more medicalised aspects) in order to better demonstrate his reputation and prowess.

Having discussed his accident, Götz almost immediately begins to give an account of the people who came to visit him during his recovery. One of these is Götz's friend and fellow knight, Christoph von Gieg, who allegedly took great care of the injured knight. Götz states:

> *Vnnd thett er mir warlich vil guts vnnd erbott sich gegenn mir, das er mich nit laßenn woltt, ich solt im nit mehr sagenn, was ich ghern hett, vnnd was ich dorfft, wer es mentschlich vnnd muglich, so woldt er sich nit sparn, vnnd wolts vberkhommen* [he did me really much good, and offered me that he would not leave me alone, I should just say, what I

[72] Frohne, p. 60.

> should like and what I needed, if it was human and possible, so he would not skimp on it and would achieve it].[73]

However, although Gieg is one of the few visitors identified by name, he is most certainly not the only knight or solider to have visited Götz whilst he was recovering.[74] As Götz explains,

> *vnd khamen sunst vill anndere mehr gesellenn zu mir, also das ich inn zweyenn oder dreyenn tagen nit vill ruhe hett, es wahr gleich ein walfart zu mir* [many other comrades [came] to me, so that I did not have much peace for two or three days, it was quite a pilgrimage to me].[75]

As well as inquiring into his wellbeing, Götz's visitors also partook in what Frohne labels 'collective acts of remembrance' by reminiscing with Götz about his knightly deeds or actions on the battlefield and sharing stories of his valour.[76] Taken at face value, Götz's description of the people who visited him (and the stories they shared) suggests that there was a strong network of community care and that, due to his popularity, many of Götz's peers visited him in order to see how his recovery was progressing. However, when considered against the background of medieval constructs of knightly masculinity, I believe that Götz's need to impress upon his readers that he had so many visitors who not only recognised his achievements, but celebrated them, highlights an underlying fear that his injury should, or could, result in a loss of his knightly status and exclusion from this social group.

---

[73] Translation taken from Dirk Rottgardt, p. 20.
[74] Other named visitors included Jorg vonn Rosenberg, Jorg Truchsas vonn Awe and Hertzog Rupprechtt. See Tilman G. Moritz, *Autobiographik als ritterschaftliche Selbstverständigung: Ulrich von Hutten, Götz von Berlichingen, Sigmund von Herberstein* (Göttingen: Vandenhoeck & Ruprecht, 2019), p. 119.
[75] Translation taken from Dirk Rottgardt, p. 20.
[76] Frohne, p. 59.

As Pierre Bourdieu suggests in his investigation into the construction of masculinity, 'manliness must be validated by other men [...] and certified by recognition of membership of the group of 'real men''.[77] Whilst Bourdieu is not necessarily focussing on medieval masculinity, his argument can be applied to it. To be a successful medieval knight, a man not only had to accept a knightly way of life – he also had to establish himself as 'a part of a fixed social group' made up of other respected men who subscribed to the same form of masculine identity.[78] To fall out of this social group would severely affect a man's status and masculinity because a large aspect of being accepted as a medieval man meant being 'present, visible, [...] and interacting with a community of other males'.[79]

Götz is evidently aware of the impact that his social group has on his reputation and construction of knightly masculinity. As Kuuliala suggests, an injured knight's future depended very heavily on three factors – the type of injury sustained, the knight's economic situation, and his social network.[80] At this point in his *Memoirs*, Götz has not established whether he is able to overcome the severity of his injury (although, as we will discuss below, it very quickly becomes apparent that his injury had no lasting effects on his physical capabilities); however, he uses his recovery as an opportunity to establish that his social network remained strong despite his having lost an arm. Following Bourdieu's

---

[77] Pierre Bourdieu, *Masculine Domination*, trans. by Richard Nice (Stanford: Stanford University Press, 2000), p. 52.
[78] Karras, p. 23.
[79] Derek Neal, *The Masculine Self in Late Medieval England* (Chicago: University of Chicago Press, 2004), p. 152.
[80] Jenni Kuuliala, 'Nobility, Community and Physical Impairment in Later Medieval Canonization Processes', in *Infirmity in Antiquity and the Middle Ages: Social and Cultural Approaches to Health, Weakness and Care*, ed. by Christian Krötzl, Katariina Mustakallio and Jenni Kuuliala (London: Routledge, 2016), pp. 67–82 (p. 78).

argument, Götz's visitors validated his masculinity through their process of care and storytelling, allowing Götz to use them as a literary device which demonstrates his continued membership of an elite male social group and the subsequent maintenance of his knightly masculinity. Nevertheless, despite his many visitors and their confirmation that his public masculinity had remained intact, Götz's *Memoirs* demonstrate that the knight faced an internal struggle over what his function in society would be if could no longer perform the physical deeds associated with knighthood. Ultimately, Götz decides to pray to God, asking Him for death, as he believes that this would be preferable to living a life in which he is incapable of fulfilling the expectations of a knight.

Frohne suggests that this is a case of 'manly suffering'.[81] She argues that Götz's plea for death is an 'idealised utterance which befits his rank and status, following the assumption that a knight would prefer death to not being able to be a knight'.[82] Whilst there may be some truth in this (we have already seen how Götz manipulates his past to conform a to narrative of knightly masculinity), it is hard to accept that Götz's fears over his change in status are as cynical as Frohne argues. A body in a state of chronic physical impairment occupied an uncomfortable liminal space between the binaries of health and sickness. This marginal position was at odds with traditional understandings of knightly masculinity and military capability, which (as we will discuss in greater detail below) promoted the idea that a knight ought to have a faultless male body, characterised by beauty, strength, and harmonious proportions. Consequently,

[81] Frohne, p. 60.
[82] Frohne, p. 60.

death might have been more appealing to Götz than living a life in which he was unable to continue to act as a knight or to fulfil the duties expected of a young, elite man.

However, whilst asking God to bring about his death, Götz states:

> *fiell mir ein knechtt ein* [...] *der hett auch nit mehr dann ein hanndt gehabt* [I think of a knight [...] he did not have a hand then either].[83]

He remembers that this knight wore an iron prosthesis in place of his missing arm, which he used to fight on the battlefield. Unfortunately, this knight is unnamed and, aside from Götz briefly explaining that he had once fought along the man's sons, nothing else is revealed about his impairment or prosthesis.[84] Nevertheless, this thought soothes Götz and encourages him to change his dialogue with God. Now, instead of pleading for his death, he asks God to provide him with a similar prosthetic limb to the one he remembers, as he is sure that, with such a device, he could regain his military prowess.

LIFE WITH A PROSTHESIS

Despite Götz petitioning God for an iron hand, once he receives it, he offers no insight into its creation or appearance. He says nothing at all about who made it, where it was made, how much it cost, or how it functioned mechanically. Considering the personal nature of a prosthesis and the need for a good fit, it is likely that Götz commissioned and was measured for the piece – although this information is not revealed to his readers. We will never know why Götz chose to

[83] Götz von Berlichingen, *Götz von Berlichingen: Mein Fehd und Handlungen,* Text of the 1567 Rossacher Handschrift, ed. by Helgard Ulmschneider (Ostfildern: Thorbecke, 1981), 33v.
[84] Berlichingen, 33v.

exclude this information. Perhaps he did not think that these details would have been significant to his readers, or maybe he believed that discussing the commission and construction of his prosthesis would diminish the notion that it had, in some way, been gifted to him by God. Either way, Götz evidently did not deem the practical considerations around the construction and functionality of his prosthesis worthy of explanation in his autobiography. Fortunately for modern scholars, two of Götz's prostheses have survived into the present day, the internal mechanisms of which were extensively documented by Christian von Mechel in 1815. Therefore, this chapter will now discuss these physical objects, before considering how assistive technologies such as these might have been used in the day-to-day life of an elite man in the Middle Ages.

THE HANDS

The first surviving example of a prosthetic limb belonging to Götz is the First Jagshäusser Hand (see image 3.13). This hand, widely believed to be Götz's first prosthesis, is usually dated by scholars to c. 1505. However, this date needs to be treated with caution. As we can see from figure 3, it is quite difficult to date later medieval prostheses as precisely as this (except for the rare example of the Ulrich Wagner hand, which is accompanied by written documentation confirming its date of commission). Therefore, I believe that the date c. 1505 is commonly attributed to this hand because it is the earliest surviving prosthesis which has been confirmed as having belonged to the knight. Seeing as Götz lost his hand at the siege of Landshut (which we know to have taken place in 1504) the date c. 1505 most likely emerged as a probable estimate for its creation; however, there is

no concrete evidence to suggest that this prosthesis was either the first hand Götz had commissioned (he may have had an earlier limb which was lost or damaged) or, if it was Götz's first prosthesis, that he had it constructed within a year of losing his limb. As such, I believe that it is much safer to assume that this hand dates from the first half of the sixteenth century (due to its use of a two fingerblock mechanism, which was popular at this time), than to unquestioningly assume that the hand was Götz's first prosthesis and that it can subsequently be dated to year following the siege of Landshut.

The hand itself measures approximately thirteen centimetres in length and weighs six-hundred grams. It is made of sheet iron and the fingers are separated into two blocks which can be moved independently of each other. The first of these fingerblocks (comprising of the index and middle finger) also controls the thumb, moving it towards the fingers so that they can be touched together to form a circular shape. The movement of the hand can be 'reset' to its open position by pressing a button on the back. It is likely that this hand also featured some kind of fabric or leather cuff so that the hand could be attached to Götz's arm. Although this cuff no longer survives, there are several holes around the base of the hand, which were most likely used to lace the hand to the cuff.

A close analysis of this hand has also revealed remains of oil paint, suggesting that this hand was painted to match Götz's complexion.[85] By painting the hand a natural colour and including details such as nailbeds and creases around the knuckles and palm of the hand, it is likely that this hand not only

[85] Löffler, pp. 25–27.

enabled physical movement, but also fulfilled an aesthetic purpose by helping Götz to present an illusion of a complete body.[86] An endoscopic investigation into the internal mechanisms of this hand revealed large amounts of wear, suggesting that it was used a great deal during Götz's lifetime.[87]

The Second Jagshäusser Hand, believed to date from c. 1530, measures thirty-seven centimetres in length and weighs approximately one and a half kilograms (see image 3.12). Although it is based on similar principles of construction, this hand is much more complex than the first hand, allowing for much more nuanced levels of movement. Each of the four fingers is individually articulated in three joints, and the thumb is articulated in two joints. With his surviving hand, Götz would be able to position these fingers into a chosen shape, before fixing the position with a ratchet mechanism. Two buttons located on the back of the hand could then be used to return the thumb and fingers back into the open hand position. The last person who was permitted to open these arms and discuss the internal mechanisms was Otto Karpinski in the later-nineteenth century. Karpinski noted that this mechanisms of this second hand were very noisy, with each finger lock sounding like a rifle being cocked.[88] A third button allows the wrist to be angled up and down by approximately fifteen degrees, and a rotary (or radial) bearing located in the wrist allows the hand to rotate from left to right. Although these features in the wrist enable greater flexibility, they do so

[86] The cosmetic importance of mechanised prostheses will be discussed in greater detail below.
[87] René Baumgartner, Pierre Botta, *Amputation und Prothesenversorgung der oberen Extremität* (Stuttgart: Enke, 1997), p. 161.
[88] Otto Karpinski, *Studien über künstliche Glieder: im Auftrage des Königlich Preussischen Kriegs-Ministeriums* (Berlin: Mittler, 1881), p. 30.

at the expense of strength. As such, these delicate mechanics would render the hand unsuitable for combat (which will be discussed in greater length below).

Unlike the first hand, this prosthesis has a surviving cuff which would have been used to attach the limb to Götz's arm. This cuff contains a hinged door, which can be opened to more comfortably insert the arm into the prosthesis. This door can then be closed and secured with two leather straps and buckles (as seen in image 3.12).[89] Although she is not speaking specifically about mechanised prostheses, Metzler suggests that 'cultural pressure [..] may have led disabled people sometimes to use certain mobility aids when out and about in public and others when alone in private'.[90] This argument can be applied convincingly to the Second Jagshäusser Hand as, despite its complexity and range of movement, this prosthesis shows very few signs of wear and no evidence of having been painted. It is therefore likely that this hand was reserved for the completion of tasks requiring more manual dexterity or saved for special occasions (perhaps intended to be worn under a glove).[91]

REHABILITATION AND USE OF THE PROSTHESES

However, although historians are very confident that these prosthetic limbs belonged to Götz (as they date from the correct period and location, and have always been owned by the Berlichingen family), there is absolutely no evidence which discusses Götz's rehabilitation or how he learned to use his prostheses.

[89] Karpinski, p. 33.
[90] Irina Metzler, 'Have Crutch, Will Travel: Disabled People on the Move in Medieval Europe', in *Travels and Mobilities in the Middle Ages: From the Atlantic to the Black Sea*, ed. by Marianne O'Doherty and Felicitas Schmeider (Turnhout: Brepols, 2015), pp. 91–117 (p. 109).
[91] Baumgartner, Botta, p. 161; Löffler, p. 54.

Instead, his autobiography skips over his recovery process, and returns to tales of his adventures and misdeeds. While this absence of information generates an abundance of unanswered questions (did Götz have to train to use his sword in his left hand? Was he ambidextrous in the first place? How did people respond to his prosthesis? Did he disguise the hand with a glove?), the very fact that Götz chooses to exclude this information is revealing. As Cohn rightly suggests, Götz's autobiography 'has more vivid details than any similar sixteenth-century German work, with uncanny recall of places, dates, distances, clothes, military banners and skirmishes going back over sixty-five years'.[92] Why then, if Götz generally demonstrates such a keen memory for details, does he choose to exclude any kind of discussion of his rehabilitation?

Firstly, it could be argued that Götz does not discuss his rehabilitation because it did not take place. While it is possible to rule out the idea that Götz was left-handed to begin with (the very reason he lost his arm was because it was hit by a cannon shot whilst holding his sword aloft), he might have been ambidextrous. This would explain the lack of focus on rehabilitation and training, as he would already have been able to wield a weapon in his left hand. Conversely, it could be that Götz did undergo some form of rehabilitation but thought that this would be of no interest to his audience and consequently chose to exclude it in favour of (what he believed were) more exciting stories. Whilst both of these options are possible and could certainly explain why Götz does not talk about his recovery, I believe that it is more likely that Götz decided to ignore

[92] Cohn, p. 31.

this part of his life in order to better construct himself as a capable, masculine, knightly ideal.

As Frohne suggests, 'an 'infirm' body is a 'performative' body – in order to be established, it has to be reiterated, and if that does not happen, the body can be read anew in a variety of contexts and meanings'.[93] By suggesting that he struggled to fight with his new hand, that he took time to adapt to life with a prosthesis, or that people treated him differently once he had lost his arm, Götz would be reiterating his infirmity and therefore undermining the remasculation narrative he had constructed for himself in his *Memoirs*. Consequently, rather than discuss his recovery (and any associated rehabilitation that went along with it), Götz jumps straight into a fresh tale about a time when he was encircled by approximately thirty mounted soldiers, but still threatened them all, stating:

> *wann sie handt an mich gelegt hettenn, so wollt ich mich durch sie schlagen* [if they lay hands on me, I would break through them].[94]

This immediate transition from deep despair at the loss of his hand, to such extreme masculine bravado is jarring to the reader, but speaks to Götz's desire to quickly move beyond his limb loss and return to his previous state of independence, bravery, and knightly virtue.

Similar to his failure to mention his rehabilitation, Götz's autobiography also includes surprisingly little discussion of how he used and maintained his prosthesis, or how individuals around him responded to his use of an artificial limb. In fact, aside from his discussion of the unnamed knight he remembered to

[93] Frohne, p. 61.
[94] Berlichingen, 35r–35v.

have used an iron hand, Götz only mentions his prosthesis on one other occasion, in which he states that he arrived one night in a town named Windtßheim (located in Bavaria, west of Nuremburg) and

> *ließ dieselbig nacht etwas ann der eisen handt, so mir zubrochenn wartt, machen* [during the same night I had something done to the iron hand, which was broken].[95]

Although this reference to his hand is brief, it offers a tantalising insight into the use and maintenance of later medieval mechanised prostheses.

Firstly, the fact that the hand was, in some way, damaged and in need of repair suggests that it must have been in frequent use (or, in the very least, that it was not being especially carefully preserved). As such, I believe that this passage refers to the First Jagshäusser Hand, as the surviving artefact supports the fact that the prosthesis was well used. Secondly, this brief passage implies that Götz gave his hand to a stranger to be fixed. This need for another person's assistance could suggest that either Götz did not want to repair the hand himself (perhaps he could afford to pay another individual to undertake a basic repair job whilst he saw to other matters), that the task was too complicated for Götz to undertake himself (due to a specialist need of mechanical knowledge or an understanding of blacksmithing and the creation of armour), or that the repair was simple enough to undertake, but required two hands to do so. Whatever the reason, we can be

[95] Dirk Rottgardt's translation is misleading here. He suggests that the passage reads: 'during the same night I had something in my iron hand repaired, which was broken' (p. 50). However, there is nothing in this extract to suggest that the damage was 'in' the hand (implying that this somehow affected the internal mechanism). Instead, the translation suggests only that some element of the hand needed fixing. This could have been as simple as re-greasing the joints, or a more complex restoration of the inner mechanism. Unfortunately, there is no way of telling this for certain from Götz's autobiography. As such, I have included my translation, rather than Rottgardt's in the text above.

sure that somebody other than Götz (whether skilled or unskilled) was employed to repair the hand.

This statement about the repair of his hand is the second and final reference to his prosthesis in his entire autobiography. Despite talking about multiple battles and campaigns after this point in the text, Götz does not mention anything about his iron hand – in either the sense that it enabled his actions or that it impeded his actions. However, he describes riding horses, wielding a sword, and even completing very dextrous tasks, such as extracting lead from door hinges and turning it into bullets – all of which would have forced him to engage (both physically and psychologically) with the difficulties of losing a hand and engaging with a prosthetic arm. Frohne argues that Götz's decision to exclude any further discussion of his prosthesis in the latter half of his *Memoirs* is a part of his adherence to a remasculation narrative. She suggests that by the end of the autobiography, 'Götz's physical integrity is [...] restored to such an extent that no 'infirmity' is left at all on a textual level'.[96] By ignoring his infirmity in the text, Götz's readers have no option but to assume that he also exhibited no trace of infirmity in his day-to-day life. If we are to believe Götz, it would seem that his missing hand in no way altered or affected his abilities or personal reputation, and that his injury and use of a mechanised prosthesis were subsequently deemed unworthy of note. By presenting himself in this way, Götz ensures that he is viewed as a strong, capable example of knightly masculinity

[96] Frohne, p. 61.

(rather than being considered incapable and helpless, and therefore emasculated as a result of his injury). As Andermann suggests:

> *gestorben ist er als angesehener und allseits – vom Kaiser, von Fürsten, Grafen und Standesgenossen sowie nicht zuletzt von Stadtbürgern – hochgeachteter Mann* [he died as a respected and highly esteemed man – by the emperor, by princes, counts and peers as well as not least by city citizens],[97]

thereby demonstrating that he was (both within him *Memoirs* and in his everyday life) clearly very successful in his self-rehabilitation and establishment of a remasculation narrative.

***

As this chapter has now considered the construction of these fifteenth- and sixteenth-century mechanised prostheses, and has discussed their predominantly high-status, male user group, the final section will consider the functions and capabilities of mechanised prostheses, asking how effectively (and for what purpose) they might have been used on a day-to-day basis. As Götz's autobiography is the only written document which discusses the lived experience of using a mechanised prosthesis, the following section of this chapter will therefore refer heavily to the activities that he appears to have been able to perform whilst using a prosthesis; however, it should not be assumed that Götz's experience exactly mirrored that of his contemporaries. This chapter will attempt to temper the over-reliance on this one source by considering the internal mechanics of the surviving prostheses to assess how their levels of mobility might have been employed in a practical sense.

---

[97] Andermann, 'Berlichingen: Portrait', (p. 196).

FUNCTIONS AND CAPABILITIES OF MECHANISED PROSTHESES

1. PHYSICAL FUNCTIONS

Due to their inner mechanics, which allowed users to set their fingers or fingerblocks (depending upon the hand) into a range of positions, later medieval prostheses could assist their wearer in a relatively broad range of physical tasks. Perhaps the most important of these everyday uses was the way in which prosthetic arms and hands helped their users to navigate a built environment by facilitating the ability to push against objects.[98] For example, the anatomically correct shape of prostheses would have provided their user with either a fist or a palm which could have been used to push open a door, have acted as a form of leverage against a table or chair to help the user stand up and sit down, or have provided something to lean against to help maintain balance.

As well as providing the user with a platform upon which they could push, lean, or steady themselves, the flexibility of the fingers in prosthetic hands and the ability to set them at various increments towards the palm could, for example, have been used to position the hand so that it was shaped to larger objects, such as a tankard. Although iron would not have been the best material for these hands to maintain a grip on items such as tankards, it is likely that they were often painted (as we will see below) or worn with a glove. The roughness of the paint and/or the fabric of the glove would have partially increased the hand's

[98] Thank you to Karen Watts for drawing these everyday uses of prosthetic arms to my attention (March 2019).

ability to grip smooth or moderately heavy objects. Unfortunately, I do not believe that these arm prostheses (especially those that operated on a fingerblock or two fingerblock mechanism) had the nuance of movement or strength of grip to facilitate holding small objects or undertaking fine work. I do not think the owners of these prostheses would have been able to use their artificial limbs for tasks such as writing, holding cutlery, or (as mentioned above in the case of Götz von Berlichingen), extracting lead from door hinges.

However, although it is important to consider how these limbs might have been used (or not used) for everyday tasks and navigating a built environment, it is worth noting that the largest user group for this kind of prosthesis was elite men, who (as we have seen) were expected to fulfil specific functions within society. As such, historians most frequently debate how (if at all) they might have been used in warfare – both for the purpose of sword fighting and horse riding. Therefore, I will discuss these functions individually in order to assess how mechanised prostheses might have been used in a military setting.

FIGHTING

When discussing Götz von Berlichingen, Frohne argues that his 'iron hand was only of limited use because it did not allow him to grasp objects firmly enough to wield them in combat. Sword fighting, for example, would have been impossible'.[99] As we have already discussed, Götz's earlier prosthesis operated on a two fingerblock mechanism that was very typical of mechanised hands at this time. Of the twenty-three surviving examples of later medieval prosthetic arms,

[99] Frohne, p. 61.

six of these operate on the same 'two fingerblock' mechanism as the First Jagshäusser Hand and, of these six limbs, four are confirmed to have belonged to knights (as discussed above).[100] Consequently, this correlation between the two-fingerblock mechanism and the knightly use of prosthetic limbs leads me to believe that Frohne's assertion requires further investigation.

The most widely accepted theory is that, if a medieval knight lost their sword hand, they would have had to train themselves to use their other hand for combat instead.[101] Although this process would have been difficult and lengthy, it is certainly a possibility. However, having discussed whether a medieval knight would have been able to fight with a prosthesis with *Kunst des Fechtens* (KDF) – a historical marital arts group who specialise in the teachings of German fight master Johannes Liechtenauer (1300–1389) – I would argue that, whilst retraining oneself to use their surviving hand might have been a useful solution in the long-term, it would also have been possible to fight with a prosthesis.[102]

First of all, Frohne is right in her suggestion that sword fighting would have been impossible.[103] The KDF community demonstrated that sword-fighting on foot requires a great deal of flexibility and movement of the wrist.[104] Unfortunately none of the two fingerblock hands owned by knights could have provided the level of dexterity possible for this kind of fighting. It is possible that prostheses with articulated wrist joints, designed to enable greater flexibility

[100] The two Jagshäusser Hands, the Alt-Ruppiner Hand, and the Skokloster Hand.
[101] Frohne, p. 61. Although, as we discussed in relation to Götz, it is also (albeit less so) possible that a knight might have been ambidextrous in the first place and therefore have not needed to retrain.
[102] KDF Leeds, *Homepage* (2018) <http://www.kdfleeds.co.uk/> [accessed July 2018].
[103] Frohne, p. 61.
[104] KDF Leeds [accessed July 2018].

(such as Götz's second hand – as demonstrated in Christian von Mechel's illustrations, see images 3.14 and 3.15), could have provided the movement necessary to wield a sword. However, the complex mechanisms needed to create these kinds of wrist joints would have also rendered the prosthesis more fragile, less capable of bearing weight, and unable to absorb the shock of striking another person with either the hand itself or with a weapon held in the hand. As such, a knight would not have been able to fight with a sword on foot as the kinds of prosthesis that were sufficiently durable to withstand combat did not provide enough flexibility, and those that were articulated at the wrist were too fragile to bear the weight of a weapon.

However, just because a knight could not wield a sword with his prosthesis whilst fighting on foot does not mean that he could not have used other kinds of weapons instead. The techniques needed for fighting with a sword were more nuanced than fighting with a blunt hand weapon such as a warhammer, club or mace. Rather than requiring intricate movements of the hand, wrist, and arm (as seen in sword fighting), bludgeoning weapons could be equally effective with a smaller range of arm movement. An example of this can be seen in Hans Talhoffer's *Alte Armatur und Ringkunst* (published in 1459). Talhoffer (c. 1410–c. 1482) was a renowned German fencing master who served the members of the lower and higher aristocracy of the Upper Rhine region in the south of the Holy Roman Empire. His *Alte Armatur und Ringkunst* consists almost entirely of images demonstrating the fighting techniques associated with

different weapons (which, it is believed, he posed for himself).[105] For example, image 3.16 demonstrates quite well how the wrist needed to be able to rotate left and right, as well as bend backwards and forwards, in order to wield a bladed weapon such as a sword or dagger, whereas image 3.17 demonstrates the more static up and down movements associated with using a club. As Ariella Elema explains, later medieval judicial combats were most frequently fought using wooden clubs, and therefore it is likely that most knights would have been familiar with the use of a club as a weapon.[106] Experimentation has also demonstrated that (contrary to Frohne's assertion, discussed above) a prosthesis did, in fact, have enough grip to hold a bludgeoning weapon, such as a mace. As can be seen in image 3.20, the private owner of the Nürnberger Hand (a German prosthesis dating from c. 1580, which operates on a two fingerblock mechanism) has demonstrated the hand's ability to hold contemporary weapons. As such, it is possible that (in terms of ground combat) an impaired knight might have used his prosthetic arm, not for sword fighting, but to wield a bludgeoning weapon that required less flexibility and nuance of movement.

However, knights fought not just on foot, but also on horseback. When fighting on horseback, the movements are more restricted, with much of the power coming from the shoulder (rather than the wrist). In this case (assuming the knight's arm was amputated below the elbow) it might have been possible for a man to use his prosthesis to wield a sword on horseback. Provided that the

[105] Daniel Jaquet, *Hans Talhoffer's Fight Book, a Sixteenth-Century Manuscript about the Art of Fighting* (2018) <https://www.metmuseum.org/toah/hd/fight/hd_fight.htm> [accessed December 2019].
[106] Ariella Elema, 'Tradition, Innovation, Re-enactment: Hans Talhoffer's Unusual Weapons', *Acta Periodica Duellatorum*, 7:1 (2019), 3–25 (p. 5).

prosthesis was firmly attached to his arm, the sword was firmly attached to the prosthesis, and that the iron hand could withstand the shock when Götz's weapon made contact, there is no reason why he could not have fought with his prosthesis when confined to this more limited style of fighting on horseback – that is, of course, if the knight was still able to ride a horse after his injury.

RIDING

For later medieval knights, the ability to ride a horse was fundamental. Not only were mounted soldiers, or cavalry, an essential component in late medieval warfare (making a horse invaluable to a knight), but the warhorse was a key signifier of a knight's social class. Destriers were expensive to both buy and maintain, and consequently acted as a luxury commodity that demonstrated a knight's wealth and status.[107]

This relationship between a knight and his horse was so entrenched within medieval cultural understanding that, within both the literature and artwork of the Middle Ages, the body and status of a knight was reflected in that of his horse.[108] For example, in the twelfth-century *Gesta Francorum* knights who lose their horses (while on the First Crusade) cease to be referred to as knights.[109] As Conor Kostick suggests, 'the anonymous author of the *Gesta Francorum* described *milites* becoming *pedites* through the loss of their horses'.[110] Whilst this

[107] Marina Viallon, *Knights and Destriers: Representations and Symbolism of The Medieval Warhorse in Medieval Art* (2014) <https://mad.hypotheses.org/375> [accessed November 2018].
[108] The French term *chevalier* and the German term *ritter* (which we frequently translate as 'knight') literally mean 'horseman' or 'rider' – further demonstrating the importance of the knight's relationship with his horse and the act of mounted fighting.
[109] Anon, *Gesta Francorum et aliorum Hierosolimitanorum – The Deeds of the Franks and the Other Pilgrims to Jerusalem,* trans. by Rosalind Hill (London: Nelson, 1962), p. 20.
[110] Conor Kostick, *The Social Structure of the First Crusade* (Leiden: Brill, 2008), p. 160.

could represent a simple change in status from being a mounted soldier to a foot soldier, the *Gesta Francorum* seems to imply that the knights lose more than just their steeds – they also lose their knightly identity. Once the symbiotic relationship between knight and horse is broken down, the rider can no longer function as a knight and is instead reduced to the status of *pedes* (foot-soldier). In this transition, the knight does not just lose his steed, but also forfeits his implied noble status and knightly values. As such, it is arguable that a knight's horse was a prosthetic extension of his body – creating the kind of 'human-animal cyborg assemblage' discussed by Haraway in her 'Cyborg Manifesto'.[111] Just as Götz felt as though he had lost a sense of his elite male identity when he lost his arm, so too do the knights in the *Gesta Francorum* when they lose their horses. As a result, it could be argued that (to the knights in the *Gesta Francorum* at least) their steeds were as important a part of their physicality as their corporeal limbs – thereby rendering these men cyborgs, made up of a 'potent fusion' of the human and animal body.

However, although historians have considered this relationship between a knight and his steed, very little research has been conducted into how people physically rode horses in the Middle Ages – let alone how a riding style could be adapted for the needs of an individual with a bodily impairment (potentially adding a third 'mechanical' element to the horse-human cyborg assemblage in the form of a mechanised prosthesis). As such, this chapter will now consider

[111] Donna Haraway, 'A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s', in Donna Haraway, *The Haraway Reader* (New York: Routledge, 2004), pp. 7–45 (pp. 10–12).

how an impaired knight might have been able to continue being a good horseman with the help of an artificial limb.

Young noble boys would have practised horse riding from a very early age. As well as learning how to take care of their lord's horses, they would also have studied the basic skills of armed combat, 'such as leaping into the saddle fully armed without touching the stirrup'.[112] These training exercises were outlined in military manuals which were read widely by the elite, knightly classes. Amongst these, Vegetius's *De Re Militari* was especially popular. In the first book of this treatise, Vegetius explains that, when training,

> *supra hos iuniores primo inermes, dum consuetudo proficeret, deinde armati cogebantur ascendere. Tantaque cura erat, ut non solum a dextris sed etiam a sinistris partibus et insilire et desilire condiscerent, euaginatos etiam gladios uel contos tenentes* [young soldiers were taught to vault [onto wooden horses] at first without arms, afterwards completely armed. And such was their attention to this exercise that they were accustomed to mount and dismount on either side indifferently, with their drawn swords or lances in their hands].[113]

Although the *De Re Militari* dates from the fifth century and was written about Roman warfare, it remained popular well into the late Middle Ages, with print editions being produced in multiple European languages throughout the fifteenth century.[114] In 1476, Augsburg printer Johan Wiener, released *Kurze Verweissung von Der Ritterschaft* – a vernacular German edition of the *De Re Militari*, which was commissioned specifically for the press and contained sixty-three woodcut

---

[112] R. H. C. Davies, *The Medieval Warhorse: Origin, Development and Redevelopment* (London: Thames and Hudson, 1989), p. 19.
[113] Flavius Vegetius Renatus, *De Re Militari*, trans. by John Clarke (Washington, D. C.: Praetorian Press, 2011) p. 19. For the original Latin see Vegetius, *Epitoma rei militaris*, ed. by M. D. Reeve (Oxford: Oxford Clarendon Press, 2004), Liber I, VXIII.
[114] Christopher Allmand, *The De Re Militari of Vegetius: The Reception, Transmission and Legacy of a Roman Text in the Middle Ages* (Cambridge: Cambridge University Press, 2011), p. 253.

illustrations.[115] Therefore, it is not unlikely that many later medieval knights had access to at least one translation of Vegetius's treatise and may well have incorporated its techniques into their own riding. If this is the case, a knight would not have required the use of his hands when mounting a horse because (as can be seen in the extract above) in Vegetius's style of riding, mounted soldiers were expected to keep their hands free when vaulting onto a horse so that they could hold their weapons.

The need to keep hold of a sword, shield, or lance on horseback also meant that, once sat atop the horse, a knight was not required to use his arms to maintain balance or to guide his horse – making it very likely that a knight would not have had to re-learn or adjust his technique in order to continue riding after his injury. This style of 'hands-free' riding was supported by a special saddle called a *selle a piquer*. This type of saddle had a high pommel (located at the rear of the saddle) and cantle (located at the front of the saddle).[116] Together, these amendments formed a 'cradle-like' seat, which helped to hold the knight in place whilst riding. An example of this can be seen in Henry VIII's horse armour. Produced c. 1515, it is believed that this armour was created for the king by Italian craftsmen. However, whilst one must be aware that it represents the top level of craftsmanship available in the early-sixteenth century, it also accurately demonstrates the supportive pommel and cantle of a military saddle – showing

[115] Mark Geldof, 'The Pike and the Printing Press: Military Handbooks and the Gentrification of the Early-Modern Military Revolution', in *International Exchange in the Early Modern Book World*, ed. by Matthew McLean and Sara Barker (Leiden: Brill, 2016), pp. 147–68 (p. 155).
[116] Luigi Gianoli, *Horses and Horsemanship Through the Ages* (New York: Crown Publishers, 1969), p. 83.

how these features would have kept a knight firmly wedged in the seat.[117] The *selle a piquer* was often accompanied by padded upper-leg guards, which not only protected the knight's thighs and knees from attack, but also stopped the rider's legs from slipping backwards – preventing 'any disturbance of the rider's balance in the saddle'.[118]

Contrary to popular understanding, the horses' reins were often redundant in the riding process. According to the historical riding team at the Leeds Royal Armouries, a horse's movement was largely guided by the hips and legs – the reins themselves were 'artificial aids', which were only used if the knight's 'natural aids' (i.e. movement of the legs, hips or voice commands) failed.[119] Therefore, if a knight was already adept at guiding his horse through movements of his legs and hips, or the use of vocal commands, it is likely that he would not have had to adapt his riding style to any significant extent after his injury. However, that does not mean that hand prostheses were not designed with the ability to hold reins in mind as, even though the reins were not an integral part of riding, they were still an important back up should something go wrong. Consequently, the fact that all kinds of hand prostheses (be that with a single fingerblock mechanism, a two fingerblock mechanism, or individually moveable fingers) could be set in a 'closed' position, with the first finger and thumb making

---

[117] Royal Armouries, *Horse Armour (1515)* (2018) <https://collections.royalarmouries.org/object/rac-object-2629.html> [accessed 1st December 2018].
[118] Elizabeth Pope Simmons, 'The Rejection of the Manege Tradition in Early Modern England: "Equestrian Elegance at Odds with English Sporting Tradition"' (Unpublished Doctoral Thesis, University of North Florida, 2011), p. 13.
[119] With thanks to conversation with the Royal Armouries Riding team at the International Medieval Congress, Leeds (July 2018). To find more on the Royal Armouries historical horse-riding see <https://royalarmouries.org/>.

a sealed 'o' shape (as demonstrated in image 3.22) would have allowed a knight to maintain a loose hold of his horse's reins, should he need to use them. One unique example of a prosthesis, seen in images 3.21 and 3.22 (constructed in sixteenth-century Germany) has a large iron nail through the palm, which is believed to have been included so that its wearer could secure his horse's reins to the hand by looping them around the nail. Interestingly, this protruding nail would have made it impossible to use the hand for other day-to-day activities (such as holding a tankard or using the palm of the hand as leverage when moving around a built environment – as discussed earlier). This leads me to believe that this prosthesis was constructed specifically for riding and that its user might also have had a more practical hand to wear when he was not on horseback.

2. COSMETIC FUNCTIONS

Having discussed the predominantly elite male user-group of later medieval mechanised prostheses, how (and by whom) these items might have been designed and constructed, and the various physical functions of which these limbs were capable, this final section of this chapter will now consider the cosmetic importance of mechanised prostheses. Mechanised prostheses are the only form of assistive technology in this thesis whose aesthetic features served a practical purpose. Whilst some of the other assistive aids we have discussed were certainly constructed with decorative elements, these design features did not affect the overall functionality of the aid. The Worcester Pilgrim's staff, for example, would have worked just as well for traversing difficult landscape if it

was coloured purple or left undyed. Similarly, as we will see in the following chapter, it did not make a lot of difference to the general function of eyeglasses if they were set in wooden or silver-gilt frames. However, unlike the crutches, wheeled-chairs, and spectacles discussed in the rest of this thesis, the physical appearance of prostheses played a very important role in their ability to construct the illusion of a 'complete' body. For many users of prostheses, it was just as important that these aids could be easily disguised as an organic part of the body, as it was that they could be used to hold a tankard, wield weapons, or hold a horse's reins. Consequently, the final section of this chapter will consider the cosmetic function of mechanised prostheses, paying particular attention to how their aesthetic qualities were designed to meet the needs of a predominantly high-status, male user group.

1. HIGH-STATUS MASCULINITY AND BODILY INTEGRITY

As this thesis has already demonstrated, a person's physical impairment and their use of a certain kind of assistive technology revealed a lot about their status, gender and disability. However, the case studies that we have dealt with prior to this chapter have been primarily focussed on lower status people who, as Kuuliala points out, 'were more easily associated with the body as well as bodily ailments' in the medieval mindset, than those of upper status.[120] For high-status men, on the other hand, it appears to have been much more important to conceal physical impairments in order to present an outward show of strength and bodily

[120] Kuuliala, 'Nobility, Community and Physical Impairment', p. 67.

perfection.[121] As Derek Neal suggests in *The Masculine Self*, due to the traditionally public-facing nature of a man's role within society (as opposed to the domestic-facing role of a woman), 'the importance of the outward, social face was much greater in masculine than feminine identity'.[122] As such, illness or impairment were considered a humiliating imperfection for elite men, who were particularly sensitive to shame.[123]

This belief that bodily impairments were humiliating is mirrored the writings of Cicero, whose rediscovery by humanist scholars in the fifteenth century popularised his writings amongst the later medieval elite. In *On Duties*, Cicero (106BCE–43BCE) suggests that good men will try to conceal that which is 'indecent' or shameful, and will not make vulgar jokes relating to that which is 'obscene'.[124] Whilst this does not specifically refer to impairment, the association of impairment with shame (as we have seen in Götz von Berlichingen's initial reaction to the loss of his arm), and the overriding desire to hide that which is deemed to be shameful, permeated elite culture. As Raymond Lull's *Book of the Order of Chivalry* (a treatise, written c. 1274–1276, which tried to create a unified code of Chivalry) explains, being 'whole of limb' was an important criterion for

[121] Whilst it was important for elite women to demonstrate bodily integrity, the prevalence of Aristotle and Galen's teaching on the four humours meant that it was widely accepted that women were imperfect men and therefore naturally 'weaker creatures'. As such, it was generally more acceptable for women to demonstrate moments of physical and emotional weakness, and to therefore be seen making use of assistive technology. For more on this, see Jennifer Ward, *Women in Medieval Europe, 1200–1500* (London: Longman, 2002) – especially the introduction.
[122] Neal, p. 152.
[123] Ronald C. Finucane, *Miracles and Pilgrims: Popular Beliefs in Medieval England* (New York: St. Martin's Press, 1995), p. 149.
[124] Marcus Tullius Cicero, *On Duties*, trans. by M. T. Griffin and E. M. Atkins (Cambridge: Cambridge University Press, 1991), 1.104.

knighthood.[125] In order to ensure bodily perfection, prospective knights were expected to take a communal bath that not only symbolised the purification of the candidate before the ritual of knighting, but also provided 'an opportunity to verify a lack of deformity and disease'.[126] This complicated relationship between bodily perfection and knighthood posed a difficult challenge to knights who had later received an injury resulting in deformation or the amputation of a limb, calling into question their aptitude for knighthood and their social status. Understanding this complex connection between a man's health, physicality, ability to perform, and social status, further explains why individuals such as Götz viewed death as preferable to life with a visible impairment, and why many knights sought to maintain at least an illusion of corporeal 'wholeness'.[127]

[125] Raymond Llull, *The Book of the Ordre of Chyualry*, trans. by William Caxton, ed. by Alfred T. P. Byles (Oxford: Early English Text Society Original Series 168, 1926), p. 64. Although this treatise was originally written in c. 1276 by Ramon Llull (1232–1316), it retained its popularity well into the later Middle Ages. Originally written in Catalan, *The Book of the Order of Chivalry* was eventually translated into English in 1484 by William Caxton, who presented it to King Richard III of England (who, according to Caxton, commanded the book 'to be had and redde vnto other yong lorde, knyghtes, and gentylmen within this royame') – see Llull, p. 125.

[126] Karras, pp. 64–65.

[127] However, despite the contemporary importance of masculine bodily presentation, there has been very little research on specifically male-focussed health and beauty concerns. Nevertheless, some scholars are paving the way by investigating the cultural and medical responses to male hair, facial hair, and hair-loss. See:

Hair: Robert Bartlett, 'Symbolic Meanings of Hair in the Middle Ages', *Transactions of the Royal Historical Society*, 4 (1994), 43–60; Carl Phelpstead, 'Hair Today, Gone Tomorrow: Hair Loss, the Tonsure, and Masculinity in Medieval Iceland', *Scandinavian Studies*, 85:1 (2013), 1–9; Pauline Stafford, 'The Meaning of Hair in the Anglo-Norman World: Masculinity, Reform, and National Identity', in *Saints, Scholars, and Politicians: Gender as a Tool in Medieval Studies*, ed. by Mathilde van Dijk and Renée Nip (Turnhout: Brepols 2005), pp. 153–171.

Beards: Steven P. Ashby, 'Technologies of Appearance: Hair Behaviour in Early-Medieval Britain and Europe', *Archaeological Journal*, 171:1 (2004), 153–186; Giles Constable, 'Beards in the Middle Ages', in *Apoligiae duae: Gozechini Epistola ad Walcherium: Burchardi ut videtur, abbatis Bellevallis Apologia de barbis*, ed. by R. B. C. Huygens (Turnhout: Brepols, 1985); P. E. Dutton, 'Charlemagne's Moustache', in *Charlemagne's Moustache and Other Cultural Clusters of a Dark Age*, ed. by P. E. Dutton (New York: Palgrave MacMillan, 2004), pp. 3–42.

Consequently, in order for their users to create this illusion of a whole body, medieval prostheses were produced predominantly with the intention to copy nature as closely as possible. This cosmetic desire to blend the biological body with a mechanised prosthesis is in keeping with Haraway's definition of a cyborg as something which rejects the traditional boundary between human and machine, and instead allows for the fusion of technology and the flesh.[128] A good example of this 'potent fusion' can be seen in the Nürnberger Hand (photographed in images 3.18–3.20), which has been dated to c. 1580 and is believed to be German in design.[129] The arm measures 32cm in length but, despite its size, is comparatively light – weighing approximately 454g. Similarly to the Stibbert Leg, discussed above, this reduction in weight is made possible by the hollowed-out chevron style structure of the arm socket, which provides an aesthetically appealing way of limiting the amount of iron used in the construction. The hand itself is designed to be anatomically accurate, featuring nailbeds sculpted into the fingers, wrinkles carved around the knuckle joints, and creases across the palm of the hand. Although the iron has mottled over time, it is also possible to see faint traces of lines on the back of the hand representing the bone structure. At the base of the arm it is also possible to see an artistic rendering of a scalloped cuff, which is designed to imitate the ruched trim of a gentleman's shirt.[130] As Löffler suggests, it is very likely that this hand would have been painted in colours that matched the user's complexion in order

[128] Haraway, 'A Manifesto for Cyborgs', p. 10.
[129] Haraway, 'A Manifesto for Cyborgs', p. 11.
[130] Nathan Robinson, *A Rare German Prosthetic Hand* (2006) <http://myarmoury.com/talk/viewtopic.php?t=7161> [accessed August 2018].

to further enhance its appearance.[131] Demonstrating the transformative nature of the medieval body, the anatomically accurate construction of this prosthesis was designed to blend seamlessly with the corporeal body – creating a transhuman relationship between technology and flesh, and therefore allowing its wearer to present the illusion of 'bodily wholeness'.

Consequently, it is possible to see that, although a faultless, elite male body was generally characterised by strength, physical beauty, and harmonious proportions of the body, prosthetic limbs (such as the Nürnberger Hand) could be used to disguise bodily impairments or abnormalities, allowing their user to hide what might have been considered an 'imperfection' and therefore overcome the sense of shame that characterised the elite male relationship with disability. In this way, prosthetic limbs served a crucial cosmetic purpose which was arguably just as (if not more) important than their mechanical functionality.

3. A WOMAN'S PROSTHESIS?

Throughout this chapter we have largely considered the elite male use of mechanised prostheses. As I have discussed above, high-status men were the social group who were most at risk of losing a limb, as well as having the economic resources to purchase a mechanised prosthesis. However, that is not to say that women could not have made use of this kind of assistive technology as well. Although the women who would have been able to afford mechanised prostheses were generally less likely to find themselves in a situation that might result in limb loss than were their male counterparts, they would still have been

[131] Löffler, p. 14.

at risk of congenital impairments or limb-loss as a result of accidents, infections, or diseases. Unfortunately, we do not have any documentary evidence to support the notion of female usage of mechanised prostheses, but that should not be taken to assume elite women did not make use of mechanised prosthetic technology.

Whilst the majority of mechanised prostheses appear to have been relatively large, heavy, and visually similar to contemporary armour designs (thereby supporting the notion that most of these limbs belonged to male users), there is one surviving prosthesis, the Grüninger Hand, which does not share these same design features. As such, I would argue that it is a rare example of a mechanised upper limb prosthesis that belonged to an elite woman.

Dating from c. 1505–1515 and believed to be German in design, the Grüninger hand is a unique example of a composite prosthesis – the lower arm being made predominantly out of wood, whilst the upper 'sheath' (into which the upper arm stump would be fitted) and the hand are made out of iron. Much like the other lower-arm and hand prostheses discussed in this chapter, the Grüninger Hand features a fixed thumb alongside two fingerblocks which can be moved independently of one another, before being released by a push button on the back of the hand. However, its elbow mechanism differs quite significantly from the other kinds of elbow mechanisms seen in surviving artefacts. Using a gear mechanism, the elbow could be rotated and fixed in one of six positions (using a switch type lock located on the forearm), thereby providing a more diverse range of movement than other arms which could only be moved in a

series of linear, acute angles. Löffler, who was able to personally examine this arm in the 1980s, describes the elbow joint as follows:

> *In die Löcher auf dem Bogen greift ein Zahn, der auf einer Schiene befestigt ist, die zum Unterarm läuft und dort einen Auslöseknopf trägt. Will man die Stellung des Unterarms zum Oberarm verändern, drückt man auf einen Knopf, worauf der Zahn das Loch im Bogen freigibt, und das Ellbogengelenk frei um die Achse beweglich wird* [The holes on the bow are gripped by a tooth [i.e. the semi-circle of iron extending from the upper arm cuff], which is fastened on a rail, which runs to the forearm and there supports a trigger button. If you want to change the position of the forearm to the upper arm, you press on [this] button, whereupon the tooth releases the hole in the bow, and the elbow joint is free to move around the axis].[132]

In much of the literature pertaining to this arm, the prosthesis is either misattributed to Götz von Berlichingen or is otherwise labelled as belonging to a male user. For example, the 2016 Sotheby's auction lists the item as 'the property of a nobleman' and also discusses the 'tantalising possibility that Götz von Berlichingen also owned the present prosthetic'.[133] Similarly, the *Deutsches Historisches Museum's* online blog states that 'it is a fairly safe assumption that it was a custom order for a high-ranking knight'.[134] Although the hand was produced in Germany and is contemporaneous to Götz, it is a lazy assumption of Sotheby's to suggest that it was consequently owned by him. As we have seen, Götz had his arm amputated below the elbow and consequently could not have worn the Grüninger Hand even if he had wanted to, as it requires its user to have undergone an above the elbow amputation. Whilst the *Deutsches Historisches*

---

[132] Löffler, p. 15.
[133] Sotheby's, *The Property of a Nobleman; Southern German, Probably Franconia, Circa 1505–1515; The Grüninger Hand* (2016) <http://www.sothebys.com/de/auctions
[134] Deutsches Historisches Museum, *What's That For?: Grüninger Hand* (2017) <https://www.dhm.de/blog/2017/01/26/grueninger-hand/> [accessed August 2019].

Museum's suggestion that this arm belonged to a knight is much more reasonable (as the majority of mechanised prostheses do appear to have belonged to knights and high-status military men), there are two reasons why, in the specific case of the Grüninger Hand, I would disagree with their postulation and instead suggest that this arm belonged to an elite woman.

Firstly, the hand is not as hardwearing as other arm prostheses. Not only is it partially made of wood (which, despite making the item lighter and more comfortable to wear, would have made the limb less resistant to rain and damp weather, and more easily damaged by bladed weapons if it was to be worn during combat), but the elbow joint is more intricately constructed than other prostheses of this period, and lacking in any kind of armoured protection (unlike those hands, such as the Balbronner Hand, discussed above, which were known to have belonged to knights). Subsequently, it is unlikely that the arm would have been deemed appropriate for use on the battlefield – the intricate, delicate nature of its internal mechanisms, coupled with its underlying wooden frame, would have rendered the arm structurally weak and unable to withstand either bladed or blunt force damage. However, these same features would have made the arm much more likely to meet the needs of a noblewoman. For example, the wooden forearm would have reduced the overall weight of the arm, whilst maintaining a slender, feminine shape if it were to be covered with sleeves or gloves. The versatile elbow joint, whilst weakening the arm in a battlefield environment, would have allowed the arm to be fixed in a greater variety of 'poses' than other prostheses – for example, it could be positioned so that the arm

would rest more convincingly in its owner's lap, rather than being limited to a linear movement along a vertical axis.

Secondly, the arm appears to have been designed with great attention to aesthetic detail. On first inspection, it appears as though the whole lower arm is made of wood as the iron hand is painted in similar colours to the wooden forearm. Whilst it could be suggested that the iron hand was painted to look like wood, I do not believe this to be the case. As both red-based paints and natural resins darken over time, I believe that the paintwork on this hand appears much darker today than when it was first painted. Therefore, I would argue that the hand was originally painted to match its user's complexion, rather than to match the wooden forearm.[135] Consequently, although there is no surviving documentary evidence to confirm its ownership, I would argue that – as a result of its unique design (comprising of an exposed elbow joint and wooden forearm), coupled with the detailed paintwork that is still visible on the arm's iron hand – this hand is more likely to have been used by an elite woman, rather than a later medieval knight.

***

Taking somewhat of a departure from the predominantly visual source material found in chapters two and three, this chapter has drawn upon a large body of surviving material artefacts, alongside the unique autobiographical writings of Götz von Berlichingen, in order to assess how mechanised prostheses were

[135] For more on the darkening of historical red–based paints, see Katrien Keune, J. J. Boon, 'Analytical Imaging Studies Clarifying the Process of the Darkening of Vermilion in Paintings', *Analytical Chemistry*, 77 (2005), 4742–4750.

designed, constructed, and used in the fifteenth and sixteenth centuries. By undertaking a close analysis of physical objects, this chapter has considered both the physical capabilities of prostheses (and whether they could have been used effectively within later medieval warfare), as well as the cosmetic importance of these aids and the ways in which they were used to help create the illusion of a 'complete' body. Finally, this chapter has considered the reasons behind the predominantly high-status male user group of mechanised prostheses. Through an application of transhumanist theory and the notion of a remasculation narrative, it has considered the ways in which artificial limbs became an important part of a wounded knight's identity by restoring their ability to physically function according to the expectations of elite male society (such as fighting or riding on horseback), but also by repairing their sense of masculinity which had been damaged by the loss of a limb, and the resulting sense of helplessness and infirmity.

Chapter Five

SERVICE DOGS AND SPECTACLES: UNSTABLE SIGNIFIERS OF SIGHT-LOSS

In his book, *Medieval Civilisation*, Jacques Le Goff suggested that 'the medieval west was [...] full of blind people with sunken eyes and empty pupils'.[1] Whilst his claim appears to be an exaggeration of the truth, Le Goff was not wrong in pointing out that eye complaints were one of the most common ailments of the period. Medieval living and working conditions could lead to an increased number of eye impairments (for example, completing up-close work in a scriptorium, cooking in a smoky environment, manufacturing goods in a dark workshop, or participating in violent battles); however, sight-loss could also be a product of the nutritional deficiencies, congenital conditions, and effects of ageing with which we are still familiar today.

It is therefore unsurprising that there were a range of options available to those with visual impairments (depending, of course, on one's wealth, status, and location). The use of balms, ointments, and (in desperate circumstances) surgery, were possibilities for those with access to physicians and apothecaries, miracle cures provided a divine alternative to secular medicine, and hospitals for the blind were available to those whose conditions could not be 'cured' and consequently required longer term care.[2] However, whilst each of these themes is

---

[1] Jacques Le Goff, *Medieval Civilisation 400–1500*, trans. by Julia Barrow (Oxford: Blackwell, 1988), p. 240.

[2] For further information on eye-surgery, blindness healing miracles, and the origins of hospitals for the blind, see Joy Hawkins, 'Sights for Sore Eyes', in *On Light*, ed. by K. P. Clarke and Sarah Baccianti (Oxford: Society for the Study of Mediaeval Languages and Literatures, 2014), pp. 137–156; Joy Hawkins, 'Seeing the Light? Blindness and Sanctity in Later Medieval England', in *Saints*

a fascinating area of enquiry, they have already been extensively studied by scholars such as Edward Wheatley and Joy Hawkins.[3] As a result, this chapter seeks to add to this pre-existing literature on 'blindness' by evaluating the often understudied and overlooked role of assistive technology in the treatment of ocular impairments, by thinking about how late medieval people used bodily augmentation to overcome the difficulties associated with sight-loss.

Throughout the fifteenth and sixteenth centuries, two main types of assistive aids were used to help people with visual impairments – spectacles and sighted-guides. However, despite the seemingly ubiquitous nature of these aids, very little research had been conducted into their role and representation within medieval society. Kathleen Walker-Meikle and Carole Rawcliffe have, for example, written extensively on medieval dogs but neither has fully explored the use of dogs as assistive aids.[4] Similarly, despite the multitude of visual representations of spectacles, coupled with the discovery of several material finds, there has not yet been a study which draws the two together in order to understand both the practical and symbolic functions of spectacles in the later Middle Ages. This lack of scholarship pertaining to sight-related assistive aids

---

and Sanctity, Studies in Church History, 47, ed. by Peter Clarke and Tony Claydon (Woodbridge: The Ecclesiastical History Society by The Boydell Press, 2011), pp. 148–158; Mark P. O'Tool, 'Disability and the Suppression of Historical Identity: Rediscovering the Professional Backgrounds of the Blind Residents of the Hôpital des Quinze-Vingts', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyler (Farnham: Ashgate, 2010), pp. 11–24; Edward Wheatley, 'Medieval Constructions of Blindness in Medieval England and France', in *The Disability Studies Reader*, Third Edition, ed. by Lennard Davis (London: Routledge, 2010), pp. 63–73; Edward Wheatley, *Stumbling Blocks Before the Blind: Medieval Constructions of a Disability* (Ann Arbor: University of Michigan Press, 2010).

[3] See footnote 2.

[4] See Carole Rawcliffe, 'Town Tykes and Butchers' Hounds: Urban Dogs at Work in the Later Middle Ages', *Medieval Prosopography*, 33:1 (2018), 1–13; Kathleen Walker-Meikle, *Medieval Dogs* (London: The British Library Publishing Division, 2013); Kathleen Walker-Meikle, *Medieval Pets* (Woodbridge: The Boydell Press, 2012).

stems, once again, from a reluctance to participate in interdisciplinary research.[5] When approached from a monodisciplinary perspective, accounts of spectacles or guide dogs appear to carry a multitude of contradictory meanings – making them unstable sources to work with. It is only when compared across disciplines (taking into consideration a broader range of documentary evidence, literature, material remains, and visual source material) that the nuances in these representations reveal themselves.

Consequently, by taking an interdisciplinary approach to a broad range of source material, this chapter will unravel the multifaceted meanings associated with both spectacles and sighted-guides in order to understand how late medieval people used (and produced) assistive technology to help overcome visual impairment. Taking a departure from the man-made, material technologies that we have already discussed in this thesis, I begin this chapter by considering how 'living technologies' (i.e. sighted-guides) were utilised by impaired people in the fifteenth and sixteenth centuries and whether, by revisiting Donna Haraway's notion of a 'human-animal cyborg assemblage', we can even label other humans and animals as 'technologies' at all.

LEADING THE BLIND: DOGS AS ASSISTIVE AIDS

Since their domestication approximately 12,000–15,000 years ago, dogs have held a unique position within human society.[6] Their ability to obey orders, provide

[5] The need for more interdisciplinary studies and cross-disciplinary discussions is further discussed in chapter one.

[6] Darcy Morey, 'The Early Evolution of the Domestic Dog', *American Scientist*, 82:4 (1994), 336-347 (p. 338); Darcy Morey, 'Burying Key Evidence: The Social Bonds Between Dogs and People', *The Journal of Archaeological Science*, 33:2 (2006), 158–175 (p. 158).

protection, and hunt for food (amongst other skills) has elevated their status above other domesticated animals and entered dogs into an 'obligatory, constitutive, historical, protean relationship with human beings'.[7] In return for food and shelter, humans have been able to harness dogs' intelligence, fidelity, and heightened sense of smell for their own gain, adopting dogs as a kind of 'living technology'. This relationship with humans, coupled with dogs' singular combination of intelligence and subservience, has enabled people to shape dogs into a variety of assistive aids – whether to protect livestock and herd flocks, act as security guards or weapons, partake in pest-control, provide companionship, or, as is the focus of this chapter, act as guides for the blind.[8] However, despite man's long-standing ability to shape dogs into a form of 'assistive technology', research into pre-modern guide dogs is almost entirely non-existent, with most survey texts claiming that the first guide dogs were trained to meet the needs of blind veterans in the aftermath of the First and Second World Wars.[9]

In her *Social History of Disability in the Middle Ages*, Irina Metzler implies that this lack of interest in medieval guide dogs mirrors a paucity of evidence, explaining that her 'elusive hunt' for medieval guide dogs returned only a few

[7] Donna Haraway, *The Companion Species Manifesto: Dogs, People and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003), pp. 11–12.
[8] Cristina Pallí Monguilod, 'Difference that Matters: On Love in the Kennel of Life', *Athenea Digital*, 10 (2006), 250–258 (p. 251).
[9] The most prominent examples of this can be seen in the 'history' sections of websites belonging to guide dog related charities and societies, e.g. International Guide Dog Federation, *History of Guide Dogs* (2019) <https://www.igdf.org.uk/about-us/facts-and-figures/history-of-guide-dogs/> [accessed February 2019]; Guide Dogs for the Blind Association, *History* (2019) <https://www.guidedogs.org.uk/about-us/what-we-do/the-history-of-guide-dogs/> [accessed February 2019]; The Seeing Eye, *History* (2011) <http://www.seeingeye.org/about-us/history.html> [accessed February 2019].

'isolated textual references and a couple of images'.[10] Whilst this might be the case for the Central Middle Ages, a similar investigation into later medieval imagery demonstrates that there was a well-established visual trope connecting lower-status blind people with assistance dogs. However, it is important to recognise that, although we see more representations of 'guide dogs' in the later Middle Ages, the dog was a highly unstable signifier within contemporary iconography – representing anything from faithfulness to foolishness, high-status to low-status, wealth to poverty, or masculinity to femininity. Consequently, we need to be cautious in our analysis of visual material, treating it not as a direct window onto the past, but rather as an interpretation coloured by contemporary beliefs.

One way in which we can exercise caution and ensure that we do not treat an image as an unproblematic or accurate representation of the past is by thinking about how visual 'signifiers' and 'signified' are used to create meaning within medieval source material. One requires both the signifier (i.e. a word or image) plus the signified (the concept, meaning, or association that word or image carries) to equal a sign (the outcome or meaning gained by the reader or viewer).[11] This equation is particularly useful when attempting to analyse medieval marginalia, as these images are heavily-laden with meanings that are only revealed if one is familiar with the associated signifiers and signified. Let us

[10] Irina Metzler, *A Social History of Disability in the Middle Ages: Cultural Considerations of Physical Impairment* (New York: Routledge, 2013), p. 178; Irina Metzler, 'Have Crutch, Will Travel: Disabled People on the Move in Medieval Europe', in *Travels and Mobilities in the Middle Ages: From the Atlantic to the Black Sea*, ed. by Marianne O'Doherty and Felicitas Schmeider (Turnhout: Brepols, 2015), pp. 91–117 (pp. 112–113).

[11] For a fuller discussion of this premise see the introduction to this thesis.

look, for example, at image 4.3 (an illustration found in the margins of the *Smithfield Decretals*, which are a fourteenth-century copy of the glossed *Decretals* of Pope Gregory IX) in order to demonstrate how this methodology might be applied.

At a very basic level of analysis, this image could be said to simply represent a man walking a dog; however, by drawing attention to individual signifiers within the image, and considering what they signified, we are able to make it 'talkative' and in doing so, reveal a deeper meaning.

1. Downcast Eyes: Firstly, the man's downcast eyes (the signifier) represent blindness (the signified). In medieval iconography, blindness is usually represented by closed eyes, drawn in an elongated 'u' shape, as seen here. In rarer examples, blindness might also be represented by open, oval shaped eyes, which are white and pupil-less.

2. Mongrel Guide: The man's blindness is further emphasised by the inclusion of an animal, which appears to be acting as a seeing guide. It is walking out ahead of its owner, on what appears to be a short, rigid leash.[12] The animal itself is identifiable as a mongrel as a result of its large ears, broad snout, and bushy tail.[13] As we will see below, dogs operated very

[12] Recently, modern designers have proven that, when walking with a guide dog, rigid leashes tend to be more effective than slack leashes as they enable the blind person to more easily interpret signals from the dog and vice versa. See Royal Dutch Guide Dog Foundation, *Guide Dog Harness* (2019) <https://www.npkdesign.com/project/royal-dutch-guide-dog-foundation/> [accessed June 2019]. Although not all images of medieval guide dogs demonstrate the use of a rigid leash, a significant proportion do, leading me to believe that this adaptation of the leash was also practised in the Middle Ages.

[13] There has been some debate over whether the animal depicted in this image is in fact a dog. Irina Metzler has suggested to me that the animal might be a fox based upon earlier depictions of Reynard the Fox in the *Smithfield Decretals*. Undoubtably, this animal shares many similarities to images of foxes in the manuscript – such as its pointed ears, bushy tail, and colouration. However, we also see many images of dogs in this manuscript that are also depicted with one or more of

much as a status symbol in the later Middle Ages – for example, greyhounds represented fidelity and nobility, whilst mongrels and crossbreeds carried connotations of poverty and immoral behaviour. Therefore, the fact that the man is accompanied by an animal that reflects the qualities of a mongrel implies that he is probably also of low status.

3. Pilgrim's Clothes: The man's worn and patched clothes could be seen as further evidence to suggest that he is either poor or of low-status; however, a closer look at other elements of his attire complicates this narrative. We can see that he is wearing a broad brimmed hat, carrying a cross-body satchel, and walking with an upright 'pilgrim's staff' (identifiable by its size, pommel shaped head, and spiked tip). As discussed in chapter two, the combination of these items of clothing were used to represent a pilgrim within medieval visual culture. Consequently, it could be argued that, because the blind man is travelling on a pilgrimage, his worn and patched clothes are symbolic of penitence rather than poverty (it was not uncommon for pilgrims to wear hair shirts and other uncomfortable items of clothing to further demonstrate their piety

these features (take for instance the dog attacking a wild man on fol. 134v who shares the same pointed ears and bushy tail, or the pilgrim dog depicted on fol. 57v who has a bushy tail and russet colouration, but lacks the pointed ears). Metzler has also suggested that if the animal is indeed a fox, the image would carry different connotations to the viewer. Whilst dogs were perceived as loyal and (relatively) dependable, foxes were popularly represented as sly and cunning. If, therefore, this animal is a fox, the creator of the image might have intended it to be read as a metaphor for the blind man being easily led astray by deceitful individuals. Unfortunately, based on such little evidence, the answer to whether this creature is a fox or dog must remain inconclusive. What is most important for this thesis is the fact that the animal is evidently being used as a guide for a blind man (whatever its motives) and that, fox or dog, it does not display any of the visual signifiers (i.e. narrow waist, thin tail) that characterise elite dogs.

and humility).[14] However, as he is also accompanied by an animal guide (rather than a more expensive guide, such as a child – as seen in images 4.1 and 4.2), I would conclude that he is being represented as both impoverished and on pilgrimage.

Therefore, it is possible to see how (by closely analysing an image and its visual signifiers, signified and signs) we can extract information from an image. In the case of image 4.3, we have been able to show that the blind man requires a guide dog, is poor or of low-status, and is travelling on a pilgrimage (possibly, though not necessarily, in search of a cure for his blindness).

This image and its use of a network of visual signifiers, also helps us to think about the question of when is a dog a 'guide dog' as opposed to a companion animal? As we will see throughout the next section of this chapter, this distinction between companion animal/assistance animal/guide dog can become blurred. Whilst some authors, such as Bartholomaeus Anglicus, provide short textual descriptions of guides for the blind (generally dividing these into a hierarchy of adult guide > child guide > canine guide), we are largely dependent upon visual source material in order to gain an insight into the use of guide dogs in the later medieval period. Therefore, it is important that we recognise the difference between a single visual signifier, e.g. a beggar depicted with a dog, and a broader network of signifiers that, when employed together, specifically point

[14] Many examples of this can be seen in *The Book of Margery Kempe*, in which Kempe frequently seeks out bodily discomfort (be that through wearing a hair shirt or fasting) in the hope that this will bring her closer to God. For a discussion of this, see Susan Morgan, 'Body Symbolism in the Book of Margery Kempe', *New Blackfriars*, 76:897 (1995), 426–440.

to the animal being used as a guide dog, e.g. a blind beggar depicted with a mongrel dog on a leash.

1. GUIDE DOGS, CLASS AND STATUS

However, although there is very little written evidence which pertains specifically to guide dogs in the Middle Ages, we are not short of documentary evidence for the existence of hunting and companion dogs. For example, in his *De Canibus Britannicus* (published in 1570 and translated into the English *Of Englishe Dogges* by Abraham Fleming shortly after), John Caius (1510–1573) provides a detailed discussion of late medieval dogs and the roles that they played within society.[15] Prior to this, Albertus Magnus (1200–1280) wrote extensively on the health and care of dogs in his *De Animalibus*, offering advice on diet and suggesting medicinal treatments for common canine ailments such as impetigo or scabies.[16] Similarly, in c. 1387, Gaston Phébus (1331–1391) wrote a detailed account of the care and maintenance of hunting dogs in his *Livre de la Chasse* (which was published as a printed book in 1507 and proved to be very popular throughout the sixteenth century).[17] Although the focus of these texts is on elite dogs (with labouring dogs only briefly appearing in Caius's *De Canibus*), the very fact that guide dogs are excluded from these texts suggests that impaired members of the elite did not make use of dogs as a form of assistive technology. If they had, it is likely that advice on training and caring for guide dogs would have been written

[15] John Caius, *Of Englishe Dogges, the Diuersities, the Names, the Natures, and the Properties*, trans. by Abraham Fleming (London: Rychard Johnes, 1576).
[16] Albertus Magnus, *On Animals: A Medieval Summa Zoologica*, trans. by Kenneth F. Kitchell Jr. and Irven Michael Resnick (Columbus: The Ohio State University Press, 2018).
[17] Gaston le Phébus, *Livre de chasse de Gaston Phèbus*, ed. by Claude d'Anthenaise (Paris: Bibliothèque de l'Image, 2002).

about in these manuscripts alongside the discussions which pertained to hunting dogs and ladies' pets.

Scholastics and ecclesiastics also seem to have avoided using guide dogs as a form of assistive technology. As we have discussed above, it was not uncommon for scholars and scribes to develop ocular impairments as a result of either their working conditions, old age, or a combination of the two. As a result, one might assume that this social group would have benefited from (and therefore encouraged) the use of guide dogs. However, despite the numerous visual sources depicting religious men as requiring spectacles, there does not seem to be a corresponding trope of ecclesiastics making use of guide dogs.[18] In his *De rerum Proprietatibus* (written c. 1240–c. 1250), Bartholomaeus Anglicus (c. 1203–1272) even goes so far as to express his pity for impoverished blind people who have no other option than to place their trust in an (unreliable) guide dog, stating:

> *Et saepe ad tantam deducitur necessitatem; ut ad transeundum pontis vel vadi periculum plus cogitur credere cani quam sibi ipsi* [the blind [man] is often brought to so great a need, that to pass and escape the peril of a bridge or of a ford he is compelled to trust a hound better than himself].[19]

[18] It could be argued that the lack of evidence for ecclesiastics using guide dogs was because guide dogs were only required once eyesight had significantly deteriorated. With such poor vision, impaired members of the clergy might have been barred from their office (if they had not received special dispensations) and therefore, they would not have been playing an active role in church life once their vision had declined enough to warrant a guide dog. However, barring an individual from ecclesiastical duty on the grounds of impairment was more of a theoretical consideration and does not appear to have been implemented all that frequently in reality. As such (whilst there might have been some individuals who had already been removed, or retired, before requiring a guide dog) I do not believe that this is a strong enough reason to justify a complete aversion to guide dogs within ecclesiastic circles.

[19] Bartholomaeus Anglicus, *On the Properties of Things,* vol. 1, trans. by John Trevisa, ed. by M. C. Seymour (Oxford: Clarendon Press, 1975–1988), p.365. For the original Latin see Bartholomaeus Anglicus, *De rerum Proprietatibus*, Liber VII (*De Infirmitatibus*): 19 (*De Cecitate*) (Frankfurt: Minerva, 1964).

One might argue that this disinclination of ecclesiastics to make use of guide dogs stemmed from prohibitions against pet-keeping within religious orders. For example, in 1520 Elizabeth Wright (the prioress of Flixton, Lancashire) was ordered to remove most of the dogs from the convent:

> *cancellarius injunxit prioresse quod infra ensem proxim um sequentem a moveat canes extra monasterium excepto uno quem maluerit* [the Chancellor ordered that, within the following month, the prioress remove dogs from the priory, except for the one whom she prefers].[20]

Similarly, after visiting Daventry Priory in 1442, William Alnwick lists the fact that *item quilibet monachus habet per se canes* [every monk keeps dogs on his own account] as one of the practices which he believes should be stopped.[21] However, the fact that it was necessary to produce these injunctions in the first place suggests that the keeping of dogs was a common aspect of religious life – as Walker-Meikle rightly suggests, 'the best evidence of the prevalence of pet keeping in religious orders is the constant criticism of the practice'.[22] Consequently, seeing as they were so often disregarded, these prohibitions against keeping dogs in religious houses seem unlikely to have prevented ecclesiastics from using guide dogs.

Why then, if the keeping of dogs was ubiquitous within both religious establishments and elite secular society, did ecclesiastics and the upper classes seem to avoid using dogs as a form of assistive technology? Sophie Menache has

---

[20] Augustus Jessop (ed.), *Visitation of the Diocese of Norwich, 1492–1532* (London: Nichols and Sons, 1888), p. 191.
[21] A. H. Thompson (ed.), *Visitations of Religious Houses in the Diocese of Lincoln, vol. 2: Records of Visitations Held by William Alnwick, Bishop of Lincoln, A.D 1436 to A.D. 1449* (Horncastle: The Lincoln Record Society, 1918), p. 122.
[22] Kathleen Walker-Meikle, 'Late Medieval Pet Keeping: Gender, Status and Emotions' (Unpublished Doctoral Thesis, University College London, 2013), p. 103.

argued that medieval dogs were treated with negativity and suspicion in the Middle Ages as a result of their 'damning' representation in the Bible, which one might argue was a contributing factor to the absence of guide dogs in elite society.[23] However, whilst the Bible is certainly disparaging of dogs, stating that: 'greedy dogs can never be satisfied' (Isaiah 56:11), 'give not that which is holy to dogs' (Matthew 7.6), 'beware of the dogs' (Philippians 3.2), and '[outside the walls of the city] are dogs, and sorcerers, and whoremongers, and murderers, and idolaters' (Revelations 22.15), I do not believe this to be the reason why upper and middle status individuals did not make use of guide dogs.

Firstly, if we are to accept Menache's argument, we must agree that *all* dogs were treated negatively in the Middle Ages, which is clearly not the case. Although dogs were heavily commodified and could be cast out once they were no longer useful to their owners, that is not to say that they were treated with suspicion or negativity. In fact, they seem to have been highly valued and, in some cases, treated with great affection.[24] For example, a fourteenth-century sermon criticises people for putting the needs of the dogs over the needs of the poor:

> The wealthy provide for their dogs more readily than for the poor, more abundantly and more delicately too; so that, where the poor are so famished that they would greedily devour bran-bread, dogs are squeamish at the sight of wafer-bread, and spurn what is offered to them, trampling it under their feet. They must be offered the daintiest flesh, the first and choicest produce of every dish. If glutted, they

[23] Sophie Menache, 'Dogs: God's Worst Enemies?', *Society and Animals*, 5:1 (1997), 23–44 (p. 32).
[24] Rawcliffe, 'Town Tykes and Butchers' Hounds', p. 12.

> refuse it, then, as though they were infirm, there is a wailing over them.[25]

Although this quotation is taken from a sermon, and therefore cannot be considered indicative of the behaviour of all wealthy individuals, the fact that the sermon's central example relates to the pampering of elite dogs suggests that this was something with which listeners would have been familiar. This does not necessarily demonstrate literal evidence of practice, but certainly indicates that there existed a popular trope of, or concern regarding, the attentiveness and devotion of wealthy owners towards their dogs.

Similarly, although employed as labouring (rather than companion) animals, the care or mistreatment of lower-class working dogs also evoked a strong emotional response in their owners. For example, Rawcliffe cites a case from 1301, listed in the London Coroner's Rolls, in which a man named William Baman 'savagely struck' a dog belonging to Philip de Spine, after which he was 'subject to an angry tirade [...] and then beaten to death by a servant'.[26] These accounts of sentimentality and affection for one's dogs contradict Menache's argument that dogs were viewed with negativity and suspicion. If the biblical teaching of 'beware of the dogs' was followed in practice, one might understand why guide dogs were avoided as a form of assistance. However, these teachings were evidently not adhered to, otherwise people would not have excessively pampered their dogs or responded to canine mistreatment with murder.

---

[25] See the entry 'Servire' in John Bromyard's *Summa Predicantium* (Venice, 1586), p. 362. Quoted in Gerald Owst, *Literature and Pulpit in Medieval England* (Cambridge: Cambridge University Press, 1933), p. 327.

[26] Anon, *Calendar of Coroners' Rolls of the City of London*, ed. by Reginald R. Sharpe (London: Richard Clay and Sons, 1913), p. 26. See also Rawcliffe, 'Town Tykes and Butchers' Hounds', p. 13.

Secondly, Menache's argument assumes that all sectors of society were sufficiently familiar with biblical teachings that they could recognise and act upon these scattered references to dogs being greedy, dangerous, or irreligious. Although literacy rates were rising throughout the fifteenth and sixteenth centuries, 'the spoken word continued to play a very important role in European society'.[27] Even if literate, many people could not afford to buy books in great quantities (if at all) because they were very expensive to produce and purchase, and regarded as commodity items owned by institutions or the elite; therefore, access to religious texts remained predominantly oral in nature. In order to hear those biblical passages in which dogs are referred to negatively, most people would have had to hope that they appeared in the sermons of itinerant priests, church services, or public readings.[28] Consequently, even though Menache is right in suggesting that the Bible represents dogs negatively, I would disagree that this affected secular attitudes towards dogs and do not believe that it provides an explanation as to why elite members of society did not make use of guide dogs – if all dogs were treated with negativity and suspicion, then elite and educated members of society would have avoided dogs in their entirety, not just guide dogs. Therefore, I believe that a more realistic explanation for the absence of guide dogs in elite society stems from higher status prejudice regarding 'working' dogs, as well as the ability to hire more reliable human guides.

[27] Charles F. Briggs, 'Literacy, Reading, and Writing in the Medieval West', *Journal of Medieval History*, 26:4 (2000), 397–420 (p. 418).
[28] Joyce Coleman, *Public Reading and the Reading Public in Late Medieval England and France* (Cambridge: Cambridge University Press, 1996), p. 89.

As we have seen, elite members of society put a lot of time and money into caring for their dogs (sometimes to the point of criticism), suggesting that there was not an overarching attitude of negativity or suspicion surrounding *elite* dogs. However, that is not to say that elite individuals felt the same way about lower status dogs. For example, an ordinance made in London in 1475 states that:

> no persone hold nor have a dogge or dogges nor sawte Biche usyng to go at large oute of his Cloise or kepyng by day nor by nyght wtin the Fraunchese of this Citee *except gentil houndes* [my emphasis][29]

The fact that rules concerning the management of dogs did not apply to 'gentil houndes' suggests that dogs were just as much subject to class prejudice as their owners. As we have discussed above, physiognomy held an important position as a method of scientific enquiry in the Middle Ages, within which there existed a 'certain analogy [...] between humans and animals' that suggested that well-bred animals and humans shared similar features (as did lower status animals and humans).[30] This idea was propounded by scholars such as Bartholomaeus Anglicus, who supported the notion that the elite members of society shared the same 'gentil' nature as their hounds (as evidenced in their shared elegant, slender physiognomy).[31] However, these traditionally elite dogs (such as greyhounds) were bred for their athletic ability, rather than for their intelligence and aptitude as guide dogs. The dogs that we recognise as guide dogs today, such as labradors

[29] Anon, *Calendar of Letter Books of the City of London: L: Edward IV – Henry VII*, ed. by Reginald R. Sharpe (London: Richard Clay, 1913), p. 130.
[30] I. M. Resnick, 'Ps.-Albert the Great on the Physiognomy of Jesus and Mary', *Medieval Studies*, 64 (2002), 217–240 (p. 222).
[31] Bartholomaeus Anglicus, *On the Properties of Things,* vol. 2, p. 1168. This idea is also discussed by Carole Rawcliffe, who claims that human/animal physiological similarities 'did not reflect well on either the butcher's stocky cur or his pugnacious master'. See Rawcliffe, 'Town Tykes and Butchers' Hounds', p. 2.

or golden retrievers, were not bred until the sixteenth and nineteenth centuries respectively. Therefore, elite people with visual impairments might have had to turn to a less prestigious dog for use as a guide dog, such as the mongrels depicted in images 4.3–4.8, which would have negatively impacted on an individual's social status.

Finally, on top of concerns over being depicted with a lower status working dog, elite individuals had more money and therefore a greater level of choice about the kinds of assistive technology they used. Rather than employing dogs, elite individuals had the ability to hire servants to function either specifically in the capacity of 'sighted-guide' or as a general helper around the household (depending upon how much attention their master's impairment required). These servants would have been much more reliable than guide dogs and could provide a greater range of assistance by undertaking the cooking, cleaning, and broader caring responsibilities that a dog could not. Therefore, the fact that high-status individuals had easier access to the employment of servants for use as assistive technologies, explains why they were not represented as having used guide dogs. However, although elite individuals were uniquely placed to be able to pay for human assistance in the form of employed servants, they are not the only individuals to have made use of other people as a form of assistive technology, as this chapter will now investigate.

HUMAN ALTERNATIVES

As we have seen in the writings of Bartholomaeus Anglicus, dogs (although favoured as pets or hunting animals) were not believed to be completely

competent or trustworthy guides and, as a result, individuals preferred to seek out more reliable alternatives such as human guides. As Metzler suggests, the main method 'of mobility for the visually impaired consisted of being led by another person'.[32] For the vast majority of blind people, these human guides came in the form of family and friends who offered their assistance out of either a sense of familial responsibility, friendship, or love for one another; however, as we have seen, it was possible for wealthier individuals to employ servants (often children) for the specific purpose of assisting their impaired master.

As I outlined in the introduction, whilst the former category of people certainly provided assistance for their blind friends and relatives, I would argue that they cannot be considered to be a form of 'assistive technology' in the same way a guide dog or paid guide can. In this instance, the guide/guidee relationship cannot be considered 'symbiotic' as the two members do not share a mutual need of one another's assistance – whilst the blind person requires the assistance of their guide, the guide is not reliant on the blind person in order to survive. However, in the case of a paid guide, the guide is more likely to be taking on the role for economic reasons, rather than out of a duty of care, and, as such, the relationship between the guide and guidee becomes a mutually beneficial exchange of goods, in which the blind person receives assistance and the guide is financially compensated for their labour. Consequently, whilst employed in the capacity of a guide, the paid individual is more easily defined as a form of

[32] Irina Metzler, *Disability in Medieval Europe: Thinking about Physical Impairment in the High Middle Ages, c. 1100–1400* (Abingdon: Routledge, 2006), p. 176.

assistive technology than those who provide unconditional support. As such, it is with these paid guides that this thesis is concerned.

The most popular form of paid guide appears to have been children as children were more affordable than adult servants, were believed to be more reliable than dogs when guiding their employers around (being able, for example, to communicate any potential obstacles or dangers verbally), and were also capable of performing a greater range of functions than their canine counterparts – such as running errands on their master's behalf, or helping with the day-to-day chores associated with running a house. However, unlike guide dogs, children were more likely to harbour resentment towards masters who treated them badly and, as a result, Bartholomaeus Anglicus advises blind people to treat their guides fairly:

> *Item cecus aliquando puerum ductorem suum verberat et percutit et offendit. Sed eadem verbera cito per puerum suit. Nam puer verberum nos immemorum pontis medio siue a quocumquibus alio piculo ipsum solum deserit. Et ipsum fugiens sibi viam evadendi piculum non ostendit* [Also sometimes the blind beat and smite and grieve the child that him leadeth, and shall soon abide the beating by doing of the child, for the child have mind of the beating, and forsake him and leave him alone in the middle of a bridge or in some other peril, and teach him not the way to avoid the peril].[33]

Consequently, it is not uncommon to find images of children leading the blind within the margins of medieval manuscripts, several of which appear in the *Smithfield Decretals* (which, as mentioned earlier, were likely produced in London c. 1340, so would not have been so far removed from Bartholomaeus's

[33] Bartholomaeus Anglicus, *On the Properties of Things,* vol. 2, p. 365. For the original Latin see Bartholomaeus Anglicus, *De rerum Proprietatibus* (*De Cecitate*).

time and place). Depicted in images 4.1 and 4.2, it is possible to see a short narrative in which a blind man is led to church by a child, who receives a loaf of bread (perhaps given as an act of charity on account of the man's blindness), before, on the following folio, the blind man and child sit down to eat together. In the first image, it is possible to see how the child is employed as a form of assistive technology, as the blind man rests his hand on the back of the child's neck in order that the child can guide him. By physically reaching out and holding the child's neck, the blind man conjoins their two bodies – allowing himself and the child guide to act as a single 'transcorporeal' unit made up of two bodies, one of which is acting as an assistive aid.

A rare documentary example of child employed as a sighted guide can be seen in the Norwich Census of 1570, in which an orphaned twelve year old is hired as a paid employee of Richard Sandlying's household in order to 'led Sandlying about'.[34] In return for bed and board (perhaps made feasible through the receipt of 6s alms payment from the city) it is likely that the orphaned child would have been expected to assist his blind master – both by acting as a guide and leading him around, and by helping with everyday tasks and responsibilities (in the same way in which the child depicted in the *Smithfield Decretals* accompanied his master whilst he ate). By paying for assistance (rather than receiving assistance as a result of charity or familial duty), Sandlying lays the foundations for a symbiotic relationship to develop between himself and the

[34] 'Richard Sandlyng of 54 yer, a blyndman that work nott, & Katherine, his wife, of that age, that spyn white warpe; & a child of 21 yere that spyn also, & hav dwelt her 40 yere, & a fatherless child of 12 yere that lede hym'. Anon, *The Norwich Census of the Poor of 1570*, ed. by J. F. Pound (London: Norfolk Record Society, 1971), p. 66.

child, in which both participants are reliant on the other in order to thrive (Sandlying gaining a renewed sense of mobility and the child receiving physical sustenance).

However, as we have seen, employing a human guide was not always possible – especially for impoverished members of the community who did not have access to familial support and who could not afford to be selective. As a result, blind people of lower status were limited to the options of using a guide dog or receiving no 'sentient-assistance' at all. Consequently, these factors combined to create a cycle in which guide dogs became a stigmatised form of assistive technology – the elite avoided guide dogs as a result of preconceived notions about their abilities (demonstrating their wealth by employing human guides instead), guide dogs were therefore only used by those who had no other methods of assistance, and, subsequently, guide dogs became associated with poverty and begging (which, in turn, increased higher status reluctance to invest in dogs as a form of assistive aid for fear of being associated with lower status behaviour). Subsequently, it makes sense that (in visual source material) the beneficiaries of guide dogs are always lower status individuals – in particular, blind beggars.

THE BLIND BEGGAR AND HIS DOG

An example of a blind beggar being led by his dog (see image 4.4) appears in the *Hours of Mary of Burgundy*. Completed in Flanders c. 1477, it is believed that the manuscript was produced for Mary of Burgundy, to both commemorate her father's (Charles the Bold) death and her subsequent succession to his powers

and territories, and to celebrate her marriage to Maximillian I, Holy Roman Emperor.[35] The image itself depicts a blind beggar, carrying a triangle-like instrument, whilst being led by a guide dog on a leash.

We can tell that the man is blind because of both his guide dog and 'downcast eyes' (discussed above), and his lower status is revealed by his 'peasant attire' – that is, a broad-brimmed sunhat, short tunic, oversized boots slumping down the calf, and a lack of trousers. A similar visual representation of peasant dress can be found in the *Très Riches Heures du Duc de Berry* (a Book of Hours created c. 1412–1416 for Jean de Berry, brother to Charles V of France), in which the peasants' lack of trousers, falling-down stockings, and open display of their undergarments has been argued to represent the 'unselfconscious' behaviour of the lower-status, labouring individuals.[36] Seeing as 'it would be unthinkable to show any of the aristocrats in this way', this elite representation of lower status individuals as coarse and unrefined demonstrates contemporary social disparity.[37] However, by clearly representing the blind man as impoverished, disabled, and visually distinct from elite readers of the manuscript, this image also depicts the blind man as being a worthy recipient of charity. Wealthy elites needed to practise Christian values, such as charity, in order to get into heaven; therefore, images such as this (as well as those discussed below) reminded their readers of

[35] Anne H. van Buren, 'The Master of Mary of Burgundy and His Colleagues: The State of Research and Questions of Method', *Zeitschrift für Kunstgeschichte*, 38:3/4 (1975), 286–309 (p. 295).
[36] Jonathan Alexander, 'Labeur and Paresse: Ideological Representations of Medieval Peasant Labor', *The Art Bulletin*, 72:3 (1990), 436–452 (p. 442).
[37] Alexander, pp. 442–444.

their need to provide assistance to the needy – if not to help the impoverished individuals, then to ensure that the almsgiver's soul went to heaven.

A further, unusual, element of this image is the adaptation of the dog's leash with a triangle-like musical instrument. Initially I believed this instrument to be separate from the dog's leash and used, perhaps, to indicate the blind person's presence – similarly to Monica Green's argument for the use of bells and clappers 'as a means to attract people to lepers trying to beg' so that they might receive alms (rather than warning healthy people to keep their distance).[38] However, on closer inspection the instrument appears to be connected to the dog's leash through three hoops on the base of the triangle. As a result it seems that (whilst the triangle could certainly have been used to attract attention) its primary function was to act as a form of communication between the blind man and the dog – not only allowing the man to send specific audible commands to the dog by tapping the triangle (akin to modern whistle training), but also allowing communication between the man and dog through the positioning of the lead in relation to the triangle (i.e. as the lead is connected to the man's waist or belt, the line of the lead would not stretch taut from dog's collar to belt, but would change angular direction at point where the triangle would be fitted). Therefore, we may assume that the dog, although a mongrel, was well trained and sensitive to its master's commands and requirements.

[38] Monica Green, 'Bodily Essences: Bodies as a Category of Difference', in *A Cultural History of the Human Body in the Medieval Age*, ed. by Linda Kalof (Oxford: Berg, 2010), pp. 149–72 (p. 168)

An example of this can be seen in its willingness to carry its master's alms bowl in its mouth.[39] Not only does this action demonstrate that the dog was well trained, as it would evidently have to have been taught how to do this, but it also positions the dog as a living extension of the blind man's body. In isolation, the dog is employed as a servant to its master, receiving care and food in return for its assistance; however, the dog's physical connection to the blind man through its leash results in the formation of a cross-species assemblage of man and dog. As Sanders suggests – 'bound together within a relationship that is cooperative, communicative, and intrinsically rewarding, the dog and person are defined by self and others as a unitary social actor', with the human becoming an appendage of the dog and vice versa.[40] By holding the beggar's alms bowl in its mouth, the guide dog is also an emotional extension of its master, acting as a sympathy-arousing device to elicit more alms (similarly to the ways in which nineteenth-century organ grinders used monkeys to capture the attention of their audiences). In this way, the guide dog acts as an extension of the blind man's body, both as hands (by carrying the alms bowl) and eyes, and mind, and can therefore be considered to be a form of assistive 'technology' similar to the material artefacts discussed in the previous chapters.

A very similar, although slightly earlier, example of the blind beggar and his guide dog trope can be seen in image 4.5. Once again, we can see that the man is identified as blind by his downcast eyes and use of a guide dog, as lower

[39] The 'alms bowl' is a dish that was commonly used by beggars who hoped to receive money, or alms, from passers-by. As a result, it became a common visual signifier for poverty and begging within late medieval imagery.
[40] Clinton R. Sanders, 'The Impact of Guide Dogs on the Identity of People with Visual Impairments', *Anthrozoös*, 13:3 (2000), 131–139 (p. 136).

status by his 'peasant attire', and as a beggar through the presence of an alms bowl (which is carried by the dog). The beggar also makes use of a cane, which would likely have been used to assist with his walking, to form an awareness of his surroundings (for which blind people still use canes today), and, if required, to act as a defensive weapon. This depiction of a blind beggar and his dog also appears in a Book of Hours. Produced in Ghent in the style of the Master of the Copenhagen Hours, it is believed that this book was originally produced for the woman depicted in the margin of folio 171r (see image 4.6). Although anonymous, it is clear that this woman seeks to be portrayed as pious (as evidenced by her devotional posture), but also of high status and means (as suggested by her clothing and the fact that she could either afford to commission, or receive as a gift, a book of this quality). Why then might the motif of the blind beggar and his canine guide have proved a popular trope within devotional books produced for high-status women?

The purpose of marginalia has been (and still is) widely debated by historians and art historians alike – with individuals arguing for its political, cultural, and comedic significance. However, I agree with Camille's school of thought that suggests that, through the use of social satire and the subversion of the status-quo, marginal illustrations sought to police their viewer's behaviour and reinforce social, gendered, and class expectations.[41] Consequently, when considered as a didactic image, intended to remind viewers of status-appropriate behaviour, the trope of the blind beggar and his dog served two main functions

[41] Michael Camille, *Image on the Edge: The Margins of Medieval Art* (Cambridge, MA: Harvard University Press, 1992), pp. 9–11.

within the setting of an elite woman's prayer book. Firstly, is likely that these images acted as a metaphor for the dangers of spiritual blindness – reminding the readers of the importance of their devotion and drawing their attention back to the text itself. Secondly, the presence of the empty alms bowls held out by the guide dogs possibly acted as a reminder of the reader's duty to give charitably to the needy – not just for the benefit of the poor but, as we have already mentioned, also for the benefit of the almsgiver's soul (as Rubin suggests: 'charity cannot be satisfactorily understood as a purely altruistic act since gift-giving is so rich in rewards to the giver').[42]

However, as a result of the few surviving textual references to guide dogs made by individuals such as Bartholomaeus Anglicus, it is possible to argue that the visual trope of the 'blind beggar and his dog' was also grounded in the lived experience of those with visual impairments. Much like the visual trope of the old woman being pushed in a wheelbarrow (discussed in chapter two), it seems that the blind beggar and his guide dog also existed outside of marginal illustrations – although, without any first hand or documentary accounts of lower status individuals, it is difficult to make a fair assumption about the lived experience of those who made use of assistance dogs.

[42] Miri Rubin, *Charity and Community in Medieval Cambridge* (Cambridge: Cambridge University Press, 1987), p. 1. For a succinct overview of charitable giving in the Middle Ages, see also Adam J. Davis, 'The Social and Religious Meanings of Charity in Medieval Europe', *History Compass*, 12:12 (2014), 935–950.

THE BLIND MINSTREL AND THE '*DAUNSER*'

An adaptation of the 'blind beggar' can be seen in the figure of the 'blind minstrel', who (although busking rather than begging) is often represented with an alms bowl and a dog, sharing many similarities with the traditional 'blind beggar' trope. It was not uncommon for later medieval source material to conflate blindness with an aptitude for musical performance, as Singer suggests: 'blindness constitutes not only an impairment of the sense of sight, but also an enhancement of another sense, namely hearing (or musical ability)'.[43] As such, blind people were often 'encouraged to become musical performers, and the blind minstrel became a stock figure' in later medieval literature and art.[44]

A good example of this can be found in the margins of a late-fourteenth- to early-fifteenth-century copy of the *Romance of Alexander* (see image 4.8). This image depicts three musicians, the middle of which appears to be blind as, although the details of his face have been worn with time, it is just possible to make out the trace of closed, downcast eyes, remaining. Whilst it could be argued that his eyes were drawn this way to show the minstrel looking down towards his instrument, the fact that his fellow musicians are clearly represented with open

[43] Julie Singer, 'Playing by Ear: Compensation, Reclamation, and Prosthesis in Fourteenth-Century Song', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyler (Farnham: Ashgate, 2010) pp. 39–52 (p. 40). Whilst this might initially seem like an unhelpful stereotype, a study published in *Nature* in 2004 argued that blind people 'develop superior abilities in auditory perception to compensate for their lack of vision', with those who are born blind (or lose their sight at a very early age) being four hundred per cent more likely to develop 'absolute pitch' (the ability to identify a musical note without the assistance of a reference tone). See Frederic Gougoux, Franco Lepore, Maryse Lassonde, Patrice Voss, Robert J. Zatorre and Pascal Belin, 'Pitch Discrimination in the Early Blind', *Nature*, 430:309 (2004), 309–10.

[44] Singer, p. 45.

eyes (complete with pupils), coupled with his use of an assistance dog, leads me to believe that the central figure was intentionally depicted as being blind.

Like images of the 'blind beggar' discussed above, the minstrel's dog is evidently a mongrel – as implied by its bushy tail and haphazard markings, and is tied to the musician by a leash which, although faint, leads up to, and wraps across the back of, the musician's hand. The minstrel's reluctance to let the dog off the leash further confirms its status as a guide dog. The dog is evidently well-trained enough to hold out an alms bowl and therefore, I would argue, was either well-trained enough to be let off the leash or had the ability to learn how to behave off the leash. However, as we have discussed above, the dog's leash was (and arguably still is) the key component in turning the animal into a form of assistive technology, explaining why (regardless of how well-trained the dog was) the minstrel felt a need to keep hold of the leash. Nevertheless, despite the dog's many shared features with other visual representations of guide dogs, it is arguable that (due to its training and relationship with a busking musician) it also played a secondary role as a 'dauncer'.

A dauncer, as Caius outlines in his *Of Englishe Dogges,* was a highly-trained dog that worked alongside its musician-owner, in order to encourage people to donate money to the performers. For example, it was

> taught and exercised to daunce in measure at the musicall sounde of an instrument, as, at the inst stroke of the drombe, at the sweete accent of the Cyterne, & tuned strings of the harmonioue Harpe showing many pretty trickes by the gesture of their bodies. As to stand bolte upright, to lye flat vpon the grounde, to turne rounde as a ringe holding their tailes in their teeth, to begge for theyr meate, and sundry such properties, which they learne of theyr vagabundicall masters,

> whose instruments they are to gather gaine, withal in Citie, Country, Towne, and Village.[45]

Although Caius's 'dauncers' were not specifically trained to assist blind members of the community, the list of commands they are able to follow (including dancing, lying down, standing up, begging, and turning in circles) offers an insight into the capabilities of lower status dogs who had been properly trained by their masters. If a dog could be trained to beg and dance in order to assist in its master's performance, it is possible to assume that a similar kind of low-status or mongrel dog could be taught to fetch items or navigate urban landscapes in order to assist a blind owner.

A third function that both a dauncer and guide dog would likely have served is that of a protector. Both the minstrel and the beggar are likely to have lived itinerant lifestyles, spending a lot of time travelling in search of alms or audiences. As such, they would have frequently found themselves in vulnerable situations (as a result of thieves on the road, wild animal attacks, or difficult to navigate architectural and geographical features – such as narrow bridges or slippery footpaths), the danger of which would have been heightened by their blindness. Having a canine guide would have provided a blind minstrel with a sense of safety – ideally being trained to prevent the minstrel falling into trouble, but also being there to assist if their owner found themselves in a dangerous situation.[46] An example of this is recorded in Caius's *Of Englishe Dogges*. In this

[45] Caius, p. 35.

[46] Recent scientific studies have found that one of the most worthwhile qualities of modern assistance animals is their ability to reduce feelings of vulnerability. For example, CCI (Canine Companions for Independence) mobility dog users have reported feeling an improved 'sense of safety and peace of mind and greater independence', after having received their assistance dogs. See Sandra Walther, Mariko Yamamoto, Abigail Paige Thigpen (et. al.), 'Assistance Dogs: Historic

story, a high-status man, whilst out on a hunt, falls into a ditch and is unable to climb out. His dog, recognising that his master needs assistance, runs off to find help and brings back a party of men who use a rope to pull the huntsman out of the ditch. The dog, having successfully rescued his master,

> cheerefully saluted, leaping and skipping vpon his master as though he woulde haue imbraced hym, beyng glad of his presence, whose longer absence he was lothe to lacke'.[47]

Whilst this man is not blind, it is easy to imagine a scenario like this occurring to either the blind beggar or the blind minstrel and, as a result of their loyalty and training, it is possible to assume that a guide dog would act in a similar way.

However, whilst this image of the blind minstrel has a lot in common with images of the blind beggar (i.e. the use of an assistance dog, leash, and use of an alms bowl), they differ quite significantly in terms of affluence. Unlike the blind beggar, the minstrel does not appear to be impoverished. All three musicians are dressed in elaborate and colourful robes, have fashionable long hair (rather than being depicted with the cropped hair or wide brimmed sun hats commonly associated with labouring individuals), and are playing expensive musical instruments.[48] The blind minstrel, for example, plays a hurdy-gurdy, which

---

Patterns and Roles of Dogs Placed by ADI or IGDF Accredited Facilities and by Non-Accredited U.S. Facilities', *Frontiers in Veterinary Science*, 4:1 (2017), 1–14 (p. 2). For more on this subject, see Lynette A. Hart, Mariko Yamamoto, 'Dogs as Helping Partners and Companions for Humans', in *The Domestic Dog: Its Evolution, Behaviour, and Interactions with People*, ed. by James Serpell (Cambridge: Cambridge University Press, 2017), pp. 247–270; Cindy Wiggett-Barnard, Henry Steel, 'The Experience of Owning a Guide Dog', *Disability and Rehabilitation*, 30:14 (2008), 1014–1026; Melissa Winkle, Terry K. Crowe, Ingrid Hendrix, 'Service Dogs and People with Physical Disabilities Partnerships: A Systematic Review', *Occupational Therapy International*, 19:1 (2012), 54–66.

[47] Caius, p. 31.

[48] The colourful clothing of lower status individuals is a notorious problem within historical and art historical scholarship and has subsequently been discussed at length (especially in relation to the well-dressed peasants in the Luttrell Psalter). See Richard K. Emmerson, P. J. P. Goldberg,

Christopher Dyer has estimated as costing 15s (a significant amount when a general labourer's wage has been estimated at approximately 40s a year).[49] Consequently, although the central figure appears to be blind, his function does not seem to be to inspire pity, charity, or devotional practice (unlike the blind beggars discussed earlier). Instead, whilst still a marginal figure (both in society and on the page), the minstrel's purpose is to entertain – a role which is suited to subject matter of the manuscript (i.e. the adventures of Alexander the Great) and the desires of the reader (i.e. entertainment, rather than devotion – as was the case with the more pitiful representations of blind beggars discussed earlier).

Interestingly, at an earlier point in this same manuscript, the illustrator has chosen to include two marginal illustrations of more conventional 'blind beggars' (see image 4.7). However, whilst this image shares many tropes with other representations of blind beggars (such as the guide dogs, alms bowls, the use of a cane or walking stick, and downcast eyes) the blind individuals themselves are represented more positively. They are much better dressed, are not displaying bare legs, and are not hunched over. Whilst I do not believe that this represents a higher status use of guide dogs (the dogs themselves are still mongrels with floppy ears and bushy tails), I think this kindlier representation is

---

"The Lord Geoffrey had me made': Lordship and Labour in the Luttrell Psalter', in *The Problem of Labour in Fourteenth-Century England*, ed. by James Bothwell, P. J. P. Goldberg and W. M. Ormrod (York: York Medieval Press, 2000), pp. 43–64 (p. 59) which argues that 'the colour of the pigments used [in the peasant's dress] is dictated by aesthetics rather than social realism'. Similarly, Camille argues that representations of peasants in manuscript marginalia are often 'dressed-up' and 'cosmeticised' to match the patron's level of taste. See Michael Camille, 'Labouring for the Lord: The Ploughman and the Social Order in the Luttrell Psalter', *Art History*, 10:4 (1987), 423–454 (p. 429).

[49] Christopher Dyer, *Standards of Living in the Later Middle Ages* (Cambridge: Cambridge University Press, 1989), p. 29.

more representative of the lived experience of an individual who required a guide dog. As the images appear in the *Romance of Alexander*, they are not intended to inspire charity or devotional practice in their viewers, and consequently, they do not need to be such exaggerated examples of poverty or poor fortune.

***

The first half of this chapter has demonstrated how images of medieval dogs were laden with multiple and conflicting meanings depending upon the kind of dog, its owner, and its associated status. These often disparate and conflicting attitudes towards dogs (be they in visual culture or literary accounts) were equally applicable to guide dogs and their owners, who became largely associated with lower status individuals and poverty – as blind individuals who had greater financial resources would have been more likely to employ a human guide, rather than rely on a dog. However, for people who suffered from milder ocular deterioration (such as the kinds of presbyopia associated with old age), spectacles provided a much more affordable alternative to both human and canine companions. Although, as this chapter will now discuss, fifteenth- and sixteenth-century representations of those who sold, purchased, and used spectacles were just as (if not more) unstable than contemporaneous images of guide dogs.

SPECTACLES

Glass, crystals, and water (or a combination of the three) have been used as magnifying lenses for millennia.[50] For example, Seneca, writing in c. 65 CE, states that 'every object much exceeds its natural size when seen through water. Letters, however small and dim, are comparatively large and distinct when seen through a glass globe filled with water'.[51] Similarly, several eleventh- and twelfth-century lenses shaped out of quartz (known as the 'Visby' lenses) have been unearthed at Swedish Viking gravesites, and are believed to have been used as visual aids as a result of their magnifying properties.[52] However, despite the longer history of magnifying lenses, spectacles (i.e. two conjoined eyeglasses which rest upon the nose) are a specifically medieval invention. Much like the 'glasses' we are familiar with today, medieval spectacles were made of two framed circular eyeglasses. Unlike today, these eyeglasses were held together by a rivet which acted as hinge, allowing the spectacles to be folded closed on top of one another when not in use and put away in a case for safekeeping, which could be hung from one's belt. They also had no arms to enable them to rest on one's ears – instead, a person would need to hold them in front of their eyes when they were required.

A clear, and commonly cited, example of this design can be seen in an altarpiece located in the Stadtkirche at Bad Wildungen (see image 4.9). Attributed to Conrad von Soest, this image (dating from c. 1406) is believed to be

[50] For more on early visual aids, see Dimitris Plantzos, 'Crystals and Lenses in the Graeco-Roman World', *American Journal of Archaeology*, 100:3 (1997), 451–464.
[51] Seneca, *Naturales Quaestiones*, trans. by John Clarke (Baltimore: Johns Hopkins University Press, 2004) 1.6.5.
[52] Olaf Schmidt, Karl-Heinz Wilms, Bernd Lingelbach, 'The Visby Lenses', *Optometry and Vision Science*, 76:9 (1999), 624–630.

the earliest visual depiction of spectacles north of the Alps. The altarpiece represents the Virgin Mary surrounded by the twelve apostles – one of whom (sitting to Mary's right, on the left-hand side of the image) is wearing a very detailed example of rivet spectacles.[53] There is much to be said about the decision to, anachronistically, depict one of the apostles as requiring spectacles. Was this to symbolise old age or learnedness? And if so, how did spectacles come to be associated with these themes? The following section of this chapter will attempt to answer these questions through a comparative analysis of late medieval visual representations of spectacles. However, before we begin to consider the metaphorical and symbolic representation of spectacles, let us first consider their production, trade, and purchase across the late medieval West.

1. THE PRODUCTION, SALE & USE OF SPECTACLES

PRODUCTION

From the seventeenth century onwards, Roger Bacon (1214–1292) has frequently been credited as the first person to create spectacles.[54] However, although he wrote extensively on optics and the magnifying qualities of glass and (despite living in England) had plenty of contact with Italy (from where the earliest

[53] Future research projects might wish to consider the potentially problematic nature of being engrossed in a book during the Pentecostal moment (in which the Holy Spirit was believed to have descended upon the apostles in Jerusalem whilst they were celebrating the Feast of Weeks). Pentecost is generally associated with the act of receiving inspiration from above and, as such, a contemporary audience might have considered it to be problematic to depict members of the Apostles as looking down into a book. Unfortunately, however, the scope of this thesis will not allow for any further investigation of the relationship between reading and the Pentecostal moment in medieval visual culture.

[54] Joy Hawkins, 'The Blind in Later Medieval England: Medical, Social and Religious Responses' (Unpublished Doctoral Dissertation, University of East Anglia, 2011), p. 129.

evidence for the existence of spectacles is found) there is no concrete material to suggest that Roger Bacon was directly involved in the creation of bifurcated spectacles.[55] As such, I believe that the tendency to credit Bacon as the creator of spectacles stems more from a desire to both solve and attach a famous name to the question of 'who created spectacles?', than it does from a more thorough consideration of surviving evidence.

In fact, the earliest mention of spectacles comes not from Bacon, but from the record of a sermon delivered at the Dominican monastery of Santa Maria Novella, Florence, on 23rd February 1306, by Dominican friar Giordano da Pisa. In his sermon, Giordano states that:

> *Non é ancora venti anni che si trovó l'arte di fare gli occhiali, che fanno vedere bene, ch'é una de le migliori arti e de le piú neccessarie che 'I mondo abbia, e é cosi poco / che ssi trovó: arte novella, che mmai non fu* [It is not yet twenty years since there was found the art of making eyeglasses, which make for good vision, one of the best arts and most necessary that the world has. And it is so short a time that this new art, never before extant, was discovered].[56]

If we are to trust Giordano's time frame, this would suggest that spectacles were invented sometime in the late 1280s. Later in his sermon, Giordano fleetingly mentions that he had met the creator of spectacles, but he does not reveal who

---

[55] Edward Rosen, 'Did Roger Bacon Invent Glasses?', *Archives internationales d'histoire des sciences*, 7:26 (1954), 3–15 (p. 3).

[56] Translation from Vincent Ilardi, *Renaissance Vision: From Spectacles to Telescopes* (Philadelphia: American Philosophical Association, 2007), p. 5. For original Italian see Giordano da Pisa, *Quaresimale fiorentino, 1305–1306, Edizione critica*, ed. by Carlo Delcorno (Florence: Sansoni Ed., 1974), sermon XV, p. 75. The original Italian, from which this passage is translated, uses the term *occhiali*. Ilardi has chosen to translate this word as 'eyeglasses', thereby conjuring the image of bifurcated spectacles. In Italian, the term *occhiali* can also mean 'glass' and therefore might not refer to spectacles but to individual lenses. However, as we have seen, reading lenses were not a new technology. Consequently, despite the linguistic ambiguity, I would agree with Ilardi that Giordano is discussing spectacles (rather than individual lenses) as the creation of these would have been more likely to qualify as the 'new art' that Giordano discusses.

this person was, what their occupation might be, or where they could be found. We cannot even assume that this person was based in Italy as, like many friars of the time, Giordano travelled very widely and was known to have spent quite a bit of time in Paris. However, despite this lack of information, there are a couple of factors which suggest that the person who created spectacles was most likely an artisan or craftsperson, rather than an educated scholar or medical professional.[57]

Firstly, there is no surviving documentary record attesting to the design or production of spectacles prior to Giordano's sermon in 1306, and they do not appear in any contemporary optical treatises.[58] Although the documents could simply have been lost or destroyed, this lack of a record could also suggest that the creator was illiterate and did not commit their designs to paper. Secondly, one can assume that the inventor did not have a detailed knowledge of optical theory. Visual theory propounded the notion that there was a single crystalline lens in the eye that refracted visual rays entering the eye.[59] Subsequently, if one were to assume the logic of contemporary optical theory, placing a lens in front of the eye should actually impede one's vision, as it would create a double refraction and disrupt the trajectory of the visual rays. As Ilardi suggests, 'knowledge of contemporary optical theory would have been an impediment', rather than a

[57] There is certainly a difference between the person who first used glass lenses for the improvement of sight and the person who first thought to encase these lenses within bifurcated frames. As we have seen, the use of lenses for the improvement of vision was not a new technology, but the creation of framed 'glasses' that could rest upon the nose were a specifically medieval invention. Therefore, it should be noted that, this chapter is referring to the individual who brought together the use of glasses for the improvement of vision with the practical consideration of encasing these lenses in frames.

[58] A. Mark Smith, 'Ptolemy, Alhazen, and Kepler and the Problem of Optical Images', *Arabic Sciences and Philosophy*, 8:1 (1998), 9–45 (pp. 40–42).

[59] David C. Lindberg, *Theories of Vision from Al-Kindi to Kepler (*Chicago: University of Chicago Press, 1976), p. 40.

benefit, when trying to construct a visual aid such as spectacles.[60] As a result, it seems most likely that spectacles were created through a practical process of trial and error, rather than as a result of an education in optics.

This is very similar to the construction of prosthetic limbs discussed in the previous chapter. Although there are several extant designs for prosthetic limbs drawn up by individuals with a medical background (such as Paré), the limbs themselves were constructed by artisans and craftspeople. These people did not have a scholarly understanding of the body, but they were able to apply their knowledge of blacksmithing, locksmithing, and watchmaking to the task of creating prosthetic limbs. Consequently, it is arguable that a learned understanding of anatomy or optics was not necessary in the creation of assistive technology (whether prosthetic limbs or spectacles). Instead, craftspeople needed a sense of demand (or a commission), coupled with a knowledge of the lived experience of impairment (supplied either through their own experiences, or the experiences described to them by their customers).

If the person who first created bifurcated spectacles was a craftsperson, rather than a learned scholar, this would also explain why they might have wished to keep their identity and construction methods a secret – as this would have enabled them to make more money by maintaining a monopoly over the production of spectacles.[61] However, if this were the case, they were not able to

[60] Ilardi, p. 26.

[61] I have purposefully used gender neutral pronouns when discussing the inventor of spectacles, as there is no evidence to suggest that it was either a man or a woman. Erika Uitz, for example, argues that women could learn a trade through their husbands and, if widowed, be given the opportunity to take over their husband's business. See, Erika Uitz, *The Legend of Good Women: Medieval Women in Towns and Cities* (Wakefield: Moyer Bell, 1990), especially Chapter Three: 'Women in the Crafts and Other Town Trades'.

maintain their secret for long. Shortly after Giordano's public praising of spectacles, one of his contemporaries, Dominican Friar Alexander della Spina, used an existing pair of spectacles to work out the process of construction and revealed this to the public (demonstrating how some friars were capable of both practical invention and artisanal skills). The *Chronica antiqua conventus Sanctae Catharinae de Pisis* states that:

> *Frater Alexander de Spina, vir modestus et bonus, quae vidit oculis facta, scivit et facere. Ocularia ab alio prio facta, communicare nolente, ipse fecit, et omnibus communicavit corde hilari et volente* [Friar Alexander della Spina, a modest and good man, whatever he saw that had been made, he knew how to make it. Eyeglasses, having first been made by someone else, who was unwilling to share them, he made them and shared them with everyone with a cheerful and willing heart].[62]

Upon his investigation of the spectacles, Friar Alexander would have realised that they were made up of two parts – the frames and the lenses. Whilst the frames would have been relatively easy to construct, lenses would require a higher level of specialist craftsmanship if they were to function as intended.

FRAMES

Spectacle frames were made from a variety of materials including wood, bone, leather, and horn. As spectacles began to gain popularity, there also developed a relationship between goldsmiths and spectacle making, as members of the elite classes began to commission luxury spectacles made from precious metals.

---

[62] Translation from Ilardi, p. 6. For the original Latin see 'Chronica antiqua conventus Sanctae Catharinae de Pisis', in *Archivio storico italiano*, VI, Part Two, ed. by F. Bonaini (Florence: Gabinetto Scientifico Letterario G. P. Vieusseux, 1845), pp. 467–77. For further information on this account, see Edward Rosen, 'The Invention of Eyeglasses', *Journal of the History of Medicine and Allied Sciences*, 11:1 (1956), 13–46.

Perhaps the best documented case of this is King Henry VIII of England who, upon his death in 1547, owned forty-four pairs of spectacles – ten of which were silver gilt and two 'garnished with gold'.[63] A pair of bronze spectacle frames can also be found on the 'Horned Helmet' (photographed in image 4.13). Although this helmet is a source of unresolved dispute amongst historians, it is generally believed that it was given to Henry VIII as a gift from the Holy Roman Emperor, Maximilian I, in 1514. As can be seen in image 4.13, the helmet is constructed of a skull piece (into which two bronze coloured rams horns are set), two engraved cheek pieces, and a 'mask' that is designed to resemble a caricatured human face (featuring squinting eyes, a stubbly beard, wrinkles, and a large dripping nose upon which sits a pair of bronze coloured rivet spectacles). Combined, these features very closely resemble the images of fools which we will discuss below (with the exception of the ram's horns which seem to have replaced the donkey-like ears more commonly seen on a fool's cap); however, very little attention has been paid to the cultural trope connecting foolishness, learnedness, and spectacles, and how Maximillian might have been using this popular visual trope to poke fun at Henry VIII's use of spectacles. Unfortunately, the debates surrounding the Horned Helmet are likely to draw us away from the central

[63] David Starkey, Philip Ward and Alasdair Hawkyard (eds.), *The Inventory of King Henry VIII: Society of Antiquaries MS 129 and British Library MS Harley 1419* (London: Harvey Miller for the Society of Antiquaries of London, 1998). See, for example, entry 2313 which lists 'a spectacle case of lether having one spectacle siluer and thother of horne' (p. 71); entry 2530 which lists 'a paier of Spectacles garnissed with Siluer' (p. 75); entry 2286 which lists 'twoo Spectacle cases of Siluer gilte with spectacles Siluer gilte enameled' (p. 71); entry 2287 which lists 'a Spectacle case siluer gilte with twoo spectacles Syluer gilte' (p. 71); and entry 10506 which lists two pairs of 'redinge glasses garnesshed with silver in cases of printed leather' (p. 243).

themes of this thesis, so will not be considered in any greater detail here, although it is something which I hope to write about in the future.[64]

Returning to the discussion of materials from which spectacle frames were created, in most cases, wood and bone remained the most popular materials, as these were quicker and easier for craftspeople to work with than precious metals and were more affordable for non-elite customers to purchase.[65] A rare insight into the production of bone frames was made possible by the discovery of a pair of spectacles during the 1974–1975 Trig Lane excavations in London. These spectacles (photographed in image 4.14) were found in a refuse heap and have been dated to c. 1440. Although they are not intact, archaeologists have been able to use them to learn a lot about the process of constructing spectacles. In his evaluation of the find, Michael Rhodes explains that:

> The plate for each frame unit was made by sawing off the unwanted proximal and distal ends of the bull metacarpal and by removing the posterior wall of the shaft. The internal and external surfaces could then be ground down to the required thickness of c. 2.55mm. The plate was probably then polished; fine, regular smoothing marks are visible under magnification (20x) on both the upper and lower surfaces of the frames.[66]

He goes on to explain that each of the frames has a small 'break' at the bottom which could be tightened up with a length of copper wire (which has remarkably survived on one of the frames) in order to fix the lenses in place. The two frames

---

[64] For more on the debates surrounding the Horned Helmet see Claude Blair, 'The Emperor Maximilian's Gift of Armour to King Henry VIII and the Silvered and Engraved Armour at the Tower of London', *Archaeologia*, 99:1 (1965), 1-52; Alan Borg, 'The Ram's Horn Helmet', *Journal of the Arms and Armour Society*, 8:2 (1974), 127-37; Claude Blair, 'Comments on Dr Borg's 'Horned helmet'', *Journal of the Arms and Armour Society*, 8:2 (1974), 138-85.
[65] Ilardi, p. 153.
[66] Michael Rhodes, 'A Pair of Fifteenth-Century Spectacle Frames from the City of London', *Antiquaries Journal*, 62:1 (1982), 57–73 (p. 57).

would then be fixed together with an iron rivet, which acted as a hinge – allowing one half of the spectacles to be folded on top of the other.[67]

Rhodes' conclusions about the construction of the Trig Lane spectacles are mirrored in an early-sixteenth-century Florentine carnival song which, as far as we know, Rhodes was not aware of when examining the spectacles. The song not only explains the process of straightening, cutting, and cleaning the bone but also suggests that the creation of spectacle frames was such a simple process that even women and children could be taught how to make them. For example:

> We have various spectacles
> of every sight and every age;
> willingly we will teach this art
> to maidens and to married women
> and to veiled widows
> who want to learn to make spectacles
>
> If there were a child
> who would also want to learn,
> we would teach him the whole art:
> first straighten the horns,
> then cut and drill them,
> until he knows how to make spectacles.
>
> [...]
>
> We put the horn to soak,
> so that it bends more easily;
> this done, the marrow
> will flow out and then it is cut
> then we clean it and thus it is bound
> in the glass and the spectacles are made.[68]

[67] Rhodes, p. 58.
[68] Translation from Ilardi, p. 159. For the original Italian, see C. S. Singleton (ed.), *Canti carnascialeschi del Rinascimento* (Bari: Laterza, 1936), song LXXXV, pp. 114–15.

However, we must be careful not to take this song literally as, being associated with Carnival (a 'topsy turvy' festival known for encouraging satire and disruption), it is possible that the song was intended to mock spectacle makers by suggesting that their craft required no skill. Nevertheless, the construction of frames required a much lower level of craftmanship than the creation of the lenses, and that lenses were consequently bought pre-made by artisans, who then bound them into their frames.

LENSES

From the thirteenth to fifteenth centuries, spectacles were only capable of correcting long-sightedness, or presbyopia.[69] Long-sightedness is caused when the eye cannot focus light on the retina properly – either because the eye is too short, or the cornea is too flat. Whilst some can inherit this problem genetically; for most, it is a consequence of ageing, during which time the lenses in one's eyes become stiffer and less able to focus.[70] The result of this condition is the ability to see objects in the distance clearly, whilst finding nearby objects to be out of focus. Using the convex lenses found in spectacles, medieval people would have been able to overcome this form of ocular degeneration.[71] This would have been

[69] Hawkins, *The Blind in Later Medieval England*, p. 132.
[70] NHS, *Long-Sightedness* (2019) <https://www.nhs.uk/conditions/long-sightedness/> [accessed May 2019].
[71] It was not until the end of the fifteenth century that spectacles to treat myopia were invented. Unlike presbyopia, myopia occurs when the eyeball is too long, which leads to light falling just in front of (rather than on) the retina. Caused by both genetic and environmental factors, myopia can become progressively more severe throughout one's life – resulting in the ability to see close-up objects quite clearly but rendering distant objects indistinct and blurry. However, the convex lenses necessary for treating myopia did not take hold in north-western Europe until the seventeenth and eighteenth centuries (the same time that 'arms' were invented to hold spectacles in place on one's face) and will consequently not be examined by this thesis.

lifechanging for individuals whose occupations required them to complete up-close work, as it would have allowed them to continue working for years after their eyesight had begun to deteriorate.

The only known examples of medieval spectacles which have survived with their lenses intact come from a 1953 archaeological dig under the choir stalls at Wienhausen nunnery, near Celle, in Germany. This excavation found three complete pairs of spectacles and multiple fragments (all of which were made of either leather or wood) dating from the fourteenth to the sixteenth centuries. This discovery is especially interesting on account of both the ownership of the spectacles and the location in which they were found. Firstly, we can strongly assume that the spectacles all belonged to women, as the only people who would have had access to this choir stall would have been the Wienhausen nuns. As a result, this discovery is the only confirmed material example of medieval women using spectacles. Aside from this example, the owners of spectacles found in archaeological digs are unknown and in visual source material the people depicted as wearing spectacles are exclusively male. Secondly, spectacles would not have been useful in the choir as, although there would have been a large choir book for the nuns to share located at the front, spectacles at this time did not correct long-distance visual difficulties. As such, it is likely that the spectacles found in this excavation were used by the nuns in other areas of their life and had been dropped, lost, or misplaced when they were not required during religious services. This demonstrates that the spectacles were both highly valued items (in the sense that the nuns carried them around on their persons) but also that they

were affordable and easily replaced (seeing as the nuns do not appear to have gone to great lengths to recover the lost pairs of spectacles).

The Wienhausen spectacles also demonstrate three different designs – straight-handled rivet spectacles, bow-handled rivet spectacles, and bow spectacles. According to Rhodes, the straight-handled rivet spectacles, seen in image 4.10, would have been made in exactly the same way as the Trig Lane spectacles – with the surviving pair even retaining a linen tie, which was used to hold the lenses in place (fulfilling the same function as the copper wire in the Trig Lane find).[72] The bow-rivet spectacles, on the other hand, are of a slightly later design. As evidenced in image 4.11, the handles of the bow-rivet spectacles are curved – allowing for greater comfort and balance whilst resting on the nose. However, the fact that these spectacles are made from wood (the cheapest material from which to make spectacles) and are adjustable in their design, could point to the fact that they were mass produced – one could try on a series of pre-made spectacles and adjust the 'bow' to suit the width of the bridge of their nose, before purchasing a pair for an affordable price.[73]

The bow spectacles in image 4.12, were more likely to have been custom made to suit a specific person's face. They contain no rivet, so could not be adjusted, and leather was also seen to be a more comfortable alternative to bone or wood – perhaps suggesting that the owner of the spectacles might have intended to use them for extended periods of time. These leather-framed spectacles closely mirror those which belonged to Willibald Pirckheimer (a

[72] Rhodes, p. 60.
[73] Rhodes, p. 61.

sixteenth-century lawyer and humanist, who was close friends with both Albrecht Dürer and Erasmus).[74] These spectacles, which date from c. 1520 and are currently on display at Warburg Castle, would likely have been made specifically for Pirckheimer, who, as a lawyer, would have needed to use them very frequently.[75] If a pair of leather-framed bow-spectacles were the choice of a wealthy lawyer, it is arguable that the Wienhausen pair might have belonged to a high-standing member of the convent, who was required to read small text for extended hours.

However, it is the survival of the lenses in the Wienhausen spectacles which makes them such a unique find, enabling scholars to investigate exactly how they might have been made. In the Central Middle Ages, glass was made of four ingredients. Firstly, it required a base of quartz-sand. However, due to the high melting point of quartz-sand (1700°C), potash must be added to this base in order to reduce the melting point to a temperature achievable in medieval furnaces (the higher the amount of potash, the lower the melting point). Finally, lime would be added to stabilise the mixture, before any supplementary additives (e.g. metal oxides) were included to alter the colour of the final product.[76]

Unfortunately, although potash reduced the melting point, the high temperatures required meant that the 'furnace wall slowly began to dissolve and

---

[74] Corine Schleif, 'Albrecht Dürer between Agnes Frey and Willibald Pirckheimer', in *The Essential Dürer*, ed. by Larry Silver and Jeffrey Chipps Smith (Philadelphia: University of Pennsylvania Press), pp. 85–205.
[75] Ilardi, p. 162.
[76] Rolf Willach, 'The Long Road to the Invention of the Telescope', in *The Origins of the Telescope*, ed. by Albert van Helden, et al. (Amsterdam: Koninklijke Nederlandse Akademie van Wetenschappen Press, 2010), pp. 93–114 (p. 99).

ooze as long filaments and striations into the molten glass'.[77] As a result, glass was never fully transparent, retaining a lot of air bubbles from the striations, and was consequently not suitable for optical use. It was not until the late-thirteenth century that Venetian glassmakers began to use a substance called natron as a substitute for potash – which was possible because both of these minerals were types of natural salts. Glass made with natron (also referred to as *cristallum*) remained uncoloured and was less affected by impurities (i.e. the bubbles and striations developed in the melting process).[78] Consequently, *cristallum* became the most popular choice of material for the construction of optical quality lenses.

Unlike spectacle frames, which 'could be accomplished by practically any artisan', lenses required a great deal of skill if they were to be made properly.[79] Firstly, as we have discussed, the glass compound would have to be created and heated carefully to avoid impurities. Then, a glassblower would create a *cristallum* ball. This ball would have been sliced into small disks using a circular copper wire (with the same diameter as the desired lenses) which was placed on the hot glass, forming cracks around the rim of the copper circle. Once the glass is cold, it would have been carefully broken to reveal the round disks created by the copper wiring. These concave discs would have then been polished to a flat plane, after which they could be used as spectacle lenses.[80]

[77] Willach, p. 100.
[78] Willach, p. 100.
[79] Ilardi, p. 7.
[80] Willach, pp. 103–104.

The first medical recommendation of spectacles appears in Guy de Chauliac's *Inventarium sive chirurgia magna*, which was completed in 1363. Guy advised the use of spectacles as a last resort, stating that

> *et si ista non valent, ad ocularios vitri aut berillorum est recurrendum* [if these things are of no avail recourse must be given to the glass or beryl spectacles].[81]

It is interesting that Guy suggests beryl as an alternative to glass (which was the most popular choice for lenses at the time) as beryl was a natural mineral form of crystal which, although occasionally clear in colour, often had a green tint. Despite its lower optical quality (being less transparent and prone to impurities) it was this green hue which made beryl a desirable substitute for glass.

In his *History of the World*, Pliny expounds the benefits of looking upon 'smaragdus' (i.e. emeralds) in order to heal and soothe strained eyes.[82] He states:

> *Tertia auctoritas smaragdis perhibetur pluribus de causis, quippe nullius coloris aspectus iucundior est. nam herbas quoque silentes frondesque avide spectamus, smaragdos vero tanto libentius, quoniam nihil omnino viridius comparatum illis viret. Praeterea soli gemmarum contuitu inplent oculos nec satiant. quin et ab intentione alia aspectu smaragdi recreatur acies, scalpentibusque gemmas non alia gratior oculorum refectio est: ita viridi lenitate lassitudinem mulcent* [The third rank among gemstones is assigned for several reasons to the 'smaragdus.' Certainly, no colour has a more pleasing appearance. For although we gaze eagerly at young plants and at leaves, we look at 'smaragdi' with all the more pleasure because, compared with them, there is nothing whatsoever that is more intensely green. Moreover, they alone of gems, when we look at them intently, satisfy the eye without cloying it. Indeed, even after straining our sight by looking at another object, we can restore it to its normal state by looking at a 'smaragdus'; and engravers of gemstones find that this is the most agreeable means of

[81] Guy de Chauliac, *Inventarium sive chirurgia magna*, vol. 1, ed. by M. R. McVaugh (Leiden: Brill, 1997), p. 346.
[82] Pliny the Elder, *The Historie of the World: Commonly Called, The Naturall Historie of C. Plinius Secundus*, trans. by David Edward Eichholz, William Henry Samuel Jones and H. Rackham (London: William Heinemann, 1938–1962), Book 37, Section 16.

> refreshing their eyes: so soothing to their feeling of fatigue is the mellow green colour of the stone].[83]

This idea (that looking upon the colour green could soothe one's eyes) continued to hold currency well into the medieval and early modern periods, affecting the reading and writing culture of the time.[84] For example, there are several cases of green writing tablets being favoured over traditional black or white surfaces in order to ease potential eyestrain. The twelfth-century abbot and poet, Baudri of Bourgueil, received one of these tablets as a gift, stating that 'to save the eyes […] [it was] coated with green wax'.[85] Similarly, Peter of Spain (d. 1277), who was part of the thirteenth-century learned interest in optics, wrote in his *De Oculis* (a thirteenth-century treatise on eye disorders, which continued to be copied in both the original Latin, as well as vernacular German and Italian, throughout the fifteenth and sixteenth centuries) that 'green is beneficial' and that emeralds can help the eyes.[86] Peter also states that, when designing a hospital, 'rooms in which there are patients ought to be green. Beds ought to be green and pleasant to the sight'.[87] If looking at green could help to combat eyestrain and improve one's wellbeing, beryl spectacles would have been doubly effective. Not only did they help individuals to overcome the degeneration of their vision, but they also provided a calming hue through which any up-close work, reading, or writing

[83] Pliny the Elder, Book 37, Section 16.
[84] Leah Knight, *Reading the Colour Green in Early Modern England* (London: Routledge, 2014), p. 28.
[85] Raymond Irwin, *The English Library: Sources and History* (London: George Allen and Unwin, 1966), p. 146.
[86] Peter of Spain, 'The Eyebook', trans. by Walter J. Daly and Robert D. Yee, in Walter J. Daly and Robert D. Yee, 'The Eye Book of Master Peter of Spain: A Glimpse of Diagnosis and Treatment of Eye Disease in the Middle Ages', *Documenta Ophthalmologica*, 103:2 (2001), 119–153 (p. 136).
[87] Peter of Spain, p. 137.

could be viewed – thereby anticipating, and preventing, any ocular irritation that these activities might cause.

Although it still had to be mined, it is arguable that, in medieval France, beryl was used more frequently than *cristallum* in the production of spectacle lenses (as, compared to beryl, *cristallum* required more steps and equipment to produce and was consequently more expensive to purchase). The French term for spectacles is *bericles* or *besicles* – both of which are derived from 'beryl'.[88] The use of beryl for the creation of spectacle lenses must therefore have been ubiquitous in medieval France, as this direct association between the material from which an object is made, and the naming of the object itself, suggests a very close connection between the two. It was not until the fifteenth century that the terms *bericles* or *besicles* began to be replaced with the word *lunettes* (which is still in use today). The term *lunette* (from the Latin *luna*, meaning moon), derives from the circular shape of spectacle lenses, which were said to resemble 'small moons' – *lunettes*.[89]

In Middle English, on the other hand, the term 'spectacle' was not unique to eyeglasses. A spectacle could refer to anything from a magnifying lens, mirror, or transparent glass (such as windows), to a dramatic event worthy of notice.[90]

---

[88] Astrid Vitols, *Dictionaire des Lunettes: Historique et symbolique d'un objet culturel* (Paris: Rakuten, 1994), pp. 68–70. Nevertheless, it should be noted that, although there is no material evidence supporting the use of beryl in the production of German spectacles, the modern German word *Brille* (meaning spectacles) is etymologically derived from the Latin word *beryllus*, meaning 'beryl'. This could therefore suggest that beryl was used as a cheaper alternative to *cristallum* throughout Europe more broadly.

[89] Vitols, p. 70.

[90] Oxford English Dictionary, *Spectacle* (1989) <https://www.oed.com/view/Entry/186057?rskey=vW3wt3&result=1&isAdvanced=false#eid> [accessed May 2019].

The term is derived from the Latin *spectaculum* (from *spectare*, meaning 'sight' or 'to watch'), and has close connections with the term '*speculum*' (meaning mirror) – both of which relate to the broader act of watching and/or seeing.[91] One of the earliest recorded accounts of the term 'spectacle' being used exclusively in reference to eyeglasses can be seen in the poems of Thomas Hoccleve. For example, in 1415, whilst urging John Oldcastle to turn away from his heretical beliefs and seek reconciliation with the king, Hoccleve uses spectacles as a metaphor for the correction of 'feeble sighte'.[92] Although this is the first known written reference to 'spectacles' in later medieval England, the fact that Hoccleve is able to use them as a metaphor suggests that spectacles (and the function they served) were well understood at the time of writing.

The construction of spectacles therefore involved two very different skill sets. Whilst the frames could be constructed relatively easily by an artisan of moderate skill (or 'even a child' if we are to believe the sixteenth-century carnival song), the lenses required a higher level of craftmanship and a thorough knowledge of glass construction and/or the properties of various crystals (such as beryl). As a result, it was not uncommon for jewellers and spectacle makers to import lenses from reputable glassworkers, before setting these into their own frames, and selling spectacles as a complete object.

---

[91] Rhodes, p. 64.
[92] Thomas Hoccleve, *Hoccleve's Works: The Minor Poems*, vol. 1, ed. by F. J. Furnivall (London: The Early English Text Society Extra Series 61, 72, 1870), pp. 8–24 (line 417).

SALE AND USE

Once constructed, these goods would then be sold – either as complete items, or as glasses that could be fitted into locally made frames. However, whilst it was clearly popular to purchase spectacles (as we will see below, they were bought and used by a diverse range of people including scholars, ecclesiastics, and rulers), visual representations of individuals who bought and used spectacles varied greatly. Initially, spectacles came to be understood as a visual signifier of learnedness, piety, and wisdom, which, as we will see below, led many artists to retrospectively depict apostles or church fathers as requiring spectacles. However, this relationship between spectacles and learnedness changed over time, as different kinds of 'learning' were defined. Idle curiosity was considered problematic, whilst devotional study of religious texts was still considered to be a pious act. The association between eyeglasses, learnedness and piety was also diluted as spectacles became more widespread and were used by a greater number of people. Due to their reduced cost and subsequent ubiquity amongst the general population, spectacles began to lose their appeal as a signifier of learnedness because they were no longer seen to be the status-enhancing technology that they had been in the thirteenth century. As a result, later medieval illuminators and artists were able to subvert the pre-existing signifiers associated with the used of spectacles (e.g. piety and learnedness), and instead used spectacles to represent those who practised the pursuit of knowledge for its own sake as foolish, cunning, or easily misled. Consequently, the next section of this chapter will discuss the sale and use of spectacles through an investigation of these opposing visual interpretations.

SPECTACLES & FOOLISHNESS

Throughout the fifteenth and sixteenth centuries, there was a concern that spectacles had the power to manipulate the ways in which people saw the world (i.e. by making items appear magnified or distorted) and that they therefore prevented people from viewing an objective 'truth'. As Italian physicist, Vasco Ronchi suggests:

> The aim of vision is to know the truth; eyeglasses make figures look bigger or smaller than they would be seen with the naked eye, nearer or farther away, at times distorted, inverted, or coloured; hence they do not make the truth known; they deceive and are not to be used for serious purposes.[93]

It is possible (if spectacles were made from glass with a low optical quality, the curve of the lenses was too great or too little, or the user was myopic, rather than presbyopic) that spectacles could indeed distort one's view of the word in the manner suggested by Ronchi. As we have seen, working spectacles needed to be created from transparent glass with few impurities, and shaped into lenses with the correct level of curvature in order to function without distortion. Even then, it could take time for one's eyes to adapt to using spectacles, during which one might experience warped peripheral vision. Consequently, it is likely that the fear of spectacles distorting one's vision was based on people's experience of having used poorly made spectacles, or not having taken the time for their eyes to adapt to spectacle use.

As well as concern over spectacles leading to the distortion of one's vision, there was also a fear that wearing spectacles would gradually worsen one's vision.

---

[93] Vasco Ronchi, *Optics: The Science of Wisdom*, trans. by Edward Rosen (New York: New York University Press, 1957), p. 33.

This would be a difficult theory to disprove because, in many cases, eye conditions were degenerative and would continue to steadily worsen, regardless of whether or not a person wore spectacles. However, as people usually begin to wear spectacles when they first notice a decline in their quality of vision, it is possible to see how spectacle use could be conflated with the natural degeneration of vision. An example of this can be seen in *The Book of Margery Kempe*, in which the priest acting as Kempe's scribe finds that his eyesight has 'failed so much that he could not see to form his letters, and he could not see to mend his pen'; however, 'he was able to see other things well enough'.[94] In order to remedy this, the priest places a pair of spectacles on his nose only to find that, over time, they make his sight worse instead of better. Kempe urges the man to discard his spectacles and continue writing regardless of his failing eyesight, arguing that it is God's will that her book be written. Sure enough, when the priest returned to his writing 'he could see as well (he thought) as he ever had before, both by daylight and candlelight'.[95]

The contemporary notion that spectacles could worsen and distort one's vision (rather than improving one's sight, as they promised) subsequently led to the popular representation of spectacle vendors as dishonest, foolish, or fraudulent, and those who wore them as gullible or naïve.[96] An example of this

[94] Margery Kempe, *The Book of Margery Kempe*, trans. by Anthony Bale (Oxford: Oxford University Press, 2015), p. 6.
[95] Kempe, p. 6. There has been some debate over the quasi-hagiographical genre to which *The Book of Margery Kempe* may belong. For example, in this instance, whilst this story highlights the idea that spectacles can obscure or worsen one's vision, it is also used to demonstrate the strength of Kempe's relationship with the divine – the priest's vision is almost miraculously improved, in order that he might assist Kempe in writing her memoirs.
[96] Jean-Claude Margolin, 'Des lunettes et des hommes ou la satire des mal-voyants au XVIe siècle', *Annales: Economies, Sociétés, Civilisations*, 2–3:30 (1975), 375–393 (p. 379).

can be seen in *The Sleeping Pedlar Robbed by Monkeys* produced after Pieter Bruegel the Elder (see image 4.15), in which it is possible to see a travelling salesman taking a nap, whilst a horde of monkeys loot his basketful of merchandise. The pedlar, though not necessarily fraudulent, is certainly characterised as being careless and lazy in his decision to fall asleep, unguarded, in the middle of a road. His ignorance of the events taking place around him (and his foolish decision to fall asleep in the first place) is further mocked by the nature of his merchandise.

Although he appears to be selling an assortment of goods, including gloves, satchels, and a drum, the majority of his stock appears to be made up of spectacles, which can be seen scattered across the floor, in a small basket at the bottom right hand corner of the image, and perched upon the nose of a particularly curious monkey. The fact that the salesman is 'blind' to the mischief around him and yet seeks to sell devices intended to improve the vision of others would have been a source of humour for a contemporary audience, whilst also compounding the fact that spectacle pedlars and their goods should not be taken seriously. The monkeys, on the other hand, represent the foolishness of the people who choose to purchase from the spectacle pedlar – as Camille suggests, 'the ape is always a *singe*, a sign dissimulating something else'.[97] The monkeys and apes in this image mimic the foolish, sinful, or lewd behaviours of their human counterparts.[98] We see the animals dancing, wearing human clothes, riding hobby horses, defecating, playing musical instruments, and preening over

[97] Michael Camille, *Image on the Edge,* p. 30.
[98] Some of the creatures are monkeys as they are depicted with tails, whereas others have no tails and might therefore be apes. These animals were often confused in the medieval period.

their appearance in a mirror – as well as, of course, wearing spectacles. Consequently, the inclusion of wearing spectacles alongside other, perhaps more obvious, foolish behaviours, suggests that contemporaries were aware of a correlation between the purchase or wearing of spectacles and foolishness.

Although in image 4.15, foolish people and foolish behaviours are embodied in the characters of the apes, it became increasingly popular throughout the fifteenth and sixteenth centuries for Northern European artists to signify foolishness through the inclusion of a literal fool. Throughout the Middle Ages, fools can be categorised into three types – the artificial fool, the natural fool, and the learned fool. As Metzler explains, the natural fool was 'witless and innocent' and may have intellectual or learning disabilities, whilst the artificial fool is a 'professional wise fool' who is not intellectually impaired but is instead employed to act out the role of the fool.[99] To these definitions I would also add the learned fool, who is neither intellectually impaired nor employed to act out the role of a fool (as we see in the example of a court jester). Instead, learned fools can be defined as individuals who either pursue the wrong kind of learning, or engage in knowledge as a result of misplaced curiosity (rather than an attempt to become closer to God).

Within medieval iconography, these three types of 'fool' are depicted very differently. The natural fool (sometimes conflated with the 'holy fool') is often represented as tonsured, trouserless (sometimes displaying his genitals), and barefoot, whilst holding a pig's bladder on a stick and/or a circular loaf of

[99] Irina Metzler, *Fools and Idiots? Intellectual Disability in the Middle Ages* (Manchester: Manchester University Press, 2016), pp. 184–185.

bread.[100] Occasionally, these natural fools are also accompanied by a dog which appears to be an allusion to the biblical proverb, 'as a dog returns to his vomit, so a fool repeats his folly' (although, as we have seen, the iconographic function of a dog was multifaceted and complex at this time).[101] However, within visual iconography, these natural fools are never represented as wearing spectacles.[102] Artificial fools more closely resemble the 'court jester' figure with which a modern audience is likely more familiar. These fools are often depicted as wearing bi-coloured hose and tabards, often with a tripart hood (designed either to look like donkey's ears or to be decorated with bells), and are also shown carrying a fool's 'bauble' – a club-like stick often carved to resemble a human face.[103] In visual source material these artificial fools are also represented as either wearing or carrying spectacles (as depicted in images 4.16 and 4.17) – usually intended to mock learned or pious behaviour. Finally, learned fools are less likely to be dressed in the attire of a court-jester, but are instead represented as academics, scholars, or ecclesiastics who are guilty of pursuing the wrong kind of knowledge and subsequently find themselves in the presence of artificial fools. These fools are often identified by their use of spectacles which are intended to

[100] The 'Holy Fool' or *insipiens* refers to the biblical denier of God, who stated in the incipit of Psalm 52, *Dixit insipiens in corde suo: Non est Deus* [The fool said in his heart: There is no God].
[101] For more on visual representations of the 'holy fool' see Sandra Pietrini, 'Medieval Fools in Biblical Iconography', *Medieval English Theatre*, 24 (2002), 79–103.
[102] Examples of natural fools can be found in *Bible historiale* (1356–1357), British Library, MS Royale 17 E VII, fol. 241; *Psalter of Jean de Berry* (fourteenth century), Bibliothèque nationale de France, Français 13091, fol. 106r; *Psalter* (thirteenth century), Assisi, Biblioteca, Fondo Antico Cod. VIII, fol. 115 r.
[103] D. J. Gifford, 'Iconographical Notes Towards the Definition of the Medieval Fool', *Journal of the Warburg and Courtauld Institutes*, 37 (1974), 336–342 (p. 337).

draw attention to the fact that they are looking at inappropriate or unworthy things.

However, very little attention has been given to the association between fools and the wearing of spectacles, despite the fact that these three kinds of fools have been extensively studied from both an anthropological perspective as well as within the specific context of the Middle Ages (with scholars such as Sandra Billington discussing the social history of the fool, Max Harris drawing attention to 'sacred folly' in the form of the Feast of Fools, Robert Hornback studying the fool in relation to a broader tradition of 'clowning', and Irina Metzler providing new insights into the relationship between intellectual disability and 'foolishness' in the Middle Ages).[104] Consequently, it is with both learned fools and artificial fools that the following section of this chapter is concerned.

1. Folly, Deceit and the Sale of Spectacles

One place in which artificial fools frequently appear is in scenes depicting the sale of spectacles. A good example of this can be found in a Netherlandish engraving, produced in the style of Bruegel, c. 1570, entitled *The Festival of Fools* (depicted in image 4.18) and its associated poem. Much like the monkeys depicted in image 4.15, the fools in this engraving can be seen engaging in a number of foolish behaviours, such as dancing in a circle, playing loud musical instruments, and publicly urinating into a bowl, as well as, in the lower right

[104] Sandra Billington, *A Social History of the Fool* (London: Faber and Faber, 2015); Max Harris, *Sacred Folly: A New History of the Feast of Fools* (Ithaca: Cornell University Press, 2011); Robert Hornback, *The English Clown Tradition from the Middle Ages to Shakespeare* (Woodbridge: D. S. Brewer, 2013); Irina Metzler, *Fools and Idiots?*.

hand corner, wearing (and perhaps selling) spectacles. In this way, the image operates in an almost identical way to *The Sleeping Pedlar Robbed by Monkeys* (see image 4.15), by including the use of spectacles amongst an array of other established foolish behaviours.

However, what makes this image especially interesting is its connection to the poem written in its lower border, which reads:

Ghÿ Sottebollen, die met ÿdelheÿt, ghequelt sÿt
Compt al ter banen, die lust hebt om rollen
Al wordet déen sÿn eere en dnder tgelt quÿt
De weerelt die prÿst, de grootste Sottebollen.

Men vint Sottebols, onder elcke nacie,
Al en draghen sÿ geen sotscappen, op haeren cop,
Die int dansen hebben, al sulken gracie,
Dat hunnen Sottebol, draÿet, ghelÿck eenen top

De vuÿlste Sottebols, lappent al duer de billen,
Dan sÿnder, de d'een dander, metten nuese vatten,
De sulck, vercoopt trompen, en dander brillen,
Dear sÿ veel, Sottebollen, mede verschatten.

Al sÿnder Sottebols, die haer wÿsselÿck draghen,
En vant Sottebollen, den rechten fin smaken,
Om dat sÿ im hun selfs sotheÿt hebben behaghen.
Sal hueren Sottebol alder best de pin raken.

[You numbskulls who are plagued with foolishness
Come to the green if you want to go bowling
Although one has lost his honour and another his money
The world values the greatest numbskulls.

Numbskulls are found in all nations
Even though they don't wear fool's caps on their heads
Who dance so gracefully
That their foolish heads spin like top

The foulest numbskulls waste all their substance
There are some who take others by the nose
Some of them sell trumpets, others sell spectacles
With which they deceive many nitwits.

> Yet there are numbskulls who behave themselves wisely
> And grasp the true sense of numbskulling
> Because they accept their own folly
> Their numbskulls will hit the pin best].[105]

Although the author of the poem remains unknown, 'it is generally acknowledged that the meaning of the engraving is closely linked to the text placed directly beneath it, since both were meant to be viewed and appreciated at the same time'.[106] Consequently, it is possible to suggest that the fool who is depicted as holding a pair of spectacles aloft (found in the lower right hand corner of the image) is representative of the fools in the poem who sell spectacles 'with which they deceive many nitwits'. Not only does this suggest that the person selling the spectacles is a fool, but it also implies that those who purchase them are also foolish for allowing themselves to be deceived.

However, it should be noted that within medieval popular understanding there was a distinction between a fool and somebody engaging in foolish behaviour. Whilst the fool might indeed behave foolishly, their behaviour was largely understood to be an act – the fool himself had to be intelligent in order to maintain his foolish façade.[107] As Metzler suggests, artificial fools were perceived to be 'flatterers and liars, who [were] the fiend's disciples since by their tales they entice men to sin'.[108] Consequently, by portraying the spectacle pedlar as an

[105] Translation taken from Keith P. F. Moxey, 'Pieter Bruegel and The Feast of Fools', *The Art Bulletin*, 64:4 (1982), 640–646 (p. 640).
[106] Moxey, 'Pieter Bruegel and The Feast of Fools', p. 640.
[107] This idea is expressed in several of Shakespeare's plays written at the very end of the period covered by this thesis. For example, in *Twelfth Night* (written c. 1601) Viola states, 'This fellow is wise enough to play the fool' (3.1.60); and in *As You Like It* (written c. 1599), Touchstone recounts the saying 'The fool doth think he is wise, but the wise man knows himself to be a fool.' (5.1.22).
[108] Metzler, *Fools and Idiots*, p. 185.

artificial fool, the engraving is able to make a comment on the deceitful nature of the spectacle trade. As we have discussed, spectacles were associated with deception (as a result of their ability to distort one's perception of the world) and therefore, like the act of 'playing the fool', 'the action of selling spectacles was associated with duplicity and fraud'.[109]

Another image which critiques both those who sell and those who purchase spectacles can be seen in Jacob van Oostsanen's *Ill-Matched Lovers*, painted in Utrecht, c. 1533. This painting (reproduced in image 4.16) depicts a Netherlandish trader's stall selling a range of luxury goods including decorative jugs, bowls, beads, and spectacles. The front of the image is dominated by a young woman selling a pair of spectacles to a well-dressed elderly man, behind whom a young man leans suggestively towards an older woman whilst covertly taking a handful of spectacles from the bowl she is holding. Behind the secondary 'couple' it is possible to see a court jester or 'fool' who, leaning upon a raised balcony, appears to be watching over the events taking place below.

This scene is immediately reminiscent of the 'unequal/ill-matched lovers' trope which was very popular in fifteenth- and sixteenth-century Northern Europe. It first appeared in prints by the Housebook Master and Istahel van Meckenem and was later popularised by Lucas Cranach the Elder and his followers. Usually, this trope depicts an elderly man embracing a younger woman who, unbeknownst to the man, is reaching into and/or stealing from his coin purse. A clear example of this trope can be seen in Quentin Massys' *Ill-Matched*

[109] Moxey, p. 640.

Lovers, believed to have been produced in Antwerp c. 1520–1525 (see image 4.17). This painting shows a young woman who is simultaneously caressing the face of an older man and stealing from his purse. In depicting this scene, Massys (and other individuals who drew upon the unequal lovers trope)[110] clearly illustrate two contemporary concerns – firstly, that young women are able to use their sexuality to cause men to behave thoughtlessly and, in doing so, are able to take advantage of them, and secondly, that old age leads to foolish behaviour and a subsequent loss of social standing and respect.[111] Massys further underlines the man's foolish behaviour (caused as a result of either his old age, lustfulness, or both) through the inclusion of a literal 'fool', who appears to be serving as an accomplice to the young woman by helping her to rob the old man's purse.

Oostsanen's *Ill-Matched Lovers*, produced approximately thirteen years after Massys's painting, was consequently very clearly inspired by the 'unequal lovers' trope – but subverts some of the common features in order to critique the sale and purchase of spectacles. For example, whilst Oostsanen's young woman is not actively stealing from the older man, it is possible to argue that (if we assume that spectacles made one's vision worse), she is still deceiving him out of his money by selling him fraudulent goods. Although their exchange is far less sexualised than other 'unequal lovers', the woman's exposed cleavage, cocked eyebrow, and coy smile allude to the fear of female sexuality encouraging older men to behave in foolish ways (which, in this case, takes the form of buying spectacles). The second couple, made up of a younger man and an older woman,

[110] For example, Lucas Cranach the Elder, Albrecht Dürer, Hendrik Goltziu, and Jan Massijs.
[111] Hand, Wolff, p. 146.

is a much more obvious example of the unequal lovers trope; however, in this instance, the younger partner is male and the older partner female and, rather than stealing money, the man is stealing fistfuls of spectacles. This exchange hints at the folly of the young man, who believes that spectacles are valuable commodity goods (rather than items which worsen one's vision), and demonstrates the cunning of the elderly saleswoman, who has managed to use her fraudulent merchandise to win the affections of a young lover. In this instance, the man's fistfuls of spectacles might operate in a similar way to the spectacles in Bruegel's *The Sleeping Pedlar Robbed by Monkeys* (see image 4.15), acting as a metaphor for the young man's 'blindness' to the older woman's deception.

Presiding over the whole scene is a fool, who acts as a physical symbol of the deception and foolish behaviour taking place below. Česká Verze Článku suggests that, *Blázni se často objevují v tomto kontextu, aby poukázali na hloupost starých mužů a žen* [Fools often appear in this context [of the unequal lovers] to point out the stupidity of old men and women].[112] Whilst this might be the case in some images, I believe that a more accurate suggestion would be that the fool appears to point out the stupidity of those who are being deceived, as it is not always or only the older lover who is being made a fool of. For example, in Massys's painting of the *Ill-Matched Lovers*, discussed earlier, the younger woman is handing the coin purse over to the fool who is licking his lips in anticipation of receiving the coin purse. By trusting the fool not to disappear with the money,

[112] Česká Verze Článku, 'The Image of the Fool in Late Medieval Bohemia', *Umění Lxiv*, 5 (2016), 354–370 (p. 364).

Massys's painting depicts both the elderly man (who is being robbed) and the woman (who is handing her money over to the fool) as equally 'foolish' and worthy of mockery in this painting. Oostsanen's fool acts in a similar way – mocking both the elderly man for buying spectacles, as well as the younger man for entering into an 'ill-matched' relationship in order to steal an item which was relatively inexpensive to purchase (and potentially worthless if we are to presume that they worsened one's vision).

Through the subversion of the 'unequal/ill-matched lovers' visual trope, Oostsanen provides a visual critique of both the people who sell spectacles and the people who purchase them. The women in his painting are able to use their 'goods' (whether that be their sexuality or their merchandise) to deceive the men around them. Just like the female traders, the spectacles at the heart of this interaction are criticised for their ability to deceive their wearers and manipulate the world around them, making fools of the men who fall for their deceit.

2. The Use of Spectacles to Pursue Inappropriate Knowledge

Alongside the more visually recognisable artificial fools, discussed above, we also see the emergence of the 'learned' fool appearing in later medieval visual tropes. Unlike the artificial fool (who is well aware of the folly that he creates or participates in) the learned fool is unaware of their foolish behaviour. Therefore, through their ignorance (of both their folly and the subjects they seek to pursue)

these learned fools provided a space in which artists and writers could critique common human misbehaviours.[113]

An example of this kind of learned fool can be seen in Sebastian Brant's *Narrenschiff* (Ship of Fools), a German satirical poem which was first published in Basel, Switzerland, in 1494 – where it was accompanied by a series of woodcuts produced by the young Albrecht Dürer. The first of these woodcuts (accompanying Brandt's poem) depicts a fool sat in a study, peering at a book though a pair of rivet spectacles (see image 4.21). His accompanying poem reads:

1. Von unnützen büchern

Das ich sitz vornan in dem schif,
das hat worlich ein sundren grif:
on ursach ist das nit getan,
uf min libri ich mich verlan.
von büchern hab ich großen hort,
verstant doch drin gar wenig wort
und halt sie dennacht in den eren,
das ich in wil der fliegen weren.
wo man von künsten reden důt,
sprich ich: „daheim hab ichs fast gůt!"
domit loß ich benügen mich,
das ich vil bücher vor mir sich.

[…]

ich hab vil bücher ouch des glich
und lis doch ganz wenig darin.
worumb solt ich brechen min sin

[113] Yona Pinson, *The Fools' Journey: A Myth of Obsession in Northern Renaissance Art* (Turnhout: Brepols, 2008), p. 13.

und mir der ler mich blümbren fast?

[…]

des tütschen orden bin ich fro,
dan ich gar wenig kan latin;
ich weiß, das vinum heißet win,
gucklus ein gouch, stultus ein dor
und das ich heiß domne doctor.
die oren sint verborgen mir,
man säh sunst bald eins mulles tier.

[1. Of Useless Books

If on this ship I'm number one
For special reasons that was done
Yes, I'm the first one here you see
Because I like my library.
Of splendid books I own no end,
But few that I can comprehend;
I cherish books of various ages
And keep the flies from off the pages.
Where art and science be professed
I say: At home I'm happiest,
I'm never better satisfied
Then when my books are by my side.

[…]

I, too, have many books indeed
But don't peruse them very much;
Why should I plague myself with such?
My head in booklore I'll not bury

[…]

I can when scholars walk about
Say 'ita' when I might say 'yes'.

> The man of German tongue I bless;
> Although my Latin isn't fine
> I know that 'vinum' stands for wine,
> 'Gucklus' a cuckold, 'stultus' fool,
> And I am 'doctor', that's my rule.][114]

The fact that this fool is surrounded by beautiful texts, through which they could achieve legitimate learnedness, but chooses to only use these books to learn the Latin words for inappropriate things (such as wine, cuckold, or fool) demonstrates their foolish behaviour. As such, I believe that Dürer's decision to present the fool in his accompanying woodcut as wearing spectacles serves two purposes. Firstly, it parodies earlier imagery in which saints and important religious figures are depicted sitting in their studies and (appropriately) wearing spectacles to read the holy scripture (as we will see in Tomaso da Modena's frescoes below). However, the spectacles also draw attention to the act of 'looking' more specifically – highlighting the fact that the true foolishness here stems not from reading, but from focussing on the wrong things. It is significant that this is the first fool to appear in Brant's poem. Brant uses the fool to criticise those who look up inappropriate things in books – and yet the reader of Brant's texts is, themselves, spending their time reading about the subject of folly. This subsequently casts Brant's reader in the role of the fool.

A second example of the learned fool appearing upon the ship of fools can be seen in a *Schembartsbuch* (dating from 1449–1539) which records all of the costumes and floats displayed at the Nuremberg carnivals by the city's butchers.

---

[114] Sebastian Brant, *The Ship of Fools*, trans. by Edwin H. Zeydel (New York: Columbia University Press, 1944), pp. 63–64.

One of these floats (depicted in image 4.22) represents the Ship of Fools, upon which we can see a cleric, doctor, and astrologer, amongst a series of fools, devils and musicians. The doctor, located in the centre of the 'ship' (which is actually a ship-shaped wagon on wheels), is peering at a urine flask through a pair of spectacles. As Pinson suggests, this float satirically attacks 'the hypocrisy of the Church doctors and deceitful nature of both astrologers and quack-doctors'.[115] Much like in Dürer's woodcut, the spectacles which the doctor wears here are intended to draw attention to the fact that, although he is acting as though he understands medicine, he does not really understand what he is looking at.

SPECTACLES & LEARNEDNESS

However, despite the popular association of spectacle merchants with folly, spectacles continued to be sold and bought in great numbers throughout the later Middle Ages. As I have briefly mentioned above, spectacles were not always associated with foolishness. In the Central Middle Ages, this association between spectacles and folly does not appear to have existed. Instead, spectacles were generally associated with piety and learned behaviour. For the most part, this original association of spectacles with learnedness and piety was largely due to the fact that the early beneficiaries of spectacles were mostly scholars and ecclesiastics, as their professions required them to spend long hours reading and writing in dimly lit environments, thereby quickening the rate of ocular degeneration. As Hawkins suggests, 'the constant labour and poor light had a detrimental impact, and, as a result, many scribes would have suffered from poor

[115] Pinson, p. 116.

sight'.[116] As a result of this relationship with scholars, early representations of spectacles came to signify learnedness, wisdom, and piety within visual culture and were consequently retrospectively depicted as being worn by revered churchmen and saints who had lived before spectacles were invented.

The first known visual representation of spectacles appears in Tomaso da Modena's 'Hugh of St. Cher' (see image 4.23), painted c. 1352. This image is part of a series of frescoes representing forty luminaries of the Dominican Order (found in the Chapter House of the Dominican monastery of San Nicoló, Treviso, Italy) and depicts Hugh sitting in his study, writing, with a pair of rivet spectacles perched upon his nose. Although the image falls outside of both the chronological and geographical remits of this thesis, it is worth mentioning, as it is not only the first known visual depiction of spectacles but, more specifically, represents them as belonging to a learned and well-respected individual. As we have seen, the idea of a religious man requiring spectacles is not unusual in itself; however, Tomaso da Modena's decision to depict Hugh with spectacles is particularly interesting because the 'real' Cardinal Hugh of St. Cher died approximately twenty years before the invention of spectacles, and would therefore have never have been known for wearing them.[117] Although the reason behind Modena's inclusion of Hugh's anachronistic spectacles remains unknown, there are two school of thought which offer explanations as to why this might be the case.

[116] Hawkins, *The Blind in Later Medieval England*, p. 128.
[117] Illardi, p. 19

Following Baxandall's theory of 'iconographic minimalism' (that is, the argument that by reading symbolic meaning or external references in an image, a scholar obscures more than they reveal), it is possible to suggest that Modena simply had an interest in representing the tools used in a contemporary monastic study.[118] Throughout the depictions of the other thirty-nine Dominicans, we see representations of books, writing implements, inkwells, and scrolls contemporaneous with the time of painting. We even find two other depictions of visual aids in the form of the Blessed Pietro Isnardo of Vicenza's (d. 1244) reading glass (located on the shelf beside his desk), and a magnifying glass being used by Cardinal Nicholas of Rouen (b. ca. 1325–d. 1379) (see images 4.24 and 4.25). Similarly, each of the forty men depicted is dressed in fourteenth-century religious robes (be those cardinal's robes, monastic habits, or bishops' vestments), irrespective of the period in which they lived – thereby lending further credence to the notion that Modena was not concerned with 'historical accuracy' in his fresco, but rather in depicting contemporary monastic life through the medium of influential members of the Dominican order (past and present). As such, followers of Baxandall would argue that Hugh of St. Cher's spectacles were not intended to be read symbolically and should consequently be interpreted only as an object contemporary to the period in which the image was created. However, whilst Baxandall's theory is certainly compelling – providing an explanation akin to that of Ockham's Razor, I would still disagree.[119] Whilst

[118] Michael Baxandall, *Patterns of Intention: On the Historical Explanation of Pictures* (New Haven: Yale University Press, 1985), pp. 131–35.

[119] Attributed to English Franciscan Friar, William of Ockham (c. 1287–1347), Ockham's Razor argues that 'a theory that postulates fewer entities, processes, or causes is better than a theory that postulates more, so long as the simpler theory is compatible with what we observe'. For an

spectacles had not come to represent folly or to critique the pursuit of inappropriate knowledge at this point, I would argue that by c. 1350 they were popularly recognised as a signifier of learnedness and piety, and were therefore retrospectively depicted as being worn by those who had lived before their invention, in order to convey the idea that the wearer was educated and devout.

Perhaps the most consistent example of spectacles being retrospectively applied to influential religious figures can be seen in images representing the death of the Virgin Mary – as Hanley points out, 'between the last quarter of the fourteenth century and the first quarter of the sixteenth century, in excess of forty images of the Dormition of the Virgin are extant from northern Europe that depict an apostle holding or wearing a pair of spectacles'.[120] Whilst there is neither the space nor time to consider each of these forty-plus images, this chapter will use two examples of this motif, produced at either end of the fifteenth century, in order to investigate the symbolic meaning of spectacles when depicted as being used by influential church figures.

The first of these images (see image 4.26), produced at the beginning of the fifteenth century, is taken from the *Bedford Hours* – a French Book of Hours, commissioned by Anne of Burgundy (b. 1404 – d. 1432), wife of the Duke of Bedford, as a gift for her husband's nine year old nephew, King Henry VI of England (b. 1421–d. 1471). It is believed that the images in the book were produced by the 'Bedford Master', an influential illuminator working in Paris whose work

insightful investigation into the use of Ockham's Razor, see Elliott Sober, *Ockham's Razors: A User's Manual* (Cambridge: Cambridge University Press, 2015). For previous quotation, see p. 2.

[120] Stephen Hanley, 'Optical Symbolism as Optical Description: A Case Study of Canon van der Paele's Spectacles', *Journal of Historians of Netherlandish Art*, 1:1 (2009), 1–21 (p. 6).

can be seen in several surviving manuscripts, including the *Salisbury Breviary*.[121] In the bottom left hand corner of this image, it is possible to see one of the apostles holding a pair of spectacles up to his face in order to read from the book in his lap. The second image (see image 4.27) is an Alsatian engraving made by Martin Schongauer at the end of the fifteenth century, in which it is possible to see two apostles kneeling at the foot of Mary's bed, one of whom is holding a pair of spectacles over the book they are reading – allowing them to function similarly to a magnifying glass.

This magnifying function of spectacles in these images has been interpreted by some, such as Hanley, to represent the Magnificat (also known as the Song of Mary) in which the opening line states 'my soul doth magnify the Lord' ('*Magnificat anima mea Dominum*').[122] Hanley believes that,

> magnifying lenses provided artists with the visual means to convey this concept of actual and metaphorical magnification in optical terms. The tradition of depicting an apostle using spectacles to 'magnify' text was a reference to the Virgin's supreme act of magnification as expressed in her canticle of joy.[123]

However, whilst I do not necessarily disagree with Hanley's interpretation, I do think that it presupposes a more thorough knowledge of the Bible than some members of the laity might have had. For one to be able to 'decode' this visual metaphor one would need a very strong working knowledge of both the scripture and the canticles (and very possibly a working knowledge of Latin). As such, I think it is possible for elite, educated audiences to draw this conclusion, but

[121] British Library, *Bedford Hours* (2019) <https://www.bl.uk/collection-items/bedford-hours> [accessed July 2019].
[122] Hanley, p. 8.
[123] Hanley, p. 8.

doubt that this level of interpretation would have been equally well understood by all members of the laity.

Interestingly, both of the examples I have cited here (images 4.26 and 4.27) were intended for an elite audience. As we have seen, the *Bedford Hours* were commissioned by the wife of the Duke of Bedford (who would have operated in a circle of the most highly learned elite – like most royal women of the period) to be produced as a gift for the King of England. Similarly, although not marketed at such an elite audience as the former, medieval engravings (such as that produced by Schongauer) required a great deal of skill to create and, as such, commissioned a higher sale price and a subsequently 'wealthier and more educated' buyer.[124] Consequently it is likely that, in the case of these two images, the viewers might have interpreted the magnifying function of spectacles as a reference to the Magnificat.

Another element of this trope that is regularly overlooked is the question of which apostle is wearing the spectacles. Although, from images of Mary's Dormition alone, it is very difficult to tell (the apostles are often rather indistinguishable from one another), I would argue that, by looking at other named images of the apostles, the bespectacled figure is most likely to be St. Matthew as he is the apostle most frequently represented as wearing spectacles outside of the context of the death of the Virgin Mary.

An example of St. Matthew wearing spectacles can be seen in a series of four late-fifteenth-century to early-sixteenth-century frescoes (each depicting

[124] Alison G. Stewart, 'Printmaking', in *Medieval Germany: An Encyclopaedia*, ed. by John M. Jeep (New York: Garland Publishing, 2001), p. 631.

one of the four evangelists) found in the chancel vaults of Everlöv church in Sweden. It depicts St. Matthew using a pair of spectacles to assist him in the writing of, what is presumably, his gospel. The second image, in which St. Matthew is represented as requiring spectacles in order to read a book (again, most likely to be his gospel), is found on a fifteenth-century rood screen in St. Agnes's church, England. Both of these representations of St. Matthew were produced for a public audience and would have been viewed by both churchmen and the laity on a regular basis. However, despite the popular association of spectacles with foolishness and deceit (which members of the laity were likely to be familiar with), the fact that St. Matthew is depicted with spectacles does not detract from his piety and relationship with God, but instead acts as a visual signifier of his devotion. St. Matthew's spectacles demonstrate that, like later medieval scribes who suffered from ocular degeneration as a result of the intensive and repetitive nature of their work, he has also spent a lot of time reading and writing divine texts to the point of damaging his sight (and was consequently named the patron saint of scribes). Even though St. Matthew would never have worn spectacles during his lifetime, the inclusion of visual aids in later medieval depictions of him would have been recognisable to both churchmen and members laity as a necessity brought about by many long hours reading and writing the Word of God. The inclusion of spectacles would not only have been read as symbolic of learning and religious devotion but would also have reassured

'members of the congregation that declining vision did not preclude them from having inner sight' or a close relationship with God.[125]

Consequently, I would argue that images of apostles or churchmen wearing spectacles (for appropriate purposes, such as reading the Bible) acted as a sign of learnedness and piety. As Margolin suggests, the retrospective inclusion of spectacles in these images of influential religious figures acts as a

> *marque vénérable de usure des yeux qui ont lu et relu les écrits saints* [venerable mark of wear of the eyes that read and reread the holy writings],[126]

providing a useful visual shorthand for learnedness and piety despite being anachronistic. However, as we have seen, by the fifteenth and sixteenth centuries, the greater availability of spectacles, coupled with concerns over idle curiosity, led to the inclusion of spectacles as a visual signifier. As a result, the later medieval period sees many more images of both artificial and learned fools wearing spectacles to critique individuals who were 'blind' to the events taking place around them or to critique the pursuit of knowledge for its own sake and the study of inappropriate things.

***

Having discussed the construction and use of spectacles (both literally and symbolically) this chapter will now turn to a discussion of a short-term assistive aid which aimed to permanently resolve congenital ocular impairments – rather than responding to ongoing ocular degeneration (as was often the case in the use

[125] Hawkins, *Seeing the Light*, p. 156.
[126] Margolin, p. 381.

of spectacles). Through a consideration of physiognomic theory and contemporary ideas concerning the causation of congenital eye conditions, the next section of this chapter will also consider the potentially stigmatising nature of ocular impairment in the later Middle Ages.

CONGENITAL IMPAIRMENTS & 'SQUINT CAPS'

Although this chapter has predominantly focused on degenerative eye conditions (often the result of the aging process or excessive time spent focussing on up-close work in dimly lit conditions), we must not forget that people also lived with congenital visual impairments. One such impairment, the 'squint', caused great concern in the later Middle Ages. Although it would have had little effect on a child's vision in its early stages, if left untreated, a squint could result in severely diminished vision in the affected eye and the potential for prejudice as a result of contemporary physiognomic beliefs.[127] Consequently, in his *Ophthalmodouleia* (1583), a German opthalmist, George Bartisch (1535–1606), recorded the first extant example of an assistive aid designed specifically for the purpose of treating congenital squints – the full face cap. However, despite the unique nature of these squint caps and their important place in the history of opthalmy, they have been very much neglected within academic scholarship. Although there has been some interest in the manuscript as a whole (seen, for example, in Wolfgang Straub's overview of the text as well as the recent completion of a full English translation by Donald L. Blanchard), research has yet to be undertaken on the

[127] NHS, *Squint* (2019) <https://www.nhs.uk/conditions/squint/> [accessed May 2019].

individual treatments listed in the manuscript.[128] Consequently, this thesis is, to my knowledge, the first attempt to investigate the specific importance of Bartisch's squint caps.

Bartisch categorises a squint according to one of four forms (*uber sich*, which translates as 'above', refers to an upward facing eye position, *unter sich*, which can be translated as 'downward', refers to an eye that points towards the chin, *auswärts gegen den Schläffen*, literally translating as 'outwards towards the temples', and lastly *einwärts gegen der nasen*, that is, 'inwards towards the nose'), and suggests that they were predominantly caused as a result of the mother's actions during her pregnancy.[129] It was not uncommon for the maternal imagination to be cited as the reason for bodily impairment in the later Middle Ages, as it was believed that the sights that a pregnant woman was exposed to could have a direct effect upon the development of the foetus, manifesting in a recognisable way on the child's body.[130] For example, 'if a pregnant woman was startled by a rabbit, her baby could be born with a hare lip',[131] or if a pregnant woman was surprised by a disabled beggar, her baby might also be born with similar bodily impairments (a notion which was taken so seriously that, in 1478,

[128] Wolfgang Straub, 'The First German Textbook of Ophthalmology "Augendienst" by G. Bartisch, 1583', *Documenta Ophthalmologica*, 68:1–2 (1988), 105–114; George Bartisch, *Ophthalmodouleia: That is the Service of the Eyes. 1583*, trans. by Donald L. Blanchard (Ostend: Wayenborgh Publishing, 2018).
[129] George Bartisch, *Ophthalmodouleia. Das ist Augendienst. Newer vnd wolegründter Bericht von Ursachen vnd Erkentnüs al* (Dresden: Durch Matthes, 1583), fol. 14r–14v.
[130] Kathleen Crowther-Heyck, 'Be Fruitful and Multiply: Genesis and Generation in Reformation Germany', *Renaissance Quarterly*, 55:3 (2002), 904–935 (p. 925).
[131] Crowther-Heyck, p. 295.

Nuremberg beggars were ordered to hide missing limbs out of consideration for pregnant women).[132]

Martin Luther (1483–1546), in a commentary on *Genesis* 30, also discusses several cases of women who had been affected by events during their pregnancy and gave birth to correspondingly deformed children. For example, he records having met a man with 'the face of a corpse' who explained that, whilst his mother was pregnant she unexpectedly saw a dead body and was so frightened by the sight that she gave birth to a child with a corpse-like face.[133] Similarly, Luther also recalls that, when he was a boy living at Eisenach,

> *Memini me puero Isenaci formosam et pudicam matronam eniti glirem: quod eo accidit, quia ex vicinis aliquis gliri suspenderat nolam, ad cuius sonitum reliqui fugarentur. Is occurrit mulieri gravidae, quae ignara rei subito occurso et aspectu gliris ita est conter- rita, ut foetus in utero degeneraret in formam bestiolae* [A beautiful and virtuous woman gave birth to a dormouse. This happened because one of the neighbours had hung a little bell on a dormouse in order that the rest might be put to flight when the bell made a sound. This dormouse met the pregnant woman, who, ignorant of the matter, was so terrified by the sudden meeting and sight of the dormouse that the foetus in her womb degenerated into the shape of the little beast].[134]

As a result of this close correlation between a pregnant woman's experiences and the physicality of her unborn child, it is arguable that Bartisch cites seeing dying people, the slaughter or animals, or a person having a fit, as causes of a congenital squint as each of these events usually results in the person's (or

---

[132] Otto Ulbricht, 'Der einstellungswandel zur kindheit in Deutschland am ende des spätmittelalters (ca. 1470 bis ca. 1520)', *Zeitschrift für Historische Forschung*, 19:2 (1992), 159–187 (p. 163).
[133] Martin Luther, *Works*, 55 vols. (Saint Louis: Concordia Publishing House, 1955–86), vol. 5, p. 381.
[134] Luther, *Works*, vol. 5, p. 381. For the original Latin, see: Martin Luther, *D. Martin Luthers Werke. Kritische Gesamtausgabe*, 72 vols. (Weimar: Böhlau, 1884–2007), vol. 43, p. 692.

animal's) eyes rolling backwards – if a pregnant woman should witness this, it is reasonable to assume that her child might also have eyes which roll in 'unnatural' directions.[135]

However, if a woman was unfortunate enough to witness one of these things and give birth to a child with a squint, Bartisch states that the child should be given a special cap (*so mus man dem kinde auch eine sonderliche kappe oder kugel machen)* which will cover the head in such a way as to encourage the use of the affected eye and retrain the muscles so that the eye faces forward.[136] He proposes three types of cap depending on the nature of the squint. The first cap (depicted in image 4.30) covers the head entirely, save for two oval slits over the eyes. In the case of an upwards or downwards squint, this will force the child to either lower or lift their eyes into the 'correct' position in order to see out of the cap. The second cap (seen in image 4.31) is used to treat a squint that leans inwards towards the nose. The cap contains two viewing panels through which the child can look, but these are angled outwards, away from the nose. Consequently, the child must force their eyes to move against their natural inclination to look inwards, if they want to see outside of the cap. The final cap (see image 4.32) consists of a box-like structure, with a rectangular viewing panel in the centre of the face. This is used to treat children whose eyes turn outwards towards their temples. The rectangular viewing panel consequently encourages the child to look inwards, in order to retrain their eyes so that they face in the desired direction.

---

[135] Bartisch, p. 14r.
[136] Bartisch, p. 16r.

Although the caps might seem excessive to a modern viewer, Bartisch's methods are still applied in the treatment of 'lazy eyes' today. For example, the British National Health Service (NHS) suggests that lazy eyes should be treated by placing an eye patch over a child's 'good' eye, in order to encourage the lazy eye to work. They explain that this treatment is most effective in children under the age of six, and state most children will need to wear them for a few hours a day for several months. Unfortunately, Bartisch's treatise does not indicate how long his masks should be worn for or where to acquire one. However, it is possible that a local leatherworker would be able to construct a cap based on Bartisch's woodcuts and vernacular explanations – a very similar process to how Little Lorrain (a French locksmith) was able to use the vernacular texts and illustrations of Ambroise Paré to construct mechanised prosthetic limbs (as discussed in chapter three).[137]

Also similar to the construction and use of prosthetic limbs is the idea that, by having their squint treated at a young age, a child would benefit both physically and aesthetically. Not only would one of Bartish's caps ensure that the child retained vision in their affected eye, but it would also prevent them from living with a very visible, stigmatising form of facial disfigurement (which Bartish

[137] The *Ophthalmodouleia* was a designed to be an interactive, didactic text. Not only is it written in the vernacular German, making it accessible to those who did not read Latin, but it also contains ninety-one woodcuts, detailing eye defects, surgical instruments, and methods of curing ocular ailments. Although they were produced by Hans Hewamaul, it is widely accepted that these woodcuts were based on Bartisch's own watercolours as they are surgically and anatomically very accurate – thereby demonstrating a direct relationship between author, image, and text. Several of these images also employ an 'overlay' technique that allowed the reader to engage in a 'visual autopsy' of the eye, by peeling back layered flaps of paper.

labels as *scheußlich und hesslich*, meaning 'awfully ugly') with negative physiognomic connotations.[138]

From the twelfth century onward, physiognomy (i.e. the practice of discerning information about a person's character from their physical appearance) was widely acknowledged to be a reputable scientific method, which could be employed by people of varying social backgrounds.[139] For example, as Ziegler suggests, the practice of physiognomy could be used by the head of a household to 'reasonably select servants, choose a wife, and acquire the necessary tools and information to educate, guide, and govern his sons', by a merchant 'who is engaged in economic transactions, on whom to associate with and strike a deal', or by a physician to help determine what ailments a patient might be prone to.[140] It is possible, therefore, to see how having facial features which translated to positive physiognomic qualities could be beneficial in day-to-day interactions. Unfortunately, this was not the case for those born with a squint. The eyes were one of the easiest features from which to draw physiognomic conclusions, with ocular abnormalities often signifying negative character traits. For example (even though neither of these scholars mention squints specifically) Rolandus

[138] Bartisch, fol. 14r.

[139] It is not uncommon to see physiognomy being referred to as a pseudoscience in modern scholarship (for example in Caroline Walker Bynum's *Metamorphosis and Identity* (New York: Zone Books, 2001), pp. 165–166). This is anachronistic. As Ziegler demonstrates, it was accepted as a science by contemporary theologians, philosophers, and physicians. Consequently, to avoid misrepresenting late-medieval thought, this thesis will also refer to physiognomy as a science. See also Joseph Ziegler, 'Text and Context: On the Rise of Physiognomic Thought in the Later Middle Ages', in *De Sion exibit lex et verbum domini di Hierusalem: Essays on Medieval Law, Liturgy, and Literature in Honour of Amnon Linder*, ed. by Yitzhak Hen (Turnhout: Brepols, 2001), pp. 159–182 (p. 160).

[140] Joseph Ziegler, 'Phisonomia est lex nature: On the Nature of Character and Behaviour in Late Medieval Physiognomy', in *La nature comme source de la morale au Moyen Âge*, Micrologus Library, 58, ed. by Maaike van der Lugt (Florence: Sismel – Edizioni del Galluzzo, 2014), pp. 359–382 (p. 366).

Scriptoris, in his *Reductorium phisonomie* (c. 1430), states that *prominentium oculorum* [bulging eyes] mark a *stolidum* [stupid person]; similarly, John Metham states in his *Physiognomy* (c. 1450) that 'gogyl-eyn' eyes signify 'foltyschnes' [foolishness] and a 'gret dysposycion to lecchery'.[141] The fact that a person with ocular impairments would have been perceived as foolish, lecherous, 'malicious and wicked' within contemporary physiognomic thought would likely have had negative repercussions for individuals who did not have their squints treated at an early age.[142]

Consequently, Bartish's 'caps' would have been an invaluable piece of assistive technology. Not only would they have been cheap to produce and seemingly painless to wear, they would also have prevented eventual sight-loss in the affected eye(s) and the possibility of negative stereotyping as a result of contemporary physiognomic beliefs. Unfortunately, we have no data to suggest how frequently they were commissioned, and no first-person testimonies which reveal what it was like to wear one of these caps, or whether it was commonplace to witness a child wearing one of these caps; however, due to the potentially stigmatising nature of wearing a full-face cap outdoors, we can assume that children probably only wore these masks indoors. As a result, we are forced to base our judgments on the survival of a single text, which can neither affirm nor deny the ubiquity of, or popular response to, this kind of assistive technology in the fifteenth and sixteenth centuries.

---

[141] Rolandus Scriptoris, *Reductorium phisonomie*, in Lisbon, Biblioteca da Ajuda, MS 52.XIII.18, fol. 83r–83v. See Ziegler, 'Phisonomia est lex nature', p. 362; John Metham, *The Works of John Metham*, ed. by H. Craig (London: Trübner, 1916), p. 129.

[142] C. M. Woolgar, *The Senses in Late Medieval England* (New Haven: Yale University Press, 2006), p. 149.

***

Overall this chapter has explored the different kinds of assistive technologies associated with blindness in the later Middle Ages. It has considered how different technologies were employed for specific levels of blindness – for example, individuals suffering from more extreme ocular impairments might have employed sighted guides or guide dogs to assist with day-to-day tasks, whilst those lower levels of visual degeneration resulting in presbyopic (rather than myopic) conditions might have been able to get by only using spectacles when reading or up-close work demanded it. We have also seen how, although more prevalent in older people, eye complaints could affect individuals at every stage of the life-cycle, and how this resulted in contemporary ophthalmologists, such as Bartisch, considering methods that would prevent congenital squints from turning into lifelong visual impairments.

Finally, this chapter has applied methodologies from the field of art history in order to investigate how blindness and its associated disability aids were represented in visual culture (and subsequently understood by contemporaries). This has allowed us to return to Snyder and Mitchell's concept of the 'cultural locations of disability' by using materials in which individuals with ocular impairments were depicted (both consentingly and unknowingly) to extract popular beliefs about impairment and the use of spectacles and sighted guides as a form of assistive technology. However, by investigating these cultural locations of disability, we have unearthed a number of contradictory attitudes towards the use ocular assistive aids – showing, for example, how spectacles were initially associated with learnedness and piety, before later becoming associated

with foolish or deceitful behaviour; or, similarly, how dogs could be associated with wealth and nobility but also (in the case of guide dogs) with poverty and the trope of the beggar – thereby demonstrating how unstable medieval representations of sight-loss, spectacles, and service-dogs can be.

CONCLUSION

Writing in 1997, Margaret Winzer argued that pre-modern societies could not distinguish between individuals with physical impairments. She claims that 'all [disabled people] were considered to form one, all-encompassing category', and stated that this 'category' was subject to 'cruel and callous reactions from society' – including 'church expulsion, starvation, exile, or even death'.[1] Since the publication of Winzer's article, a number of scholars (including myself) have sought to challenge this 'dark ages' approach to medieval disability – allowing the field of medieval disability studies to develop in many nuanced and progressive directions. However, despite the rapid development of the field and continuing interest in medieval disability studies, there has yet to be a significant examination of the relationship between technology and disability in the later Middle Ages. Through an investigation into the material culture associated with impairment, this thesis has disproved Winzer's argument – demonstrating that 'dis/abled' individuals were perceived and treated very differently according to a range of factors, including the nature of their impairment, status, gender, and choice of assistive aid. Consequently, this thesis has broadened the discourse surrounding medieval disability by introducing the (ubiquitous but often ignored) subject of assistive technology into the conversation.

The majority of people in the twenty-first century are likely to have had multiple experiences with assistive technology. This could be through an

[1] Margaret A. Winzer, 'Disability and Society before the Eighteenth Century: Dread and Despair', *The Disability Studies Reader*, First Edition, ed. by Lennard Davis (New York: Routledge, 1997), pp. 75–109 (p. 80).

interaction with a colleague wearing spectacles, viewing the International Symbol of Access on public transport or in a car park, entering a building through ramped access or automatic doors, or, for some individuals, experience of using disability aids themselves. As this thesis has demonstrated, there have been many academic monographs dedicated to the contemporary relationship between disability and technology,[2] as well as a number of increasingly popularised campaigns that seek to de-stigmatise the use of assistive technology.[3] However, until this point, there has been no significant attempt to ask how, if at all, the questions raised in disability studies scholarship and disability rights activism can be retrospectively applied to the Middle Ages. This thesis has addressed this gap in the scholarship by thinking about the ways in which late medieval and early twenty-first-century attitudes towards assistive technology and bodily augmentation can be seen to intersect and diverge.

In order to do this, this thesis has taken an interdisciplinary approach to its source material. It has considered a range of primary sources (including, but

---

[2] See Desleigh de Jonge, Marcia Scherer and Sylvia Rodger, *Assistive Technology in the Workplace* (St. Louis: Mosby Elsevier, 2007); Stuart Murray, *Disability and the Posthuman: Bodies, Technology and Cultural Futures* (Liverpool: Liverpool University Press, 2020); Graham Pullin, *Design Meets Disability* (Cambridge, MA: The MIT Press, 2009); Bodil Ravneberg, Sylvia Söderström, *Disability, Society and Assistive Technology* (London: Routledge, 2017); Alan Roulstone, *Disability and Technology: An Interdisciplinary and International Approach* (London: Palgrave Macmillan, 2016); Alan Roulstone, Alison Sheldon and Jennifer Harris (eds.), *Disability and Technology: Key Papers from Disability and Society* (London: Routledge, 2015).

[3] Examples include (but are not limited to), The Alternative Limb Project (which aims to promote positive conversations around disability through the blending of wearable sculpture and prostheses) – see Alternative Limb Project, *The Alternative Limb Project: Home* (2019) <http://www.thealternativelimbproject.com/> [accessed November 2019]; A Toy Like Me (which encourages the toy industry to better represent disabled children and the use of assistive technology in their products) – see A Toy Like Me, *Join the Toybox Revolution* (2019) <https://www.toylikeme.org/> [accessed November 2019]; The Accessible Icon Project (a campaign which aims to adapt the International Symbol of Access to depict disabled people as having greater agency) – see Sara Hendren, *An Icon is a Verb: About the Project* (2016) <http://accessibleicon.org/#an-icon-is-a-verb> [accessed November 2019].

not limited to, visual culture, documentary evidence, physical artefacts, and skeletal remains) alongside a variety of secondary resources from the fields of history, art history, material culture studies, disability studies, archaeology, and sociology (to name but a few), whilst also engaging with individuals from a host of different backgrounds – including academics, heritage professionals, reenactors, and members of the disabled community. This interdisciplinary approach has been invaluable, as it has enabled me to bring together a range of (at first seemingly disparate) pieces of evidence in order to draw new conclusions about the design, construction, use, and representation of assistive technology in fifteenth- and sixteenth-century Northern Europe. For example, chapter five brought together manuscript marginalia, coroners' rolls, diocese visitation records, popular literature, and hunting treatises to assess fifteenth- and sixteenth-century attitudes towards guide dogs. As a result of this approach, this thesis has raised (and answered) three main questions. Let us return to these now, in order to draw some general conclusions.

Firstly, this thesis has asked the practical questions of 'what types of assistive technology were available in the fifteenth and sixteenth centuries, how and by whom were they constructed, and how did they function within the medieval urban environment?' Drawing upon the definition of the Greek word *techne* (τέχνη), this thesis has sought to understand 'technology' in its broadest sense – that is, not simply as a reference to those electrically and mechanically engineered items associated with the twentieth and twenty-first centuries, but rather as any man-made item that has been constructed or adapted to fulfil a need. This definition has allowed us to think about assistive technology in a more

abstract way, considering not just mechanised prostheses, but also more traditional non-mechanised aids (such as crutches), as well the ways in which animals and humans may (or may not) be included within the category of 'disability aid'.

By considering the definition of *techne* as an 'art, skill, or craft', this thesis has been able to devote significant time to the investigation of how assistive technologies were created. For example, we have considered the differentiation between 'intellectual' and 'artisanal' labour, and have established that, due to the cost and skill required in their construction, certain assistive aids (such as the mechanised limbs and spectacles discussed in chapters four and five) were only available to wealthier members of society. On the other hand, those individuals who could not afford the expertise or time of those physicians, barber-surgeons, blacksmiths, locksmiths, or clockmakers (etc.) who designed and produced higher status assistive aids, were forced to 'make-do' with the resources they had to hand. This led to the construction of more simple technologies (such as those crutches carved by Hernán Cortés's men whilst fleeing conflict), as well as the adaptation and re-purposing of existing technologies for the use of individuals with impairments (seen, for example, in the case studies of wheelbarrows being used for the transportation of people with disabilities).

Secondly, this thesis asked, 'what role did disability aids play in the lives of people with physical impairments, how did people respond to concepts of bodily augmentation, and how did individuals perceive their own (and others) relationship with assistive technology?' In order to answer these questions, this thesis has drawn upon the concepts of 'cyborg theory' and 'transhumanism'.

Although these theories are not frequently applied to a study of the Middle Ages, they offer the opportunity for scholars to study their source material from a new perspective. For example, by applying Haraway's concept of a 'human-animal cyborg assemblage' to the medieval past, this thesis has been able to gain new insights into the ways in which individuals understood their own relationships with 'living disability aids' – such as guide dogs or human servants.[4]

This thesis has also drawn upon contemporary attitudes towards the cosmetic importance of bodily augmentation (looking, for example, at the work of the Alternative Limb Project, Victoria Modesta, and trending social media hashtags such as #prostheticart and #bodyarchitect) in the hope that these campaigns might inspire new ways of thinking about the past.[5] By engaging with current debates surrounding assistive technology, it has therefore been able to uncover where similar attitudes existed in the Middle Ages. For example, in the cases of fifteenth- and sixteenth-century mechanised arms, the cosmetic function was often just as important to the user as the practical function, as the realistic design of these limbs facilitated the seamless blending of the prosthesis with the body, and the ability to disguise the individual's impairment.

We have also seen how individual's perceptions of their own (and others) relationships with assistive technology depended very much upon their gender, occupation, and social status. For example, the case study of Götz von Berlichingen (discussed in chapter four) has demonstrated how the use of a

[4] Donna Haraway, 'A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s', in Donna Haraway, *The Haraway Reader* (New York: Routledge, 2004), pp. 7–45 (pp. 10–12).
[5] Alternative Limb Project, *The Alternative Limb Project: Home*; Anon, *VM Story* (2019) <http://www.viktoriamodesta.com/> [accessed November 2019].

mechanised arm had the ability to restore a high-status man's sense of public and personal worth. Conversely, the legend of the 'Knight of the Cart' (discussed in chapter three) demonstrated how the use, or perceived use, of a cart as an assistive aid, had the ability to seriously damage a high-status man's social reputation. These kinds of comparisons were made possible by the time frame of this thesis. As the introduction to this thesis explained, scholars of medieval history and early modern history respectively end and begin their studies at c. 1500. By focussing on the period between c. 1400 and c. 1600, this thesis has been able to compare and contrast source material that (as a result of often arbitrarily imposed boundaries) is not usually interpreted in the same study. This has made is possible to see new similarities and differences in attitudes towards assistive technology that might otherwise have been missed within a more traditional chronology.

Finally, this thesis asked, 'how do popular representations of impairment interact with, or reveal, other socio-cultural concerns?' Raising and answering this question was made possible through my use of a socio-cultural model of disability. As outlined in the introduction to this thesis, the socio-cultural model of impairment does not focus on how one singular factor sculpts attitudes towards impairment (as is the case with the medical and social models) but instead considers how a range of facts might influence individual and societal understandings of disability. This approach has allowed us to consider several different 'cultural locations' of disability – e.g. areas in which disabled people are depicted, such as in imagery or literature (or, in the twenty-first-century, television, film, and video games) – that have, in turn, revealed how bodily

impairment and assistive technology were adopted as a cultural shorthand for other contemporary concerns.

For example, this thesis has adopted methodologies from the field of art history to investigate how assistive technologies were interpreted as visual signifiers that carried specific signified and signs. Evidence of this appears in the visual trope of the 'old woman in a wheelbarrow' (discussed in chapter three) in which the wheelbarrow signifies dependence that (when coupled with other signifiers demonstrating unruly femininity, such as the elderly woman's broom, with which she beats her husband, and canteen) act as a sign which is intended to warn men of unequal relationships and disobedient wives. A similar case can be seen in the iconography surrounding spectacles (discussed in chapter five). When coupled with signifiers of piety (e.g. being used to read a bible, being worn in the presence of the Virgin Mary, or appearing on the nose of a known religious figure) spectacles acted as a sign of learnedness and godliness; however, when coupled with signifiers of foolishness (e.g. being worn by a jester-like figure, or being used to study inappropriate or unworthy things) spectacles acted as a sign of deviance, deceit, and imprudent behaviour. As such, imagery surrounding spectacles demonstrates contemporary concerns over appropriate versus inappropriate 'looking', and anxiety over the pursuit of knowledge for knowledge's sake. By applying these methodologies associated with the history of art and visual culture, this thesis has been able to move beyond an investigation into the everyday lived experience of impairment, to consider how images of assistive technology were incorporated into a complex web of visual signifiers that were used to represent a range of contemporary concerns.

Nevertheless, this thesis is only the beginning of the discourse surrounding later medieval assistive technology – there is still much work to be done. Firstly, this thesis only considers source material from Northern Europe. As such, it would be revealing to apply similar, or adapted, methodologies to other geographical regions in order to learn how assistive technology was used, interpreted, and represented throughout the wider medieval world. For example, there has been (to my knowledge) no scholarship conducted on the development of assistive technology in the Islamic world – and yet, much of the Western knowledge of automata (which informed the production of mechanised prostheses) stemmed from the work of earlier Muslim writers, such as Jābir ibn Hayyān, Ismail al-Jazari, and the three Banū Mūsā brothers.[6] It would consequently be interesting to see if their interest in automation influenced the design of assistive technology within the Islamic world.

Due to length and time constraints, this thesis only discusses the four categories of disability aids (i.e. crutches, wheeled aids, prostheses, and ocular aids) with which modern readers are most likely to be familiar. However, this is by no means a comprehensive account of the variety of assistive aids available to medieval individuals – for example, future scholars might want to consider the role of technologies such as stretchers, litters, or sedan chairs in the lives of people with bodily impairments. It would also be particularly illuminating to

[6] See M. J. L. Young, J. D. Latham and R. B. Serjeant (eds.), *Religion, Learning and Science in the 'Abbasid Period* (Cambridge: Cambridge University Press, 2006). However, that is not to suggest that there is no work being undertaken of disability in the Islamic world. Kristina Richardson, for example, is conducting fascinating work into socio-cultural responses to disability and non-normative bodies in medieval Islamic societies. See Kristina Richardson, *Difference and Disability in the Medieval Islamic World: Blighted Bodies* (Edinburgh: Edinburgh University Press, 2012).

investigate the function of cosmetic aids. Whilst this thesis briefly touched upon this question in relation to the aesthetic function of prosthetic limbs, it would be rewarding to see this argument taken further and applied to aids such as false teeth, noses, and eyes, as well as to items that are traditionally associated with contemporary fashion, but might also have functioned as cosmetic aids – such as wigs, make-up, corsets and trusses (like those used in the treatment of hernias), and codpieces. Some of these aids have been very briefly discussed by Simone Kahlow; however, this article only surveys what might have existed and does not consider the lived experience of, or social responses to these aids.[7] Consequently, by extending research to consider the importance of cosmetic aids, scholars could facilitate a deeper understanding of the relationship between technology, the body, and physical impairment throughout the later medieval world.

However, should future medieval disability historians want to investigate the relationship between technology and the body further, I believe that they will need to develop a closer relationship with archaeologists. As this thesis has demonstrated, there are a number of examples of assistive aids that appear within the archaeological record, but which have not received significant historical interpretation (take for instance the vast number of prosthetic arms discussed in chapter three, the Worcester Pilgrim's staff, the crutches found at St. Anne's Hospital in Magdeburg, or the Wienhausen nunnery spectacles). I am sure that there is a lot of other evidence for the use of assistive technology to be found in

[7] Simone Kahlow, 'Prosthesen im Mittelalter – ein Überblick aus archäologischer Sicht', in *Homo debilis. Behinderte – Kranke – Versehrte in der Gesellschaft des Mittelalters*, ed. by Cordula Nolte (Korb: Didymos-Verlag, 2009), pp. 203–223.

the archaeological record (be that in the form of objects themselves, or to be observed on skeletal remains – as we discussed in relation to the Saint Gudula chapel skeleton in chapter four); however, the limited dialogue between historians and archaeologists prevents this from being easily discussed. As such, I believe that the future studies into the relationship between bodily impairment and material culture will benefit significantly from a more interdisciplinary relationship between archaeologists and historians.

Overall, this thesis has sought to demonstrate the value of introducing a discussion of assistive technology into the broader remit of medieval disability studies. It has shown how assistive technology can be studied as an independent area of enquiry, but also how it can be used as a lens through which we can better understand the broader themes of gender, status, and popular belief in the later Middle Ages. Finally, due to its grounding in disability rights scholarship and contemporary philosophical thought, this thesis has shown how historical scholarship and current socio-political concerns can come together to raise new and interesting questions, demonstrating how interdisciplinary methodologies can (and must) be used, if we hope to produce innovative contributions to the advancement of the field.

APPENDIX I: CRUTCHES, STICKS AND TRESTLES

Images have been removed due to copyright restrictions.

Image 1.1: *Crutches found at the Hospital of St. Anne*, Magdeburg. Kulturhistorisches Museum, Magdeburg, Germany, Thirteenth–Sixteenth Century. In Simone Kahlow, 'Prosthesen im Mittelalter – ein Überblick aus archäologischer Sicht', in *Homo Debilis: Behinderte – Kranke – Versehrte in der Gesellschaft des Mittelalters*, ed. by Cordula Nolte (Korb: Didymos, 2009), 201–223 (figure 18)

Image 1.2: Anon, *August: Labours of the Months* (Fresco), Swiss, Fifteenth Century. Santa Maria del Castello Mesocco, Ticino, Switzerland

Image 1.3: Jacques de Voragine, *The Golden Legend,* trans. by Jean de Vignay (Parchment), France, Fifteenth Century, fol. 158r. Bibliothèque nationale de France, Paris, France (Français 244)

Image 1.4 (Left): Guillaume de Lorris, Jean de Meun, *Roman de la Rose* (Parchment, 39.5cm x 29cm), Netherlandish, c. 1490–c. 1500, fol. 10v. British Library, London, England (Harley 4425)

Image 1.5 (Right): Bartholomaeus Anglicus, *De proprietatibus rerum*, trans. by Jean Corbechon (Parchment, 47cm x 33cm) Netherlandish, 1482, fol. 139v. British Library, London, England (Royal 15 E II)

Image 1.6: Guillaume de Saint-Pathus, *Vie et Miracles de saint Louis* (Parchment, 22.5cm x 15cm), French, c. 1350, fol. 567r. Bibliothèque nationale de France, Paris, France (Français 576)

Image 1.7: *Tripod Wide Base Walking Stick* (Steel, Aluminium and Plastic, 1kg, 79cm–107cm), c. 2020 <https://www.completecareshop.co.uk/walking-sticks/tripod-walking-sticks/tripod-wide-base-walking-stick> [accessed January 2020]

Image 1.8: Anon, *The De Lisle Hours* (Parchment, 36cm x 23.5cm), English, c. 1310–c. 1320, fol. 126v. British Library, London, England (Arundel 83)

Image 1.9 (Left): Anon, *Book of Hours* (Parchment, 22.5cm x 16.1cm), Belgian, c. 1440, fol. 165v. The Morgan Library and Museum, New York, USA (MS M.19)

Image 1.10 (Right): Anon, *Book of Hours* (Parchment, 14.8cm x 10.8cm), French, c. 1475, fol. 80r. The Morgan Library and Museum, New York, USA (MS M.1001)

Images 1.11-1.14: *Worcester Pilgrim Burial Finds (Staff, Boots, and Shell)*, English, Fifteenth Century. Worcester Cathedral, Worcester, England

Image 1.15: Bartholomaeus Anglicus, *Liber de proprietatibus rerum*, trans. by Jean Corbechon (Parchment, 43.3cm x 34.5cm), French, Fifteenth Century, fol. 95r. Bibliothèque Nationale de France, Paris, France (Français 218)

Image 1.16: Anon, *The Hours of Catherine of Cleves* (Parchment, 19.2cm x 13cm), Netherlandish, c. 1440, p. 149. The Morgan Library, New York, USA (MS M.917/945)

Image 1.17: Anon, *Whalley Abbey Dalmatic (Detail)* (Velvet, Gold Thread, Coloured Silk), English, Mid-Fifteenth Century. Towneley Hall Museum, Burnley, England

Image 1.18: Anon, *Hours of François de Guise* (Parchment, 24cm x 17.5cm), French, c. 1410, fol. 191r. La bibliothèque du château de Chantilly, Chantilly, France (MS 64)

Image 1.19: Hieronymus Bosch, *Triptych of the Temptation of St Anthony (Detail)* (Oil on Panel, 131cm x 228cm), Netherlandish, c. 1501. Museu Nacional de Arte Antiga, Lisbon, Portugal

Image 1.20: Anon, *Tapestry (Detail)* (Velvet, Coloured Silk), German, c. 1390. Museum der Stadt Regensburg, Regensburg, Germany

Image 1.20: *Tri-Wheel Walker with Loop Brakes* (Steel and Plastic, 5kg, 86cm–99cm), c. 2020 <https://romamedical.co.uk/shop/walking-aids/rollators/chrome-tri-wheel-walker/> [accessed January 2020]

Image 1.21: *Maxi Walker* (Steel and Plastic, 10kg, 83cm–99cm), c. 2020 <https://romamedical.co.uk/shop/walking-aids/walking-frames/2252-maxi-walker/> [accessed January 2020]

Image 1.22: Anon, *St Martin and the Beggar* (Tempera on Wood, 101.5cm x 89.5cm), Hungarian, c. 1490. Magyar Nemzeti Galéria, Budapest, Hungary (Acc. No. 149)

Image 1.23: Master of Uttenheim, *St Martin of Tours and St. Nicholas of Bari* (Tempera on Wood, 76.3cm x 68cm), Austrian, c. 1450. The Art Gallery of South Australia, Victoria, Australia (Acc. No. 0.1245)

Image 1.24: Hieronymus Bosch, *Beggars and Cripples* (Pen and Ink on Paper, 26.5cm x 19.9cm), Netherlandish, c. 1520–1540. Bibliothèque Royale Albert I, Brussels, Belgium (S.II 133708)

Image 1.25: Hieronymus Bosch, *Beggars and Cripples (Detail)* (Pen and Ink on Paper, 26.5cm x 19.9cm), Netherlandish, c. 1520–1540. Bibliothèque Royale Albert I, Brussels, Belgium (S.II 133708)

Image 1.26: Hieronymus Bosch, *Beggars and Cripples (Detail)* (Pen and Ink on Paper, 26.5cm x 19.9cm), Netherlandish, c. 1520–1540. Bibliothèque Royale Albert I, Brussels, Belgium (S.II 133708)

APPENDIX II: CHAIRS, CARTS AND BARROWS

Images have been removed due to copyright restrictions.

Image 2.1: Rehabilitation International, *International Symbol of Access*, 1969–2020

Image 2.2: Accessible Icon Project, *International Symbol of Access*, c. 2011 <http://accessibleicon.org/> [accessed June 2016]

Image 2.3: Jehan Lhermite, *Philip II's Gout Chair* (Pen and Ink on Paper), Spanish, Late Sixteenth Century. Photography Department, Yale University Library, New Haven, Connecticut, USA

Image 2.4: Stephan Farfler, Hans Hautsch, *Darstellung von Hanns Haydens Geigen-clavicymbel, Johann Hautschens Kunstwagen und Stephan Farflers Kunstwagen (Detail)* (Etching, 32.0cm x 19.7cm), German, c. 1700–1747. Germanisches Nationalmuseum, Nuremberg, Germany (Inventory No. MP 10110, Capsule No. 167)

Image 2.5: René d'Anjou, *Le Mortifiement de Vaine Plaisance* (Parchment, 27.6cm x 19.9cm), Netherlandish, 1455–1467, fol. 43. Koninklijke Bibliotheek van België, Brussels, Belgium *(MS 10308)*

Image 2.6: *Princess Dorothea of Denmark's Wedding Carriage* (Timber Frame), German, c. 1560. Veste Coburg, Coburg, Germany

Image 2.7: Walter Map, *Le livre du Saint-Graal* (Parchment, 46cm x 31.3cm), French, 1401–1425, fol. 59. Bibliothèque nationale de France, Paris, France (Arsenal MS 3480)

Image 2.8: Anon, *Guiron le Courtois (Fragment)* (Parchment), Flemish, c. 1500, fol. 004r. Bodleian Library, Oxford, England (MS. Douce 383)

Image 2.9: Raymund of Peñafort, *Smithfield Decretals* (Parchment, 45cm x 28cm), Southern France, Fourteenth Century, fol. 63v. British Library, London, England (Royal 10 E IV)

Image 2.10: Anon, *Taymouth Hours* (Parchment, 17cm x 11.5cm), English, Mid-Fourteenth Century, fol. 139v. British Library, London, England (Yates Thompson MS 13)

Image 2.11: Anon, *Second Volume of the Vulgate Bible from Proverbs to the Apocalypse* (Parchment, 27.3cm x 19.8cm), French, c. 1290, fol. 138v. Bibliothèque de l'Agglomération du Pays de Saint-Omer, Saint-Omer, France (MS 005)

Image 2.12: Giovanni Boccaccio, *Des Cas des nobles hommes et femmes*, trans. by Laurent de Premierfait (Parchment), French, Fifteenth Century, fol. 104v. Bibliothèque nationale de France, Paris, France (Français 226)

Image 2.13: Jehan de Grise (illuminator), *Romance of Alexander* (Parchment), c. 1338–1410, fol. 109r. Bodleian Library, Oxford, England (Ms. Bodl. 264)

Image 2.14: *Dr. Gerd Riedel, Dr. Ansgar Reiß, Stefan Dembinski, and Dr. Ruth Sandner with one of the Ingolstadt Wheelbarrows* (2017) <https://www.ingolstadt.de/Home/Die-erste-Schubkarre-der-alten-Schanzer.php?object=tx,2789> [accessed December 2019]

Image 2.15: Georgius Agricola, *De Re Metallica* (Basel: Apud Hieron Frobenium et Nicolaum Episcopium, 1556), p. 112

Image 2.16: Anon, *Book of Hours* (Parchment), Flemish, Late-Fifteenth Century, p. xvi. Bodleian Library, Oxford, London (Douce 8)

Image 2.17: Anon, *Cantionale* (Parchment), Austrian, 1490, fol. 92v. Österreichische Nationalbibliothek, Vienna, Austria (Codex Vindobonensis Palatinus 15501)

Image 2.18: Ulrich von Richental, *Chronicle of the Constance Council* (Parchment, 39.5cm x 28cm), German, c. 1475, fol. 82v. Österreichische Nationalbibliothek, Vienna, Austria (Codex 3044)

Image 2.19: Henri de Ferrières, *Les Livres du Roy Modus et de la Royne Ratio* (Parchment), Netherlandish, c. 1475, fol. 334. Koninklijke Bibliotheek van België, Brussels, Belgium (MS 10218–19)

Image 2.20: Anon, Luttrell Psalter (Parchment), c. 1325–1335, fol. 186v. British Library, London, England (Add. MS 42130)

Image 2.21: Jehan de Grise (illuminator), *Romance of Alexander* (Parchment), c. 1338–1410, fol. 158v. Bodleian Library, Oxford, England (Ms. Bodl. 264)

Image 2.22: Monogrammist BxG, *A Beggar Carrying his Wife in a Wheelbarrow* (Engraving, 9.5cm x 15.5cm), German, c. 1470–1490. British Museum, London, England (1845,0809.218)

Image 2.23: Robinet Testard, Jean Bourdichon (Illuminators), *Horae ad usum Parisiensem, dites Heures de Charles d'Angoulême* (Parchment, 21cm x 15.5cm), French, c. 1485, fol. 4v. Bibliothèque nationale de France, Paris, France (Latin 1173)

Images 2.24-2.26: Ripon School (headed by William Bromflet), *Ripon Cathedral Misericord, South No. 9* (Wood), English, c. 1489–1494. Ripon Cathedral, Ripon, England

Image 2.27: *Canteen,* German, Fifteenth Century. Kunstgewerbemuseum, Cologne, Germany (Nr. 110, RBA 103 521)

Image 2.28: *Canteen,* German, Fifteenth Century. Kunstgewerbemuseum, Cologne, Germany (Nr. 111, RBA 58404)

Image 2.29: *Canteen,* German, Fifteenth Century. Kunstgewerbemuseum, Cologne, Germany (Nr. 112, RBA 103 522)

Image 2.30: Ripon School (headed by Willam Bromflet), *Beverley Minster Misericord* (Wood), English, c. 1520–1524. Beverley Minster, Beverley, England

Image 2.31: Ripon School (headed by Willam Bromflet), *Durham Castle Chapel Misericord* (Wood), English, Late-Fifteenth Century. Durham Castle, Durham, England

Image 2.32: Anon, *Fountain of Youth* (Tapestry), German, c. 1430–1440. Musée d'Unterlinden, Colmar, France

Image 2.33: Master of Manta, *Fountain of Youth* (Fresco), Italian, Mid-Fifteenth Century. Manta Castle, Manta, Piedmont, Italy

Image 2.34: Lucas Cranach the Elder, *The Fountain of Youth* (Oil on Canvas, 186.1cm x 120.6 cm), German, 1546. Gemäldegalerie, Berlin, Germany (Inventory no. 593)

APPENDIX III: MECHANISED PROSTHESES

Images have been removed due to copyright restrictions.

Image 3.1 (Left): Ambroise Paré, *Instrumenta chyrurgiae et icones anathomicae* (Parchment, 17cm) French, 1564, fol. 39v. Wellcome Collection, London, England (.b20274609)

Image 3.2 (Right): *Stibbert Leg* (Iron, 1480g), Sixteenth Century. Stibbert Museum, Florence, Italy (Inv. No. 3820)

Image 3.3 (Above): *Eisfelder Hand* (Iron, 525g), German, c. 1547. Museen Thüringen, Thuringia, Germany (Inventory No. 307)

Image 3.4 (Left): *Stibbert Hand (C)* (Iron, 620g), Sixteenth Century. Stibbert Museum, Florence, Italy (Inv. No. 3818)

Image 3.5: Ambroise Paré, *Instrumenta chyrurgiae et icones anathomicae* (Parchment, 17cm) French, 1564, fol. 38v. Wellcome Collection, London, England (.b20274609)

Image 3.6: Ambroise Paré, *Instrumenta chyrurgiae et icones anathomicae* (Parchment, 17cm) French, 1564, fol. 41v. Wellcome Collection, London, England (.b20274609)

Image 3.7: Ambroise Paré, *Instrumenta chyrurgiae et icones anathomicae* (Parchment, 17cm) French, 1564, fol. 49v. Wellcome Collection, London, England (.b20274609)

Images 3.8 & 3.9 (Left): Ulrich Wagner, *Eiserne Hand* (Iron), Swiss, 1476. Musée d'art et d'histoire de Friborg, Friborg, Switzerland (Inv. No. MAHF7611)

Image 3.10 (Above): *Balbronner Hand* (Iron, complete arm estimated to weigh 1675g), German, c. 1560. Musée Historique, Strasbourg, France (Inv. No. MH 4052a-b)

Image 3.11: *Lithograph of the Alt-Ruppiner Hand*, in Carl Alexander Ferdinand Kluge, Hermann Eduard Fritze, *Arthroplastik Oder Die Sämmtlichen, Bisher Bekannt Gewordenen Künstlichen Hände Und Füsse, Zum Ersatz Dieser Verloren Gegangenen Gliedmassen: Mit 26 In Stein Gravirten Tafeln* (Lemgo: Verlag der Meyer'schon Hof-Buchhundlund, 1842)

Image 3.12 (Above): *Second Jagshäusser Hand* (Iron, 13cm x 7cm, 600g), German, c. 1530. Schlossmuseum von Jagsthausen, Jagsthausen, Germany

Image 3.13 (Left): First Jagshäusser Hand (Iron, 37cm, 1500g), German, c. 1505. Schlossmuseum von Jagsthausen, Jagsthausen, Germany

Image 3.14: Christian von Mechel, 'Die eiserne Hand des Ritters Götz von Berlichingen nach ihrem inner Mechanismus und allen zu demselben ġehörenden einzelnen Theilen' (Berlin, 1815), in Friedrich Wolfgang Götz von Berlichingen-Rossach, *Geschichte des Ritters Götz von Berlichingen mit der eisernen Hand und seiner Familie* (Leipzig: J. M. Brockhaus, 1861), p. 478

Image 3.15: Christian von Mechel, 'Die eiserne Hand des Ritters Götz von Berlichingen in ihrer natürlichen Grösse' (Berlin, 1815), in Friedrich Wolfgang Götz von Berlichingen-Rossach, *Geschichte des Ritters Götz von Berlichingen mit der eisernen Hand und seiner Familie* (Leipzig: J. M. Brockhaus, 1861), p. 478

Image 3.16: Hans Talhoffer, *Alte Armatur und Ringkunst* (Parchment, 30cm x 21cm), German, 1459, fol. 119r. Det Kongelige Bibliotek, Copenhagen, Denmark (MS Thott.290.20). Caption reads *der recht not stand gen zwainen* [the right and needed stance against two foes], trans. by Jeffrey Hull

Image 3.17: Hans Talhoffer, *Alte Armatur und Ringkunst* (Parchment, 30cm x 21cm), German, 1459, fol. 100r. Det Kongelige Bibliotek, Copenhagen, Denmark (MS Thott.290.20). Caption reads *Der anlauß* [The onslaught/the provocation], trans. by Jeffrey Hull

Images 3.18–3.20: *Nürnberger Hand* (Iron, 31.75cm long, 454g), German, c. 1580. F.W. Paul Collection, Berlin, Germany

Images 3.21–3.22: *Artificial Hand* (Iron, 18cm long, 326g), German, Sixteenth Century. British Museum, London, England (Inv. No. 1870,1013.38)

Images 3.23–3.24: *Grüninger Hand* (Iron and Wood, 1290g), German, Sixteenth Century. Deutsches Historisches Museum, Berlin, Germany (Inv. No. AK 2016/26)

APPENDIX IV: SERVICE DOGS AND SPECTACLES

Images have been removed due to copyright restrictions.

Image 4.1: Raymund of Peñafort, *Smithfield Decretals* (Parchment, 45cm x 28cm), England, Fourteenth Century, fol. 218v. British Library, London, England (Royal 10 E IV)

Image 4.2: Raymund of Peñafort, *Smithfield Decretals* (Parchment, 45cm x 28cm), Southern France, Fourteenth Century, fol. 219r. British Library, London, England (Royal 10 E IV)

Image 4.3: Raymund of Peñafort, *Smithfield Decretals* (Parchment, 45cm x 28cm), Southern France, Fourteenth Century, fol. 110r. British Library, London, England (Royal 10 E IV)

Image 4.4: Anon, *Hours of Mary of Burgundy* (Parchment, 22.5cm x 16.3cm) Belgian, c. 1477, fol. 39v. Austrian National Library, Vienna, Austria (Codex Vindobonensis)

Image 4.5: Anon, *Psalter-Hours* (Parchment, 11.1cm x 16.2cm), Belgian, Fourteenth Century, fol. 207r. Walters Art Museum, Baltimore, USA (Ms. W.82)

Image 4.6: Anon, *Psalter-Hours* (Parchment, 11.1cm x 16.2cm), Belgian, Fourteenth Century, fol. 171r. Walters Art Museum, Baltimore, USA (Ms. W.82)

Image 4.7 (Above): Jehan de Grise (Illuminator), *Romance of Alexander* (Parchment), c. 1338–1410, fol. 77v. Bodleian Library, Oxford, England (Ms. Bodl. 264)

Image 4.8 (Below): Jehan de Grise (Illuminator), *Romance of Alexander* (Parchment), c. 1338–1410, fol. 180v. Bodleian Library, Oxford, England (Ms. Bodl. 264)

Image 4.9: Conrad von Soest, *Passionsaltar* (Tempora on Wood, 152cm x 188cm), German, c. 1403. Stadtkirche St. Nikolaus, Bad Wildungen, Germany

Image 4.10: *Rivet Spectacles* (Wood and Glass), German, Fourteenth Century.
Wienhausen Monastery, Wienhausen, Germany

Image 4.11: *Bow-Rivet Spectacles* (Wood and Glass), German, Fifteenth Century.
Wienhausen Monastery, Wienhausen, Germany

Image 4.12: *Bow Spectacles* (Leather and Glass), German, Fourteenth Century.
Wienhausen Monastery, Wienhausen, Germany

Image 4.13: Konrad Seusenhofer, *The Horned Helmet* (Iron, 48.5cm (over horns) x 33.5cm x 37cm), Austrian, 1512. Royal Armouries, Leeds, England (Object No. IV.22)

Image 4.14: *Trig Lane Spectacles* (Bone, 6.5cm x 6.5cm in open position), English, c. 1410. Museum of London, London, England (TL74[274]<2216>)

Image 4.15: After Pieter Bruegel the Elder, *The Sleeping Pedlar Robbed by Monkeys* (Engraving, 21cm x 28.9cm), Netherlandish, c. 1562. British Museum, London, England (1866,0407.22)

Image 4.16: Jacob Cornelisz van Oostsanen, *Laughing Fool* (Oil on Panel, 35.2cm x 23.2cm) Netherlandish, c. 1500. The Davis Museum, Wellesley College, Massachusetts, USA (1958.3)

Image 4.17: Anon, *Laughing Fool* (Oil on Oak, 47cm x 37cm) Netherlandish, c. 1540. Nationalmuseum, Stockholm, Sweden (NM 6783)

Image 4.18: After Pieter Bruegel the Elder, *The Festival of Fools* (Engraving, 32.5cm x 43.7cm) Netherlandish, c. 1570. The Museum of Fine Arts, Boston, Massachusetts, USA (2008.174)

Image 4.19: Jacob Cornelisz van Oostsanen, *The Ill-Matched Lovers* (Oil on Panel, 49.5cm x 35.9cm), Netherlandish, c. 1533. Private Collection

Image 4.20: Quentin Massys, *Ill-Matched Lovers* (Oil on Panel, 43.2cm x 63cm), Netherlandish, c. 1520. National Gallery of Art, Washington, D. C., USA (1971.55.1)

Image 4.21: Albrecht Dürer, *Büchernarr* (Woodcut), German, c. 1494. In Sebastian Brandt, Das Narrenschiff (Basel: Johann Bergmann von Olpe, 1494), Fool No. 1

Image 4.22: Anon, *Schembartsbuch* (Paper), German, 1449–1539, fol. 258r. Bodleian Library, Oxford, England (MS. Douce 346)

Image 4.23: Tommaso da Modena, *Cardinal Hugh of St. Cher* (Fresco), Italian, 1352. Chapter House, Dominican Monastery of San Nicoló, Treviso, Italy

Image 4.24: Tommaso da Modena, *Blessed Pietro Isnardo of Vicenza* (Fresco), Italian, 1352. Chapter House, Dominican Monastery of San Nicoló, Treviso, Italy

Image 4.25: Tommaso da Modena, *Cardinal Nicholas of Rouen* (Fresco), Italian, 1352. Chapter House, Dominican Monastery of San Nicoló, Treviso, Italy

Image 4.26: Bedford Master, *Bedford Hours* (Parchment, 26.3cm x 18.4cm), French, c. 1410–1415, fol. 89v. British Library, London, England (Add 8MS 18850)

Image 4.27: Martin Schongauer, *Death of the Virgin* (Copperplate Engraving on Paper, 25.8cm x 17cm), Alsatian, c. 1480. British Museum, London, England (PD 1895-9-15-258)

Image 4.28: Everlöv Workshop, *Saint Matthew with Spectacles Writes his Gospel Book* (Fresco), Swedish, c. 1500. Everlöv Church, Everlöv, Sweden

Image 4.29: Anon, *Saint Matthew* (Rood Screen), English, Fifteenth Century. St. Agnes Church, Cawston, England

Image 4.30: George Bartisch, *Ophthalmodouleia: Das ist Augendienst. Newer vnd wolgegründter Bericht von Ursachen vnd Erkentnüs al* (Dresden: Durch Matthes, 1583), fol. 15v. Wellcome Collection, London, England (X152910)

Image 4.31: George Bartisch, *Ophthalmodouleia: Das ist Augendienst. Newer vnd wolgegründter Bericht von Ursachen vnd Erkentnüs al* (Dresden: Durch Matthes, 1583), fol. 16v. Wellcome Collection, London, England (X152910)

Image 4.32: George Bartisch, *Ophthalmodouleia: Das ist Augendienst. Newer vnd wolgegründter Bericht von Ursachen vnd Erkentnüs al* (Dresden: Durch Matthes, 1583), fol. 16r. Wellcome Collection, London, England (X152910)

BIBLIOGRAPHY

PRIMARY SOURCES

ORIGINAL LANGUAGE

Agricola, Georgius, *De Re Metallica* (Basel: Apud Hieron Frobenium et Nicolaum Episcopium, 1556)

Anon, *Actes anciens et documents concernant le Bienheureux Urbain V papae*, ed. by Joseph Hyyacinthe Albanès and Ulysses Chevalier (Paris: Picard, 1897)

Anon, *Calendar of Coroners' Rolls of the City of London*, ed. by Reginald R. Sharpe (London: Richard Clay and Sons, 1913)

Anon, *Calendar of Letter Books of the City of London: L: Edward IV–Henry VII*, ed. by Reginald R. Sharpe (London: Richard Clay, 1913)

Anon, *Canti carnascialeschi del Rinascimento*, ed. by C. S. Singleton (Bari: Laterza, 1936)

Anon, 'Chronica antiqua conventus Sanctae Catharinae de Pisis', in *Archivio storico italiano*, VI, Part Two, ed. by F. Bonaini (Florence: Gabinetto Scientifico Letterario G. P. Vieusseux, 1845), pp. 467–477

Anon, *Libellus de Vita et Miraculis S. Godrici, Heremitae de Finchale, auctore Reginaldo Monacho Dunelmensi,* ed. by J. Stevenson (Durham: Surtees Society, 1845)

Anon, *The Inventory of King Henry VIII: Society of Antiquaries MS 129 and British Library MS Harley 1419*, ed. by David Starkey, Philip Ward and Alasdair Hawkyard (London: Harvey Miller for the Society of Antiquaries of London, 1998)

Anon, *The Norwich Census of the Poor of 1570*, ed. by J. F. Pound (London: Norfolk Record Society, 1971)

Anon, 'The Tournament of Tottenham', in *Sentimental and Humorous Romances*, ed. by Erik Cooper (Kalamazoo: Medieval Institute Publications, 2005)

Anon, *Visitations of Religious Houses in the Diocese of Lincoln, vol. 2: Records of Visitations Held by William Alnwick, Bishop of Lincoln, A.D. 1436 to A.D. 1449*, ed. by A. H. Thompson (Horncastle: The Lincoln Record Society, 1918)

Anon, *Visitation of the Diocese of Norwich, 1492–1532,* ed. by Augustus Jessop (London: Nichols and Sons, 1888)

Bartholomaeus Anglicus, *De rerum Proprietatibus*, Liber VII (Frankfurt: Minerva, 1964)

Bartisch, George, *Ophthalmodouleia. Das ist Augendienst. Newer vnd wolegründter Bericht von Ursachen vnd Erkentnüs al* (Dresden: Durch Matthes, 1583)

Berlichingen, Götz von, *Götz von Berlichingen: Mein Fehd und Handlungen, Text of the 1567 Rossacher Handschrift*, ed. by Helgard Ulmschneider (Ostfildern: Thorbecke, 1981)

Bromyard, John, *Summa Predicantium* (Venice, 1586)

Chauliac, Guy de, *Inventarium sive chirurgia magna*, vol. 1, ed. by M. R. McVaugh (Leiden: Brill, 1997)

Gersdorff, Hans von, *Feldbuch der Wundartzney* (Strassburg: J. Schott, 1517)

Hoccleve, Thomas, *Hoccleve's Works: The Minor Poems*, vol. 1, ed. by F. J. Furnivall (London: The Early English Text Society Extra Series 61, 72, 1870)

Kersey, John (ed.), *The New World of Words; or, Universal English Dictionary*, Sixth Edition (London: Printed for J. Phillips, at the King's-Arms in St Paul's Church-Yard, 1706)

Luther, Martin, *D. Martin Luthers Werke. Kritische Gesamtausgabe*, vol. 43 (Weimar: Böhlau, 1884–2007)

Lydgate, John, *Siege of Thebes*, ed. by Paul Kegan Trench (London: Oxford University Press for the Early English Text Society Extra Series 108, 125, 1911)

Metham, John, *The Works of John Metham*, ed. by H. Craig (London: Trübner, 1916)

Paré, Ambrose, 'Livre traictant des moyens et artifices d'adiouster ce qui defaut naturellement, ou par accident', in Ambrose Paré, *Les oeuvres d'Ambroise Paré* (Lyon: Chez Pierre Rigaud, 1652), pp. 572–584

Phébus, Gaston le, *Livre de chasse de Gaston Phèbus,* ed. by Claude d'Anthenaise (Paris: Bibliothèque de l'Image, 2002)

Pisa, Giordano da, *Quaresimale fiorentino, 1305–1306,* Edizione critica, ed. by Carlo Delcorno (Florence: Sansoni Ed., 1974)

Rolandus Scriptoris, *Reductorium phisonomie*, in Lisbon, Biblioteca da Ajuda, MS 52.XIII.18, fol. 83r–83v

Shakespeare, William, *The Oxford Shakespeare: As You Like It*, ed. by Alan Brissenden (Oxford: Oxford University Press, 2008)

Shakespeare, William, *The Oxford Shakespeare: Twelfth Night, or What You Will*, ed. by Roger Warren and Stanley Wells (Oxford: Oxford University Press, 1994)

Sherry, Richard, Desiderius Erasmus (eds.), *A Treatise of Schemes [and] Tropes Very Profytable for the Better Understanding of Good Authors, Gathered out of the Best Grammarians [and] Oratours by Rychard Sherry Londoner* (London: John Day, 1550)

Skeat, Walter (ed.), 'Nominale sive verbale', *Transactions of the Philological Society*, 25:3 (1906), 1-50

Sutton, Anne F., P. W. Hammond (eds.), *The Coronation of Richard III: The Extant Documents* (New York: St. Martin's Press, 1983)

Thynne, William, *The Romaunt of the Rose: A Reprint of the First Printed Edition,* ed. by Frederick J. Furnivall (New York: Johnson Reprint Corp., 1967)

Vegetius, *Epitoma rei militaris*, ed. by M. D. Reeve (Oxford: Oxford Clarendon Press, 2004)

ENGLISH TRANSLATIONS

Agricola, Georgius, *De Re Metallica*, trans. by Herbert Clark Hoover and Lou Henry Hoover (London: The Mining Magazine, 1912)

Albertus Magnus, *On Animals: A Medieval Summa Zoologica*, trans. by Kenneth F. Kitchell Jr. and Irven Michael Resnick (Columbus: The Ohio State University Press, 2018)

Alighieri, Dante, *Convivio: A Critical Edition in English*, trans. by Andrew Frisardi (Cambridge: Cambridge University Press, 2017)

Anon, *Gesta Francorum et aliorum Hierosolimitanorum – The Deeds of the Franks and the Other Pilgrims to Jerusalem,* trans. by Rosalind Hill (London: Nelson, 1962)

Bacon, Francis, *Novum Organum*, ed. and trans. by Peter Urbach and John Gibson (Chicago: Open Court Press, 1994)

Bartholomaeus Anglicus, *On the Properties of Things,* vol. 1, trans. by John Trevisa, ed. by M. C. Seymour (Oxford: Clarendon Press, 1975–1988)

Bartholomaeus Anglicus, *On the Properties of Things,* vol. 2, trans. by John Trevisa, ed. by M. C. Seymour (Oxford: Clarendon Press, 1975–1988)

Bartisch, George, *Ophthalmodouleia: That is the Service of the Eyes. 1583*, trans. by Donald L. Blanchard (Ostend: Wayenborgh Publishing, 2018)

Berlichingen, Götz von, *Götz von Berlichingen: Autobiography of a Sixteenth-Century Knight*, trans. by Dirk Rottgardt (Leavenworth: The Nafziger Collection Inc., 2014)

Caius, John, *Of Englishe Dogges, the Diuersities, the Names, the Natures, and the Properties*, trans. by Abraham Fleming (London: Rychard Johnes, 1576)

Cicero, Marcus Tullius, *On Duties*, trans. by M. T. Griffin and E. M. Atkins (Cambridge: Cambridge University Press, 1991)

Cortés, Hernán, *Letters from Mexico*, ed. by A. R. Pagden (New York: Grossman Publishers, 1971)

Kempe, Margery, *The Book of Margery Kempe*, trans. by Anthony Bale (Oxford: Oxford University Press, 2015)

Llull, Raymond, *The Book of the Ordre of Chyualry*, trans. by William Caxton, ed. by Alfred T. P. Byles (Oxford: Early English Text Society Original Series 168, 1926)

Luther, Martin, *Works*, vol. 5 (Saint Louis: Concordia Publishing House, 1955–86)

Luther, Martin, *The Book of Vagabonds and Beggars*, trans. by John Camden Hotten (London: John Camden Hotten, 1860)

Peter of Spain, 'The Eyebook', trans. by Walter J. Daly and Robert D. Yee, in Walter J. Daly and Robert D. Yee, 'The Eye Book of Master Peter of Spain: A Glimpse of Diagnosis and Treatment of Eye Disease in the Middle Ages', *Documenta Ophthalmologica*, 103:2 (2001), 119–153

Pizan, Christine de, *The Book of the City of Ladies*, trans. by Earl Jeffrey Richards (New York: Persea Books, 1982)

Pliny the Elder, *The Historie of the World: Commonly Called, The Naturall Historie of C. Plinius Secundus*, trans. by David Edward Eichholz, William Henry Samuel Jones and H. Rackham (London: William Heinemann, 1938–1962)

Seneca, *Naturales Quaestiones*, trans. by John Clarke (Baltimore: Johns Hopkins University Press, 2004)

Severus, Sulpicius, 'Life of St. Martin of Tours', in *Medieval Saints: A Reader*, ed. by Mary-Ann Stouck (Peterborough, Ont.: Broadview Press, 1999), pp. 139-141.

Troyes, Chrétien de, *Lancelot: The Knight of the Cart*, trans. by Burton Raffel (New Haven: Yale University Press, 1997)
Vegetius Renatus, Flavius, *De Re Militari*, trans. by John Clarke (Washington, D.C.: Praetorian Press, 2011)

SECONDARY SOURCES

A Toy Like Me, *Join the Toybox Revolution* (2019) <https://www.toylikeme.org/> [accessed November 2019]

A Toy Like Me, *Our Story* (2019) <https://www.toylikeme.org/about-us/our-story/> [accessed November 2019]

Alexander, Jonathan, 'Labeur and Paresse: Ideological Representations of Medieval Peasant Labor', *The Art Bulletin*, 72:3 (1990), 436–452

Allmand, Christopher, *The De Re Militari of Vegetius: The Reception, Transmission and Legacy of a Roman Text in the Middle Ages* (Cambridge: Cambridge University Press, 2011)

Alternative Limb Project, *The Alternative Limb Project* (2019) <http://www.thealternativelimbproject.com/> [accessed November 2019]

Alternative Limb Project, *The Alternative Limb Project: About* (2018) <http://www.thealternativelimbproject.com/about/the-alternative-limb-project/> [accessed August 2018]

Andermann, Kurt, 'Götz von Berlichingen und Franz von Sickingen. Zeitgenossen – Altersgenossen – Standesgenossen', *Zeitschrift für die Geschichte des Oberrheins*, 165 (2017), 141–161

Andermann, Kurt, 'Berlichingen: Portrait der scheinbar bekanntesten Familie des fränkischen Ritteradels', *Zeitschrift für Württembergische Landesgeschichte*, 73 (2014), 187–200

Andermann, Kurt, 'Götz von Berlichingen (um 1480–1562). Adliger Grundherr und Reichsritter', in *Fränkische Lebensbilder 20,* ed. by Erich Schneider (Neustadt an der Aisch: Veröffentlichungen der Gesellschaft für fränkische Geschichte, Reihe 7A, Band 20, 2004), pp. 17–37

Anon, *A Bit on the Side: The Development of Spectacle Sides* (2019) <https://www.college-optometrists.org/the-college/museum/online-exhibitions/virtual-spectacles-gallery/a-bit-on-the-side.html> [accessed September 2019]
Anon, *VM Story* (2019) <http://www.viktoriamodesta.com/> [accessed November 2019]

Arnott, Robert, *The Archaeology of Medicine: Papers Given at a Session of the Annual Conference of the Theoretical Archaeology Group held at the University of Birmingham on 20 December 1998*, BAR International Series 1046 (Oxford: Archaeopress Publishing Ltd., 2002)

Ashby, Steven P., 'Technologies of Appearance: Hair Behaviour in Early-Medieval Britain and Europe', *Archaeological Journal*, 171:1 (2004), 153–186

Austin, David, 'The Presence of Poverty: Archaeologies of Difference and Their Meaning', in *The Sign Language of Poverty: International Round Table-Discussion Krems an Der Donau October 10 and 11, 2006*, ed. by Gerhard Jaritz (Vienna: Austrian Academy of Sciences Press, 2007), pp. 19–42

Backhouse, Janet, *Medieval Rural Life in the Luttrell Psalter* (Toronto: University of Toronto Press, 2000)

Baker, Patricia, 'Roman Medical Instruments: Archaeological Interpretations of Their Possible 'Non-Functional' Uses', *Social History of Medicine*, 17:1 (2004), 3–21

Bartlett, Robert, 'Symbolic Meanings of Hair in the Middle Ages', *Transactions of the Royal Historical Society*, 4 (1994), 43–60

Baumgartner, René, Pierre Botta, *Amputation und Prothesenversorgung der oberen Extremität* (Stuttgart: Enke, 1997)

Baxandall, Michael, *Patterns of Intention: On the Historical Explanation of Pictures* (New Haven: Yale University Press, 1985)

Bennett, Judith M., *Ale, Beer and Brewsters in England: Women's Work in a Changing World, 1300–1600* (New York: Oxford University Press, 1996)

Bibliothèque Nationale de France, *Ambroise Paré (c. 1510–1590) Bibliographie Sélective* (2009) <http://www.bnf.fr/documents/biblio_pare.pdf> [accessed February 2018]

Billington, Sandra, *A Social History of the Fool* (London: Faber and Faber, 2015)

Blair, Claude, 'The Emperor Maximilian's Gift of Armour to King Henry VIII and the Silvered and Engraved Armour at the Tower of London', *Archaeologia*, 99:1 (1965), 1-52

Blair, Claude, 'Comments on Dr Borg's 'Horned helmet'', *Journal of the Arms and Armour Society*, 8:2 (1974), 138-85

Blanchard, Raoul, 'Ulrich Wagner: Eiserne Kunsthand des Buchsenmeisters, 1476', in Anon, *Blätter des Museum für Kunst und Geschichte Freiburg 2000–2002* (Freiburg: Museum für Kunst und Geschichte, 2002), unpaginated

Borg, Alan, 'The Ram's Horn Helmet', *Journal of the Arms and Armour Society*, 8:2 (1974), 127-37

Bourdieu, Pierre, *Masculine Domination*, trans. by Richard Nice (Stanford: Stanford University Press, 2000)

Bouchard, Constance Brittain, *Strong of Body, Brave & Noble: Chivalry and Society in Medieval France* (Ithaca: Cornell University Press, 1998)
Brenner, Elma, *Leprosy and Charity in Medieval Rouen* (Woodbridge: The Boydell Press, 2015)

Briant, Pierre, *Darius in the Shadow of Alexander*, trans. by Jane Marie Todd (Cambridge, MA: Harvard University Press, 2015)

Briggs, Charles F., 'Literacy, Reading, and Writing in the Medieval West', *Journal of Medieval History*, 26:4 (2000), 397–420

British Library, *Bedford Hours* (2019) <https://www.bl.uk/collection-items/bedford-hours> [accessed July 2019]

British Stick Makers' Guild, *Competition Categories* (2016) <http://thebsg.org.uk/> [accessed 8th September 2017]

Brown, Kevin, *The Pox: The Life and Near Death of a Very Social Disease* (Stroud: Sutton, 2006)

Buren, Anne H. van, 'The Master of Mary of Burgundy and His Colleagues: The State of Research and Questions of Method', *Zeitschrift für Kunstgeschichte*, 38:3/4 (1975), 286–309

Burrow, J. A., *The Ages of Man: A Study in Medieval Writing and Thought* (New York: Clarendon Press, 1986)

Bynum, Caroline Walker, *Metamorphosis and Identity* (New York: Zone Books, 2001)

Cadden, Joan, *Meanings of Sex Difference in the Middle Ages: Medicine, Science, and Culture* (Cambridge: Cambridge University Press, 1993)

Camille, Michael, *Image on the Edge: The Margins of Medieval Art* (Cambridge, MA: Harvard University Press, 1992)

Camille, Michael, 'Labouring for the Lord: The Ploughman and the Social Order in the Luttrell Psalter', *Art History*, 10:4 (1987), 423–454

Campaign Live, *Campaign of the Year 2016: Channel 4 'We're the Superhumans'* (2016) <https://www.campaignlive.co.uk/article/campaign-year-2016-channel-4-were-superhumans/1418721> [accessed August 2018]

Carden-Coyne, Ana, *Reconstructing the Body: Classicism, Modernism, and the First World War* (Oxford: Oxford University Press, 2009)

Carruthers, Mary, *The Craft of Thought: Meditation, Rhetoric, and the Making of Images, 400–1200* (Cambridge: Cambridge University Press, 1998)

Článku, Česká Verze, 'The Image of the Fool in Late Medieval Bohemia', *Umění Lxiv*, 5 (2016), 354–370

Cock, Emily, 'Wounded: 'A Small Scar will be much Discerned': Treating Facial Wounds in Early Modern Britain', *Science Museum Group Journal*, 11:11 (2019), unpaginated

Cock, Emily, ''Off dropped the Sympathetic Snout': Shame, Sympathy, and Plastic Surgery at the Beginning of the Long Eighteenth Century', in *Passions, Sympathy and Print Culture: Public Opinion and Emotional Authenticity in Eighteenth-Century Britain*, ed. by Heather Kerr, David Lemmings and Robert Phiddian (London: Palgrave Macmillan, 2016), pp. 145–164

Cock, Emily, ''Lead[ing] 'em by the Nose into Publick Shame and Derision': Gaspare Tagliacozzi, Alexander Read and the Lost History of Plastic Surgery, 1600–1800', *Social History of Medicine*, 28: 1 (2015), 1–21

Cohen, J. J., *More on Wonder: MIMs* (2007) <http://www.inthemedievalmiddle.com/2007/06/more-on-wonder-mims.html> [accessed May 2018]

Cohen, J. J., *Hybridity, Identity and Monstrosity in Medieval Britain: Of Difficult Middles* (London: Palgrave Macmillan, 2006)

Cohen, J. J., *Medieval Identity Machines* (Minneapolis: University of Minnesota Press, 2003)

Cohn, Henry J., 'Götz von Berlichingen and the Art of Military Autobiography', in *War, Literature and the Arts in Sixteenth-Century Europe*, ed. by J. R. Mulryne and M. Shewring (London: Palgrave Macmillan, 1989), pp. 22–40

Coleman, Joyce, *Public Reading and the Reading Public in Late Medieval England and France* (Cambridge: Cambridge University Press, 1996)

Coltman, Viccy, 'Material Culture and the History of Art(efacts)', in *Writing Material Culture History*, ed. by Anne Gerritsen and Giorgio Riello (London: Bloomsbury, 2015), pp. 17–32

Colvin, H. M., *Building Accounts of Henry III* (Oxford: Oxford University Press, 1971)

Comber, Abigail Elizabeth, 'A Medieval King 'Disabled' by an Early Modern Construct: A Contextual Examination of Richard III', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyler (Farnham: Ashgate, 2010), pp. 182–196

Constable, Giles, 'Beards in the Middle Ages', in *Apoligiae duae: Gozechini Epistola ad Walcherium: Burchardi ut videtur, abbatis Bellevallis Apologia de barbis*, ed. by R. B. C. Huygens (Turnhout: Brepols, 1985)

Cooke, W. G., 'The Tournament of Tottenham: Provenance, Text and Lexicography', *English Studies*, 69:2 (1988), 113-116

Coon, Nelson, *A Brief History of Guide Dogs for the Blind* (Morristown: The Seeing Eye, Inc., 1959)

Crowther-Heyck, Kathleen, 'Be Fruitful and Multiply: Genesis and Generation in Reformation Germany', *Renaissance Quarterly*, 55:3 (2002), 904–935

Daniell, Christopher, *Death and Burial in Medieval England, 1066–1550* (London: Routledge, 1997)

Davis, Adam J., 'The Social and Religious Meanings of Charity in Medieval Europe', *History Compass*, 12:12 (2014), 935–950

Davies, R. H. C., *The Medieval Warhorse: Origin, Development and Redevelopment* (London: Thames and Hudson, 1989)

Delony, Mikee, 'Alisoun's Aging, Hearing Impaired Female Body: Gazing at the Wife of Bath in Chaucer's Canterbury Tales', in *The Treatment of Disabled Persons in Medieval Europe: Examining Disability in the Historical, Legal, Literary, Medical, and Religious Discourses of the Middle Ages*, ed. by Wendy Turner and Tory Vandeventer Pearman (Lewiston: Edwin Mellen Press, 2010), pp. 313–346

Demaitre, Luke, *Leprosy in Premodern Medicine: A Malady of the Whole Body (*Baltimore: Johns Hopkins University Press, 2007)

Derrida, Jacques, *Margins of Philosophy*, trans. by Alan Bass (Chicago: University of Chicago Press, 1982)

Desmond, Marilynn R., 'From Book-Lined Cell to Cyborg Hermeneutics', in *Christine de Pizan and the Categories of Difference*, ed. by Marilynn R. Desmond (Minneapolis: University of Minnesota Press, 1998), pp. x–xix

Deutsches Historisches Museum, *What's That For?: Grüninger Hand* (2017) <https://www.dhm.de/blog/2017/01/26/grueninger-hand/> [accessed August 2019]

Duggan, Joseph J., 'Afterward', in Chrétien de Troyes, *Lancelot: The Knight of the Cart*, trans. by Burton Raffel (New Haven: Yale University Press, 1997), pp. 255–239

Dutour, Olivier, György Pálfi, Jacques Berato and Jean-Pierre Brun (eds.), *L'origine de la syphilis en Europe: avant ou après 1493?* (Toulon: Editions Errance, 1994)

Dutton, P. E., 'Charlemagne's Moustache', in *Charlemagne's Moustache and Other Cultural Clusters of a Dark Age*, ed. by P. E. Dutton (New York: Palgrave MacMillan, 2004), pp. 3–42

Dyer, Christopher, *Standards of Living in the Later Middle Ages* (Cambridge: Cambridge University Press, 1989)

Edge, Sherri, *Going Cyborg: Advanced Prosthetic Technologies take the Spotlight* (2016) <https://opedge.com/Articles/ViewArticle/2016-10_01?spanish=False> [accessed August 2018]

El Escorial Online, *Architecture* (2016) <https://el-escorial.com/el-escorial-architecture/> [accessed 12th June 2016].

Elema, Ariella, 'Tradition, Innovation, Re-enactment: Hans Talhoffer's Unusual Weapons', *Acta Periodica Duellatorum*, 7:1 (2019), 3–25

Ellis, Kate, *Disability and Digital Television Cultures: Representation, Access and Reception* (New York: Routledge, 2019)

Ellis, Kate, *Disability and Popular Culture: Focussing Passion, Creating Community and Expressing Defiance* (New York: Routledge, 2016)

Emmerson, Richard K., P. J. P. Goldberg, "The Lord Geoffrey had me made': Lordship and Labour in the Luttrell Psalter', in *The Problem of Labour in Fourteenth-Century England*, ed. by James Bothwell, P. J. P. Goldberg and W. M. Ormrod (York: York Medieval Press, 2000), pp. 43–64

Evans, Ruth, 'Our Cyborg Past: Medieval Artificial Memory as Mindware Upgrade', *Postmedieval: A Journal of Medieval Cultural Studies*, 1: 1–2 (2010), 64–71

Farmer, Sharon, *Surviving Poverty in Medieval Paris: Gender, Ideology and the Daily Lives of the Poor* (Ithaca: Cornell University Press, 2002)

Feminae, *Disabled Beggar Child* (2012) <http://inpress.lib.uiowa.edu/Feminae/DetailsPage.aspx?Feminae_ID=41155> [accessed September 2020]

Ferrando, Francesca, *Humans, Cyborgs, Posthumans: Lecture at TEDx SiliconAlley* (2013) <https://www.youtube.com/watch?v=RGjMUw03Bv0'> [accessed 12th June 2018]

Finkelstein, Vic, 'Disability: An Administrative Challenge? (The Health and Welfare Heritage)', in *Social Work – Disabling People and Disabling Environments*, ed. by Michael Oliver (London: Jessica Kingsley Publishers, 1991), pp. 63–77

Finkelstein, Vic, *Attitudes and Disabled People: Issues for Discussion* (New York: World Rehabilitation Fund, 1980)

Finucane, Ronald C., *Miracles and Pilgrims: Popular Beliefs in Medieval England* (New York: St. Martin's Press, 1995)

Fleming, E. McClung, 'Artifact Study: A Proposed Model', *Winterthur Portfolio*, 9 (1974), 153–73

Forrer, Robert, 'Die Eiserne Hand von Balbronn (Elsaß)', in *Zeitschrift für historische Waffen- und Kostümkunde: Organ des Vereins für Historische Waffenkunde*, ed. by Erich Haenel (Dresden: Budarch, 1915), pp. 102–107

Frohne, Bianca, 'Performing Dis/ability? Constructions of 'Infirmity' in Late Medieval and Early Modern Life Writing', in *Infirmity in Antiquity and the Middle Ages: Social and Cultural Approaches to Health, Weakness, and Care*, ed. by Christian Krötzl, Katariina Mustakallio and Jenni Kuuliala (Farnham: Ashgate, 2015), pp. 51–65

Furtado, Antonio L., Paulo A. S. Veloso, 'Folklore and Myth in "The Knight of the Cart"', *Arthuriana*, 6:2 (1996), 28-43

Geldof, Mark, 'The Pike and the Printing Press: Military Handbooks and the Gentrification of the Early-Modern Military Revolution', in *International Exchange in the Early Modern Book World*, ed. by Matthew McLean and Sara Barker (Leiden: Brill, 2016), pp. 147–68

Gerber, David A., 'Preface to the Enlarged and Revised Edition: The Continuing Relevance of the Study of Disabled Veterans', in *Disabled Veterans in History*, ed. by David A. Gerber (Ann Arbor: Michigan University Press 2012), pp. ix–xxiii

Gerritsen, Anne, Giorgio Riello, 'Introduction: Writing Material Culture History', in *Writing Material Culture History*, ed. by Anne Gerritsen and Giorgio Riello (London: Bloomsbury, 2014), pp. 1–14

Gianoli, Luigi, *Horses and Horsemanship Through the Ages* (New York: Crown Publishers, 1969)

Gifford, D. J., 'Iconographical Notes Towards the Definition of the Medieval Fool', *Journal of the Warburg and Courtauld Institutes*, 37 (1974), 336–342

Gilchrist, Roberta, *Medieval Life: Archaeology and the Life Course* (Woodbridge: The Boydell Press, 2012)

Gillibrand, Rachael, ''Sans Everything': Late Medieval Representations of the Aged Female Body' (Unpublished Masters Dissertation, University of Leeds, 2015)

Gleeson, Brendan, *Geographies of Disability* (London: Routledge, 1999)

Gordon, Sarah, 'Representations of Aging and Disability in Early-Sixteenth-Century French Farce', in *Old Age in the Middle Ages and the Renaissance: Interdisciplinary Approaches to a Neglected Topic*, ed. by Albrecht Classen (Berlin: Walter De Grutyer, 2007), pp. 421–436

Gougoux, Frederic, Franco Lepore, Maryse Lassonde, Patrice Voss, Robert J. Zatorre and Pascal Belin, 'Pitch Discrimination in the Early Blind', *Nature*, 430:309 (2004), 309–10

Green, David, 'Masculinity and Medicine: Thomas Walsingham and the Death of the Black Prince', *Journal of Medieval History*, 35:1 (2009), 34–51

Green, Monica, 'The Value of Historical Perspective', in *The Ashgate Research Companion to the Globalization of Health*, ed. by Ted Schrecker (Farnham: Ashgate, 2012), pp. 17–38

Green, Monica, 'Bodily Essences: Bodies as a Category of Difference', in *A Cultural History of the Human Body in the Medieval Age*, ed. by Linda Kalof (Oxford: Berg, 2010), pp. 149–72

Grigsby, Byron Lee, *Pestilence in Medieval and Early Modern English Literature* (London: Routledge, 2004)

Grössinger, Christa, *The World Upside Down: English Misericords* (London: Harvey Miller, 1996)

Guenée, Bernard, *La folie de Charles VI: Roi Bien-Aimé (*Paris: CNRS Editions, 2018)

Guffey, Elizabeth, *Designing Disability: Symbols, Space and Society* (London: Bloomsbury, 2018)

Guffey, Elizabeth, 'The Scandinavian Roots of the International Symbol of Access', *Design and Culture*, 7:3 (2015), 357–376

Guide Dogs for the Blind Association, *History* (2019) <https://www.guidedogs.org.uk/about-us/what-we-do/the-history-of-guide-dogs/> [accessed February 2019]

Hähn, Cathrin, 'Mobility Limitations and Assistive Aids in the Merovingian Burial Record', in *New Approaches to Disease, Disability and Medicine in Medieval Europe*, ed. by Erin Connelly and Stefanie Künzel (Oxford: Archaeopress Publishing Ltd., 2018), pp. 31–42

Hanley, Stephen, 'Optical Symbolism as Optical Description: A Case Study of Canon van der Paele's Spectacles', *Journal of Historians of Netherlandish Art*, 1:1 (2009), pp. 1–21

Haraway, Donna, 'A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s', in Donna Haraway, *The Haraway Reader* (New York: Routledge, 2004), pp. 7–45

Haraway, Donna, *From Cyborgs to Companion Species: Lecture as the 2003–2004 Avenali Chair in the Humanities at the Townsend Center for the Humanities, UC Berkeley* (2004) <https://www.youtube.com/watch?v=Q9gis7-Jads> [accessed June 2018]

Haraway, Donna, *The Companion Species Manifesto: Dogs, People and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003)

Harris, Max, *Sacred Folly: A New History of the Feast of Fools* (Ithaca: Cornell University Press, 2011)

Harrison, Freya, et al., 'A 1,000-Year-Old Antimicrobial Remedy with Antistaphylococcal Activity', *MBio*, 6:4 (2015), 1–7

Hart, Lynette A., Mariko Yamamoto, 'Dogs as Helping Partners and Companions for Humans', in *The Domestic Dog: Its Evolution, Behaviour, and Interactions with People*, ed. by James Serpell (Cambridge: Cambridge University Press, 2017), pp. 247–270

Hawkins, Joy, 'Sights for Sore Eyes', in *On Light*, ed. by K. P. Clarke and Sarah Baccianti (Oxford: Society for the Study of Mediaeval Languages and Literatures, 2014), pp. 137–156

Hawkins, Joy, 'Seeing the Light? Blindness and Sanctity in Later Medieval England', in *Saints and Sanctity*, Studies in Church History, 47, ed. by Peter Clarke and Tony Claydon (Woodbridge: The Ecclesiastical History Society by The Boydell Press, 2011), pp. 148–158

Hawkins, Joy, 'The Blind in Later Medieval England: Medical, Social and Religious Responses' (Unpublished Doctoral Dissertation, University of East Anglia, 2011)

Hendren Sara, *An Icon is a Verb: About the Project* (2016) <http://accessibleicon.org/#an-icon-is-a-verb> [accessed November 2019]

Herman, Bernard, *The Stolen House* (Charlottesville: University of Virginia Press, 1992)

Hernigou, Philippe, 'History of Clubfoot Treatment, Part I: From Manipulation in Antiquity to Splint and Plaster in Renaissance before Tenotomy', *International Orthopaedics*, 41:8 (2017), 1693–1704

Hernigou, Philippe, 'Medieval Orthopaedic History in Germany: Hieronymus Brunschwig and Hans von Gersdorff', *International Orthopaedics*, 39:10 (2015), 2081–2086

Hernigou, Philippe, 'Crutch Art Painting in the Middle Ages as Orthopaedic Heritage (Part II: The Peg Leg, the Bent-knee Peg and the Beggar)', *International Orthopaedics*, 38:7 (2014), 1535–1542

Hernigou, Philippe, 'Crutch Art Painting in the Middle Ages as Orthopaedic Heritage (Part I: The Lepers, the Poliomyelitis, the Cripples)', *International Orthopaedics*, 38:6 (2014), 1329–1335

Hernigou, Philippe, 'Ambroise Paré IV: The Early History of Artificial Limbs (from Robotic to Prostheses)', *International Orthopaedics*, 37:6 (2013), 1195–1197

Hernigou, Philippe, 'Ambroise Paré III: Paré's Contributions to Surgical Instruments and Surgical Instruments at the time of Ambroise Paré', *International Orthopaedics*, 37:5 (2013), 975–980

Hernigou, Philippe, 'Ambroise Paré II: Paré's Contributions to Amputation and Ligature', *International Orthopaedics*, 37:4 (2013), 769–772

Hernigou, Philippe, 'Ambroise Paré's Life (1510–1590)', *International Orthopaedics*, 37:3 (2013), 543–547

Hicks, Michael, *Richard III: The Man Behind the Myth* (London: Collins & Brown Ltd, 1991)

Horn, Jennifer van, *The Power of Objects in Eighteenth-Century British America* (Chapel Hill: University of North Carolina Press, 2017)

Hornback, Robert, *The English Clown Tradition from the Middle Ages to Shakespeare* (Woodbridge: D. S. Brewer, 2013)

Hsy, Jonathan, 'Disability', in *The Cambridge Companion to the Body in Literature*, ed. by David Hillman and Ulrika Maude (Cambridge: Cambridge University Press, 2015), pp. 24–40

Illardi, Vincent, *Renaissance Vision: From Spectacles to Telescopes* (Philadelphia: American Philosophical Society, 2007)

Imrie, Rob, *Disability and the City: International Perspectives* (London: Paul Chapman Publishing, 1996)

International Guide Dog Federation, *History of Guide Dogs* (2019) <https://www.igdf.org.uk/about-us/facts-and-figures/history-of-guide-dogs/> [accessed February 2019]

Irwin, Raymond, *The English Library: Sources and History* (London: George Allen and Unwin, 1966)

Jacobsen, A. L., 'A Cripple from the Late Middle Ages', *Ossa: International Journal of Skeletal Research*, 5 (1978), 17–24

Jaquet, Daniel, *Hans Talhoffer's Fight Book, a Sixteenth-Century Manuscript about the Art of Fighting* (2018) <https://www.metmuseum.org/toah/hd/fight/hd_fight.htm> [accessed December 2019]

Jaritz, Gerhard, 'Poverty Constructions and Material Culture', in *The Sign Language of Poverty: International Round Table-Discussion Krems an Der Donau October 10 and 11, 2006*, ed. by Gerhard Jaritz (Vienna: Austrian Academy of Sciences Press, 2007), pp. 7–18

Jensenius, Alexander Refsum, *Disciplinarities: Intra, Cross, Multi, Inter, Trans* (2012) <https://www.arj.no/2012/03/12/disciplinarities-2/> [accessed January 2020]

Johnson, Liz, Eileen Moxon, 'In Whose Service? Technology, Care and Disabled People: The Case for a Disability Politics Perspective', in *Disability and Technology: Key Papers from Disability and Society*, ed. by Alan Roulstone, Alison Sheldon and Jennifer Harris (London: Routledge, 2015), pp. 10–27

Jonge, Desleigh de, Marcia Scherer and Sylvia Rodger, *Assistive Technology in the Workplace* (St. Louis: Mosby Elsevier, 2007)

Juárez-Almendros, Encarnación, *Disabled Bodies in Early Modern Spanish Literature: Prostitutes, Aging Women and Saints* (Liverpool: Liverpool University Press, 2017)

Junior, Nyasha, Jeremy Schipper, 'Disability Studies and the Bible', in *New Meanings for Ancient Texts: Recent Approaches to Biblical Criticisms and Their Applications*, ed. by Steven L. McKenzie and John Kaltner (London: John Knox Press, 2013), pp. 21–37

Jusserand, J. J., *English Wayfaring Life in the Fourteenth Century*, trans. by Lucy Smith (New York: Putnam's Sons, 1931)

Kahlow, Simone, 'Prosthesen im Mittelalter – ein Überblick aus archäologischer Sicht', in *Homo debilis. Behinderte – Kranke – Versehrte in der Gesellschaft des Mittelalters*, ed. by Cordula Nolte (Korb: Didymos-Verlag, 2009), pp. 203–223

Kamenetz, Herman L., 'A Brief History of the Wheelchair', *Journal of the History of Medicine and Allied Sciences*, 24:2 (1969), 205–210

Karpinski, Otto, *Studien über künstliche Glieder: im Auftrage des Königlich Preussischen Kriegs-Ministeriums* (Berlin: Mittler, 1881)

Karras, Ruth, *From Boys to Men: Formations of Masculinity in Late Medieval Europe (*Philadelphia: University of Pennsylvania Press, 2002)

Karsten, Angela, et. al., *Waterlogged Organic Artefacts Guidelines on their Recovery, Analysis and Conservation* (Swindon: English Heritage Publishing, 2012)

KDF Leeds, *Homepage* (2018) <http://www.kdfleeds.co.uk/> [accessed July 2018]

Keune, Katrien, J. J. Boon, 'Analytical Imaging Studies Clarifying the Process of the Darkening of Vermilion in Paintings', *Analytical Chemistry*, 77 (2005), 4742–4750

Kibblewhite, Mark, Gergely Tóth and Tamás Hermann, 'Predicting the Preservation of Cultural Artefacts and Buried Materials in Soil', *Science of the Total Environment*, 5:9 (2015), 249–263

Kirkup, John R., *A History of Limb Amputation* (New York: Springer, 2007)

Klaniczay, Gabor, 'The Sign Language of the "Pauperes Christi"', in *The Sign Language of Poverty: International Round Table-Discussion Krems an Der Donau October 10 and 11, 2006*, ed. by Gerhard Jaritz (Vienna: Austrian Academy of Sciences Press, 2007), pp. 201–220

Kluge, Carl Alexander Ferdinand, Hermann Eduard Fritze, *Arthroplastik Oder Die Sämmtlichen, Bisher Bekannt Gewordenen Künstlichen Hände Und Füsse, Zum Ersatz Dieser Verloren Gegangenen Gliedmassen: Mit 26 In Stein Gravirten Tafeln* (Lemgo: Verlag der Meyer'schon Hof-Buchhundlund, 1842)

Knight, Leah, *Reading the Colour Green in Early Modern England* (London: Routledge, 2014)

Kostick, Conor, *The Social Structure of the First Crusade* (Leiden: Brill, 2008)

Kuuliala, Jenni, *Childhood Disability and Social Interaction in the Middle Ages: Constructions of Impairments in Thirteenth- and Fourteenth-Century Canonization Processes* (Turnhout: Brepols, 2016)

Kuuliala, Jenni, "Heavenly Healing or Failure of Faith? Partial Cures in Later Medieval Canonization Processes' in *Church and Belief in the Middle Ages: Popes, Saints, and Crusaders*, ed. by Kirsi Salonen and Sari Katajala-Peltomaa (Amsterdam: Amsterdam University Press, 2016), pp. 171–200

Kuuliala, Jenni, 'Nobility, Community and Physical Impairment in Later Medieval Canonization Processes', in *Infirmity in Antiquity and the Middle Ages: Social and Cultural Approaches to Health, Weakness and Care*, ed. by Christian Krötzl, Katariina Mustakallio and Jenni Kuuliala (London: Routledge, 2016), pp. 67–82

Laes, Christian, 'Pedes habent et not ambulabunt: Mobility Impairment in Merovingian Gaul', in *Travel, Pilgrimage and Social Interaction from Antiquity to the Middle Ages*, ed. by Jenni Kuuliala and Jussi Rantala (London: Routledge, 2020), pp. 183–204

Le Goff, Jacques, *Medieval Civilisation 400–1500*, trans. by Julia Barrow (Oxford: Blackwell, 1988)

Lewis, M. J. T., 'The Origins of the Wheelbarrow', *Technology and Culture*, 35:3 (1994), 453–475

Liat, Ben-Moshea, Justin J. W. Powell, 'Sign of Our Times? Revis(it)ing the International Symbol of Access', *Disability & Society*, 22:5 (2007), 489–505

Lie, Ida Kamilla, "Make Us More Useful to Society!' The Scandinavian Design Students' Organization (SDO) and Socially Responsible Design, 1967–1973', *Design and Culture*, 8:3 (2016), 327–361

Lifshitz, Felice, 'A Cyborg Initiation? Liturgy and Gender in Carolingian East Francia', in *Paradigms and Methods in Early Medieval Studies*, ed. by Celia Chazelle and Felice Lifshitz (Basingstoke: Palgrave Macmillan, 2007), pp. 101–117

Lindberg, David C., *Theories of Vision from Al-Kindi to Kepler* (Chicago: University of Chicago Press, 1976)

Löffler, Liebhard, *Der Ersatz für die obere Extremität: die Entwicklung von den ersten Zeugnissen bis heute* (Stuttgart: Enke, 1984)

Lubin, Helen, *Worcester Cathedral Publications 1: The Worcester Pilgrim* (Worcester: West Mercian Archaeological Consultants, 1990)

Magnusen, Kaia L., '"Those Who Dance in Such a Way:" Linking Gesture and Judgement in the *Danse Macabre des Femmes*', in *Reflections on Medieval and Renaissance Thought*, ed. by Darci Hill (Cambridge: Cambridge Scholars Publishing, 2017), pp. 6–20

Margolin, Jean-Claude, 'Des lunettes et des hommes ou la satire des mal-voyants au XVIe siècle', *Annales: Economies, Sociétés, Civilisations*, 2–3:30 (1975), 375–393

Martin, A. Lynn, 'Old People, Alcohol and Identity in Europe, 1300–1700', in *Food, Drink and Identity: Eating and Drinking in Europe since the Middle Ages*, ed. by Peter Scholliers (Oxford: Berg, 2011), pp. 119–37

Massey, Anne, *Chair* (London: Reaktion Books, 2011)

Matte, Brian, *Carve a Staff/Walking Stick* (2009) <http://www.instructables.com/id/Whittle-a-Staff--Walking-Stick/> [accessed September 2017]

Matthies, Andrea L., 'The Medieval Wheelbarrow', *Technology and Culture*, 32:2 (1991), 356–364

Mays, Simon, *The Archaeology of Human Bones* (New York: Routledge, 1998)

McClanan, Anne L., Karen Rosoff Encarnacion (eds.), *Material Culture of Sex, Procreation and Marriage in Premodern Europe* (New York: Palgrave, 2002)

Menache, Sophie, 'Dogs: God's Worst Enemies?', *Society and Animals*, 5:1 (1997), 23–44

Metzler, Irina, *Fools and Idiots? Intellectual Disability in the Middle Ages* (Manchester: Manchester University Press, 2016)

Metzler, Irina, 'Have Crutch, Will Travel: Disabled People on the Move in Medieval Europe', in *Travels and Mobilities in the Middle Ages: From the Atlantic to the Black Sea*, ed. by Marianne O'Doherty and Felicitas Schmeider (Turnhout: Brepols, 2015), pp. 91–117

Metzler, Irina, *A Social History of Disability in the Middle Ages: Cultural Considerations of Physical Impairment* (New York: Routledge, 2013)

Metzler, Irina, 'Disability in the Middle Ages: Impairment at the Intersection of Historical Inquiry and Disability Studies', *History Compass*, 9:1 (2011), 45–60

Metzler, Irina, *Disability in Medieval Europe: Thinking about Physical Impairment in the High Middle Ages, c.1100–c.1400* (London: Routledge, 2006)

Miller, Timothy, John Nesbitt, *Walking Corpses: Leprosy in Byzantium and the Medieval West* (Ithaca: Cornell University Press, 2014)

Monguilod, Cristina Pallí, 'Difference that Matter: On Love in the Kennel of Life', *Athenea Digital*, 10 (2006), 250–258

Montgomery, C. F., 'The Connoisseurship of Artefacts', in *Material Culture Studies in America*, ed. by T. J. Schlereth (Nashville: AASLH Press, 1982), pp. 143–52

More, Max, 'Transhumanism: Towards a Futurist Philosophy', *Extropy*, 6:1 (1990), 6–12

Morey, Darcy, 'Burying Key Evidence: The Social Bonds Between Dogs and People', *The Journal of Archaeological Science*, 33:2 (2006), 158–175

Morey, Darcy, 'The Early Evolution of the Domestic Dog', *American Scientist*, 82:4 (1994), 336–347

Morgan, Susan, 'Body Symbolism in the Book of Margery Kempe', *New Blackfriars*, 76:897 (1995), 426–440

Moritz, Tilamn G., *Autobiographik als ritterschaftliche Selbstverständigung: Ulrich von Hutten, Götz von Berlichingen, Sigmund von Herberstein* (Göttingen: Vandenhoeck & Ruprecht, 2019)

Mollat, Michel, *The Poor in the Middle Ages*, trans. by Arthur Goldhammer (New Haven: Yale University Press, 1986)

Moulton, Ian Frederick, '"A Monster Great Deformed": The Unruly Masculinity of Richard III', *Shakespeare Quarterly*, 47:3 (1996), 251–268

Moxey, Keith P. F., 'Pieter Bruegel and The Feast of Fools', *The Art Bulletin*, 64:4 (1982), 640–646

Munby, Julian, 'From Carriage to Coach: What Happened?', in *The Art, Science, and Technology of Medieval Travel*, ed. by Robert Odell Bork and Andrea Kann (Aldershot: Ashgate, 2008), pp. 41–54

Murray, Stuart, *Disability and the Posthuman: Bodies, Technology and Cultural Futures* (Liverpool: Liverpool University Press, 2020)

Museum Eisfeld, *Eiserne Hand* (2018) <http://www.museen.thueringen.de/Objekt/DE-MUS-868915/lido/dc00001376> [accessed August 2018]

National Archives, *Currency Converter* (2017) <http://www.nationalarchives.gov.uk/currency-converter/#currency-result> [accessed January 2020]

Neal, Derek, *The Masculine Self in Late Medieval England* (Chicago: University of Chicago Press, 2004)

Neuhaus, Volker, 'Götz von Berlichingen', in *Goethe Handbuch*, ed. by Theo Buck (Stuttgart: J.B. Metzler, 1996), pp. 78–99

Newman, Paul B., *Travel and Trade in the Middle Ages* (Jefferson: McFarland & Company, Inc., 2011)

NHS, *Long-Sightedness* (2019) <https://www.nhs.uk/conditions/long-sightedness/> [accessed May 2019]

NHS, *Squint* (2019) <https://www.nhs.uk/conditions/squint/> [accessed May 2019]

Nias, Kay, *History of the Wheelchair* (2019) <https://blog.sciencemuseum.org.uk/history-of-the-wheelchair/> [accessed September 2019]

Nichols, Tom, *The Art of Poverty: Irony and Ideal in Sixteenth-Century Beggar Imagery* (Manchester: Manchester University Press, 2007)

North, John, *God's Clockmaker: Richard of Wallingford and the Invention of Time* (London: Hambledon Continuum, 2005)

Oliver, Michael, *The Politics of Disablement* (Basingstoke: McMillan, 1990)

Open Bionics, *Hero Arm* (2019) <https://openbionics.com/hero-arm/> [accessed March 2019].

O'Tool, Mark P., 'Disability and the Suppression of Historical Identity: Rediscovering the Professional Backgrounds of the Blind Residents of the Hôpital des Quinze-Vingts', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyer (Farnham: Ashgate, 2010), pp. 11–24

Ott, Katherine, 'Material Culture, Technology, and the Body in Disability History', in *The Oxford Handbook of Disability History*, ed. by Michael Rembis, Catherine Kudlick and Kim E. Nielsen (Oxford: Oxford University Press, 2018), pp. 125–141

Owst, Gerald, *Literature and Pulpit in Medieval England* (Cambridge: Cambridge University Press, 1933)

Oxford Dictionary of National Biography, *Paget [Formerly Bayly], Henry William, First Marquess of Anglesey (1768–1854)* (2008) <http://www.oxforddnb.com.wam.leeds.ac.uk/view/10.1093/ref:odnb/9780198614128.001.0001/odnb-9780198614128-e-21112?rskey=mwQipE&result=2> [accessed September 2018]

Oxford English Dictionary, *Crutch* (2010) <http://0-www.oed.com.wam.leeds.ac.uk/view/Entry/45320?rskey=Cn3fyl&result=1#eid> [accessed August 2017]

Oxford English Dictionary, *Techne* (2010) <https://www.oed.com/view/Entry/273538?rskey=Bbc2MM&result=1&isAdvanced=false#eid> [accessed November 2019]

Oxford English Dictionary, *Prosthesis* (2007) <http://0-www.oed.com.wam.leeds.ac.uk/view/Entry/153069?redirectedFrom=prosthesis&> [accessed August 2018]

Oxford English Dictionary, *Spectacle* (1989) <https://www.oed.com/view/Entry/186057?rskey=vW3wt3&result=1&isAdvanced=false#eid> [accessed May 2019]

Parliamentary and Health Service Ombudsman, *Introduction to the Social and Medical Models of Disability* (2018) <https://www.ombudsman.org.uk/sites/default/files/FDN-218144_Introduction_to_the_Social_and_Medical_Models_of_Disability.pdf> [accessed January 2018]

Parlopiano, Brandon, 'Propter Deformitatem: Towards a Concept of Disability in Medieval Canon Law', *Canadian Journal of Disability Studies*, 4:3 (2015), 72–102

Pattison, Bonnie L., *Poverty in the Theology of John Calvin* (Eugene, OR: Pickwick Publications, 2006)

Peacock, Martha Moffitt, 'Proverbial Reframing: Rebuking and Revering Women in Trousers', *The Journal of the Walter's Art Gallery*, 57 (1999), 13–34

Pearman, Tory Vandeventer, *Women and Disability in Medieval Literature* (New York: Palgrave Macmillan, 2010)

Pearman, Tory Vandeventer, 'Disruptive Dames: Disability and the Loathly Lady in the Tale of Florent, the Wife Of Bath's Tale, and the Weddynge Of Sir Gawain And Dame Ragnelle', in *The Treatment of Disabled Persons in Medieval Europe: Examining Disability in the Historical, Legal, Literary, Medical, and Religious Discourses of the Middle Ages*, ed. by Wendy Turner and Tory Vandeventer Pearman (Lewiston: Edwin Mellen Press, 2010), pp. 291–312

Pearman, Tory Vandeventer, "O Sweete Venym Queynte!' Pregnancy and the Disabled Female Body in the Merchant's Tale', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyler (Farnham: Ashgate, 2010), pp. 25–38

Phelpstead, Carl, 'Hair Today, Gone Tomorrow: Hair Loss, the Tonsure, and Masculinity in Medieval Iceland', *Scandinavian Studies*, 85:1 (2013), 1–9

Phillips, Gordon, *Best Foot Forward: Chas. A. Blatchford & Sons, Ltd. – Artificial Limb Specialists, 1890–1990 (*London: Granta Editions, 1990)

Phillpott, Matt, review of *Society in Early Modern England: The Vernacular Origins of Some Powerful Ideas*, by Phil Withington (Cambridge: Polity Press, 2010) (2010) <https://reviews.history.ac.uk/review/1011> [accessed January 2020].

Pietrini, Sandra, 'Medieval Fools in Biblical Iconography', *Medieval English Theatre*, 24 (2002), 79–103

Piggott, Stuart, *Wagon, Chariot and Carriage: Symbol and Status in the History of Transport* (London: Thames and Hudson, 1992)

Plantzos, Dimitris, 'Crystals and Lenses in the Graeco-Roman World', *American Journal of Archaeology*, 100:3 (1997), 451–464

Pope Simmons, Elizabeth, 'The Rejection of the Manege Tradition in Early Modern England: "Equestrian Elegance at Odds with English Sporting Tradition"' (Unpublished Doctoral Thesis, University of North Florida, 2011)

Prown, Jules David, 'The Truth of Material Culture: History or Fiction?', in *History from Things: Essays on Material Culture*, ed. by Steven Lubar and W. David Kingery (Washington, D. C.,: Smithsonian Institution Press, 1995), pp. 1–19

Pullin, Graham, *Design Meets Disability* (Cambridge, MA: The MIT Press, 2009)

Quasigroch, Günter, 'Die Handprothesen des fränkischen Reichsritters Götz von Berlichingen. 1. Fortsetzung: Die Ersthand', *Waffen- und Kostümkunde*, 24 (1982), 17–33

Randall, Lilian M. C., *Images in the Margins of the Gothic Manuscript* (Berkley: University of California Press, 1966)

Ravneberg, Bodil, Sylvia Söderström, *Disability, Society and Assistive Technology* (London: Routledge, 2017)

Rawcliffe, Carole, 'Town Tykes and Butchers' Hounds: Urban Dogs at Work in the Later Middle Ages', *Medieval Prosopography*, 33:1 (2018), pp. 1–13

Rawcliffe, Carole, *Leprosy in Medieval England* (Woodbridge: Boydell, 2006)

Remnant, G. L., *A Catalogue of Misericords in Great Britain* (Oxford: Clarendon Press, 1969)

Resnick, I. M., 'Ps.-Albert the Great on the Physiognomy of Jesus and Mary', *Medieval Studies*, 64 (2002), 217–40

Retief, Marno, Rantoa Letšosa, 'Models of Disability: A Brief Overview', *HTS Teologiese Studies/Theological Studies*, 74:1 (2018), 1–8

Rexworth, Frank, *Deviance and Power in Late Medieval London*, trans. by Pamela E. Selwyn (Cambridge: Cambridge University Press, 2007)

Rhodes, Michael, 'A Pair of Fifteenth-Century Spectacle Frames from the City of London', *Antiquaries Journal*, 62:1 (1982), 57–73

Richardson, Kristina, 'Drug Overdose, Disability and Male Friendship in Fifteenth-Century Mamluk Cairo', *Postmedieval: A Journal of Medieval Cultural Studies*, 3:2 (2012) 168–181

Richardson, Kristina, *Difference and Disability in the Medieval Islamic World: Blighted Bodies* (Edinburgh: Edinburgh University Press, 2012)

Robinson, Nathan, *A Rare German Prosthetic Hand* (2006) <http://myarmoury.com/talk/viewtopic.php?t=7161> [accessed August 2018]

Roelofsen, Mathijs, *An Iron Hand for a Master Gunner Injured in the Burgundian Wars* (2019) <https://martcult.hypotheses.org/331> [accessed January 2020]

Ronchi, Vasco, *Optics: The Science of Wisdom*, trans. by Edward Rosen (New York: New York University Press, 1957)

Rosen, Edward, 'The Invention of Eyeglasses', *Journal of the History of Medicine and Allied Sciences*, 11:1 (1956), 13–46

Rosen, Edward, 'Did Roger Bacon Invent Glasses?', *Archives internationales d'histoire des sciences*, 7:26 (1954), 3–15

Roulstone, Alan, *Disability and Technology: An Interdisciplinary and International Approach* (London: Palgrave Macmillan, 2016)

Row-Heyveld, Lindsay, *Dissembling Disability in Early Modern Drama* (New York: Palgrave MacMillan, 2018)

Royal Armouries, *Horse Armour (1515)* (2018) <https://collections.royalarmouries.org/object/rac-object-2629.html> [accessed 1st December 2018]

Royal Dutch Guide Dog Foundation, *Guide Dog Harness* (2019) <https://www.npkdesign.com/project/royal-dutch-guide-dog-foundation/> [accessed June 2019]

Rubin, Miri, *Charity and Community in Medieval Cambridge* (Cambridge: Cambridge University Press, 1987)
Rublack, Ulinka, Pamela Selwyn, 'Fluxes: The Early Modern Body and the Emotions', *History Workshop Journal*, 53:1 (2002), 1–16

Sanders, Clinton R., 'The Impact of Guide Dogs on the Identity of People with Visual Impairments', *Anthrozoös*, 13:3 (2000), 131–139

Sanga, Panna, Adolph H. Giesecke, et al., 'History of Trauma', in *Trauma: Emergency Resuscitation, Perioperative Anaesthesia, Surgical Management*, vol. 1, ed. by William C. Wilson, Christopher M. Grande and David B. Hoyt (Boca Raton: Taylor and Francis, 2007), pp. 1–24

Sapey, Bob, John Stewart and Glenis Donaldson, 'Increases in Wheelchair Use and Perceptions of Disablement', in *Disability and Technology: Key Papers from Disability and Society*, ed. by Alan Roulstone, Alison Sheldon and Jennifer Harris (London: Routledge, 2015), pp. 97–113

Saussure, Ferdinand de, *Course in General Linguistics*, ed. by Charles Bally and Albert Sechehaye, trans. by Wade Baskin (New York: McGraw-Hill Book Company, 1966)

Sayers, Edna Edith, 'Experience, Authority and the Mediation of Deafness: Chaucer's Wife of Bath', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyler (Farnham: Ashgate, 2010), pp. 81–92

Scarborough, Connie, *Viewing Disability in Medieval Spanish Texts: Disgraced or Graced?* (Amsterdam: Amsterdam University Press, 2018)

Schäfer, Daniel, *Old Age and Disease in Early Modern Medicine* (London: Pickering & Chatto, 2011)

Schleif, Corine, 'Albrecht Dürer between Agnes Frey and Willibald Pirckheimer', in *The Essential Dürer*, ed. by Larry Silver and Jeffrey Chipps Smith (Philadelphia: University of Pennsylvania Press), pp. 85–205

Schmidt, Olaf, Karl-Heinz Wilms and Bernd Lingelbach, 'The Visby Lenses', *Optometry and Vision Science*, 76:9 (1999), 624–630

Schwartz, Jaclyn K., et al., 'Methodology and Feasibility of a 3D Printed Assistive Technology Intervention', *Disability and Rehabilitation: Assistive Technology*, 1748–3115 (2019), 1–7

Schwyzer, Phillip, *Shakespeare and the Remains of Richard III* (Oxford: Oxford University Press, 2013)

Shahar, Shulamith, *Growing Old in the Middle Ages: 'Winter Clothes Us in Shadow and Pain'* (London: Routledge, 1996)

Shahar, Shulamith, 'Who Were Old in the Middle Ages?', *Social History of Medicine*, 6 (1993), 313–41

Shahar, Shulamith, *Childhood in the Middle Ages* (New York: Routledge, 1992)

Shakespeare, Tom, 'Cultural Representation of Disabled People: Dustbins for Disavowal?', *Disability & Society*, 9:3 (1994), 283–299

Shoham-Steiner, Ephraim, *On the Margins of a Minority: Leprosy, Madness, and Disability among the Jews of Medieval Europe*, trans. by Haim Waltzman (Detroit: Wayne State University Press, 2014)

Shoham-Steiner, Ephraim, 'Poverty and Disability: A Medieval Jewish Perspective', in *The Sign Language of Poverty: International Round Table-Discussion Krems an Der Donau October 10 and 11, 2006*, ed. by Gerhard Jaritz (Vienna: Austrian Academy of Sciences Press, 2007), pp. 75–94

Singer, Julie, *Representing Mental Illness in Late Medieval France: Machines, Madness, Metaphor* (Rochester: Boydell and Brewer, 2018)

Singer, Julie, 'Playing by Ear: Compensation, Reclamation, and Prosthesis in Fourteenth-Century Song', in *Disability in the Middle Ages: Reconsiderations and Reverberations,* ed. by Joshua Eyler (Farnham: Ashgate, 2010) pp. 39–52

Skinner, Patricia, Emily Cock, '(Dis)functional Faces: Signs of the Monstrous?', in *Monstrosity, Disability, and the Posthuman in the Medieval and Early Modern World*, ed. by Richard H. Godden and Asa Simon Mittman (London: Palgrave, 2019), pp. 85–105

Skinner, Patricia, Emily Cock (eds.), *Approaching Facial Difference: Past and Present* (London: Bloomsbury, 2018)

Skinner, Patricia, *Living with Disfigurement in Early Medieval Europe* (London: Palgrave, 2017)

Skinner, Patricia, ''Better off Dead than Disfigured'? The Challenges of Facial Injury in the Premodern Past', *Transactions of the Royal Historical Society*, 26 (2016), 25–41

Skinner, Patricia, 'Mutilation and the Law in Early Medieval Europe and India: A Comparative Study', *The Medieval Globe*, 2:2 (2016), 115–139

Skinner, Patricia, 'The Gendered Nose and its Lack: "Medieval" Nose-Cutting and its Modern Manifestations', *Journal of Women's History*, 26:1 (2014), 45–67

Skoda, Hannah, 'Representations of Disability in the Thirteenth-Century Miracles de Saint Louis', in *Disability in the Middle Ages: Reconsiderations and Reverberations*, ed. by Joshua Eyler (Ashgate: Farnham, 2010), pp. 53–66

Smith, A. Mark, 'Ptolemy, Alhazen, and Kepler and the Problem of Optical Images', *Arabic Sciences and Philosophy*, 8:1 (1998), 9–45

Snyder, Sharon L., David T. Mitchell, *Cultural Locations of Disability* (Chicago: University of Chicago Press, 2006)

Sober, Elliott, *Ockham's Razors: A User's Manual* (Cambridge: Cambridge University Press, 2015)

Solomon, Don, *Interview with N. Katherine Hayles: Preparing the Humanities for the Post Human* (2007) <http://onthehuman.org/archive/more/interview-with-n-katherine-hayles/> [accessed May 2018]

Sotheby's, *The Property of a Nobleman; Southern German, Probably Franconia, Circa 1505–1515; The Grüninger Hand* (2016) <http://www.sothebys.com/de/auctions/ecatalogue/lot.93.html/2016/old-master-sculpture-l16231> [accessed August 2019]

Spriggs, James A., 'The Worcester Pilgrim Project', in *Conservation Today*, ed. by Victoria Todd (Hertford: UCIK, 1998), p. 112

Stadt Inglostadt, *The First Wheelbarrow of the Old Schanzer* (2018) <https://www.ingolstadt.de/Home/Die-erste-Schubkarre-der-alten-Schanzer.php?object=tx,2789.5&ModID=7&FID=3052.11343.1&NavID=2789.411> [accessed January 2020]

Stagg, Kevin, 'Representing Physical Difference: The Materiality of the Monstrous', in *Social Histories of Disability and Deformity: Bodies, Images and Experiences*, ed. by David M. Turner and Kevin Stagg (London: Routledge, 2006), pp. 19–38

Stafford, Pauline, 'The Meaning of Hair in the Anglo-Norman World: Masculinity, Reform, and National Identity', in *Saints, Scholars, and Politicians: Gender as a Tool in Medieval Studies*, ed. by Mathilde van Dijk and Renée Nip (Turnhout: Brepols 2005), pp. 153–171

Stein, Claudia, *Negotiating the French Pox in Early Modern Germany* (Aldershot: Ashgate, 2009)

Stewart, Alison G., 'Printmaking', in *Medieval Germany: An Encyclopaedia*, ed. by John M. Jeep (New York: Garland Publishing, 2001), p. 631

Stiker, Henri-Jaques, *A History of Disability*, trans. by W. Sayers (Ann Arbor: University of Michigan Press, 1999)

Straub, Wolfgang, 'The First German Textbook of Ophthalmology "Augendienst" by G. Bartisch, 1583', *Documenta Ophthalmologica*, 68:1–2 (1988), 105–114

Strub, Marcel, *Les monuments d'art et d'histoire du canton de Friborg. Tome II: La Ville de Friborg* (Basel: Birkhäuser, 1956)

The British Academy, *The Dictionary of Latin from British Sources* (Turnhout: Brepolis, 1975–2013)

The Seeing Eye, *History* (2011) <http://www.seeingeye.org/about-us/history.html> [accessed February 2019]

Thompson, Jesse E., 'History of Vascular Surgery', in *Surgery: Basic Scientific and Clinical Evidence*, Second Edition, ed. by Jeffrey A. Norton, et. al. (New York: Springer, 2008), pp. 1299–1316

Tott, Ruth, *How to Make a Walking Stick* (2015) <https://homefarmer.co.uk/how-to-make-a-walking-stick/> [accessed September 2017]

Truitt, E. R., *Studies in Post-humanity 1* (2011) <http://www.medievalrobots.org/2011/08/studies-in-posthumanity-i.html> [accessed May 2018]

Truitt, E. R., 'Mysticism and Machines', *History Today*, 65:7 (2015), unpaginated

Truitt, E. R., *Medieval Robots: Mechanism, Magic, Nature, and Art* (Philadelphia: University of Pennsylvania Press, 2015)

Truitt, E. R., 'Fictions of Life and Death: Tomb Automata in Medieval Romance', *Postmedieval: A Journal of Medieval Cultural Studies*, 1:1–2 (2010), 194–198

Tschen-Emmons, James B., *Artefacts from Medieval Europe* (Santa Barbara: ABC-CLIO, 2015)

Tulloch, Isabel, 'Richard III: A Study in Medical Misrepresentation', *Journal of the Royal Society of Medicine*, 102:8 (2009), 315–323

Turner, David M., Alun Withey, 'Technologies of the Body: Polite Consumption and the Correction of Deformity in Eighteenth-Century England', *History*, 99:338 (2014), 775–796

Turner, David M., 'Introduction: Approaching Anomalous Bodies', in *Social Histories of Disability and Deformity: Bodies, Images and Experiences*, ed. by David M. Turner and Kevin Stagg (London: Routledge, 2006), pp. 1–16

Uitz, Erika, *The Legend of Good Women: Medieval Women in Towns and Cities* (Wakefield: Moyer Bell, 1990)

Ulbricht, Otto, 'Der einstellungswandel zur kindheit in Deutschland am ende des spätmittelalters (ca. 1470 bis ca. 1520)', *Zeitschrift für Historische Forschung*, 19:2 (1992), 159–187

United Nations Economic and Social Commission for Western Asia, *Accessibility for the Disabled – A Design Manual for a Barrier Free Environment* (2015) <http://www.un.org/esa/socdev/enable/designm/index.html> [accessed December 2015]

UPIAS, *The Union of the Physically Impaired Against Segregation and the Disability Alliance Discuss Fundamental Principles of Disability: Being a Summary of the Discussion Held on 22nd November 1975 and Containing Commentaries from Each Organisation* (London: The Disability Alliance, 1975)

Van Cant, Marit, 'Surviving Amputations: A Case of a Late Medieval Femoral Amputation in the Rural Community of Moorsel (Belgium)', in *Trauma in Medieval Society*, ed. by Wendy J. Turner and Christina Lee (Leiden: Brill, 2018), pp. 180–214

Van Cant, Marit, 'A Scrutiny of Osteological Analyses of Medieval Populations in the Rural Low Countries in Comparison with North-Western European Case Studies, Based on the Osteological Analysis of the Skeletal Remains from Moorsel (Belgium)' (Unpublished Masters Dissertation, Free University of Brussels, 2012)

Viallon, Marina, *Knights and Destriers: Representations and Symbolism of The Medieval Warhorse in Medieval Art* (2014) <https://mad.hypotheses.org/375> [accessed November 2018]

Vitols, Astrid, *Dictionaire des Lunettes: Historique et symbolique d'un objet culturel* (Paris: Rakuten, 1994)

Walther, Sandra, Mariko Yamamoto, Abigail Paige Thigpen, et al., 'Assistance Dogs: Historic Patterns and Roles of Dogs Placed by ADI or IGDF Accredited Facilities and by Non-Accredited U.S. Facilities', *Frontiers in Veterinary Science*, 4:1 (2017), 1–14

Walker-Meikle, Kathleen, *Medieval Dogs* (London: The British Library Publishing Division, 2013)

Walker-Meikle, Kathleen, *Medieval Pets* (Woodbridge: The Boydell Press, 2012)

Walker-Meikle, Kathleen, 'Late Medieval Pet Keeping: Gender, Status and Emotions' (Unpublished Doctoral Thesis, University College London, 2013)

Ward, Jennifer, *Women in Medieval Europe, 1200–1500* (London: Longman, 2002)

Watson, Frederick, *Civilisation and the Cripple* (New York: Arno Press, 1930)

Webb, Diana, *Medieval European Pilgrimage, c. 700–c. 1500* (Basingstoke: Palgrave, 2002)

Webb, Diana, *Pilgrims and Pilgrimage in the Medieval West* (London: I. B. Tauris, 2001)

Wheatley, Edward, 'Medieval Constructions of Blindness in Medieval England and France', in *The Disability Studies Reader*, Third Edition, ed. by Lennard Davis (London: Routledge, 2010), pp. 63–73

Wheatley, Edward, *Stumbling Blocks Before the Blind: Medieval Constructions of a Disability* (Ann Arbor: University of Michigan Press, 2010)

Wigelsworth, Jeffrey R., *Science and Technology in Medieval European Life* (London: Greenwood Press, 2006)

Wiggett-Barnard, Cindy, Henry Steel, 'The Experience of Owning a Guide Dog', *Disability and Rehabilitation*, 30:14 (2008), pp. 1014–1026

Willach, Rolf, 'The Long Road to the Invention of the Telescope', in *The Origins of the Telescope*, ed. by Albert van Helden, et al. (Amsterdam: Koninklijke Nederlandse Akademie van Wetenschappen Press, 2010), pp. 93–114

Wilson, Louise Elizabeth, 'Hagiographical Interpretations of Disability in the Twelfth-Century Miracula of St. Frideswide of Oxford', in *The Treatment of Disabled Persons In Medieval Europe: Examining Disability in the Historical, Legal,*

Literary, Medical, and Religious Discourses of the Middle Ages, ed. by Wendy Turner and Tory Vandeventer Pearman (Lewiston: Edwin Mellen Press, 2010), pp. 135–165

Winkle, Melissa, Terry K. Crowe, Ingrid Hendrix, 'Service Dogs and People with Physical Disabilities Partnerships: A Systematic Review', *Occupational Therapy International*, 19:1 (2012), pp. 54–66

Winzer, Margaret A., 'Disability and Society before the Eighteenth Century: Dread and Despair', in *The Disability Studies Reader*, First Edition, ed. by Lennard Davis (New York: Routledge, 1997), pp. 75–109

Woolgar, C. M., *The Senses in Late Medieval England* (New Haven: Yale University Press, 2006)

Wolfe, Jessica, *Humanism, Machinery, and Renaissance Literature* (Cambridge: Cambridge University Press, 2004)

Woosnam-Savage, Robert C., Kelly DeVries, 'Battle Trauma in Medieval Warfare: Wounds, Weapons and Armor', in *Wounds and Wound Repair in Medieval Culture*, ed. by Larissa Tracy and Kelly DeVries (Leiden: Brill, 2015), pp. 27–56

Young, M. J. L., J. D. Latham and R. B. Serjeant (eds.), *Religion, Learning and Science in the 'Abbasid Period* (Cambridge: Cambridge University Press, 2006)

Ziegler, Joseph, 'Text and Context: On the Rise of Physiognomic Thought in the Later Middle Ages', in *De Sion exibit lex et verbum domini di Hierusalem: Essays on Medieval Law, Liturgy, and Literature in Honour of Amnon Linder*, ed. by Yitzhak Hen (Turnhout: Brepols, 2001), pp. 159–182

Ziegler, Joseph, 'Phisonomia est lex nature: On the Nature of Character and Behaviour in Late Medieval Physiognomy', in *La nature comme source de la morale au Moyen Âge, Micrologus Library, 58*, ed. by Maaike van der Lugt (Florence: Sismel – Edizioni del Galluzzo, 2014), pp. 359–382

Zimmerman, Leo M., Ilza Veith, *Great Ideas in the History of Surgery* (San Francisco: Norman Publishing, 1993)