

SEEING THE WHOLE MAN: A VISUALIST ANALYSIS OF ARTIFICIAL LIMBS
AT THE END OF THE NINETEENTH CENTURY

By

Constance Crompton, B.A.

Toronto, Ontario

Canada

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Abstract

The thesis uses the central concerns of visual culture studies to investigate the shift towards artificial limbs that imitate the body as identified by Stephen Mihm (2002). Drawing on a modified, less utopian, form of critical discourse analysis, which recognizes the sociocultural power of the visual, this thesis interrogates the promotional literature that the A.A. Marks Company, an artificial limb manufacturer, produced between 1888 and 1920. This thesis critically analyzes the techniques used by the company to assert their authority to frame their relationship to their clients. In addition, this analysis interrogates the company's use of the technologies of vision to champion visually imitative prosthesis. The goal of this analysis is to determine how the company deployed the turn towards the imitative, and what was at stake for the producers, and consumers, as well as the wider culture in the use of imitative limbs.

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Introduction

Following the American Civil War the Surgeon General, Joseph K. Barnes, was charged with accounting for the medical and surgical needs of those involved in the fighting. *The Medical and Surgical History of the War of the Rebellion (1861-65)*, a multivolume account, was compiled by the office of the Surgeon General between 1875 and 1888. The fourth volume, issued in 1883, is a work that stands almost a foot tall and is eight inches thick. This volume provides a detailed record of each soldier who had suffered amputation during Civil War, and includes the outcome of each amputation. Many accounts are lurid, and are accompanied by graphic illustrations of bodies in need of, or undergoing, amputation. While many accounts recorded by the Surgeon General's office resulted in death, a surprising number of amputees survived the Civil War and had to be reintegrated into civilian life.

The Civil War was responsible for a drastic increase in the number of amputations performed in the United States. In 1837 there only 95 amputations took place in the United States (Phillips 1838). Less than thirty years later, as a result of the Civil War, the number would rise to almost 9,000 per year (Ott, 2002).

Following the conclusion of the Civil War, the American government was responsible for the wellbeing of an enormous number of amputees. Before the 1860s most amputations were the consequence of industrial accidents. Limbs were sometimes caught in machinery, sometimes crushed in rail yards or severed as the result of road accidents. These amputations were no fault of the government and as a result, the care and provision of artificial limbs was essentially a private concern. In contrast, following the Civil War, the government was indebted to soldiers who lost their limbs in service of

the state. The American federal government provided the funds for thousands of amputees to acquire artificial limbs. Producers of artificial limbs, such as the A.A. Marks Company, Dr. Douglas Bly and the J. E. Hanger Company, were all beneficiaries of the funding that the state provided to its amputated soldiers. These limb manufacturers capitalized on the first artificial limb that resembled the natural leg, the known as the Anglesey leg in Britain, and launched the mass-production of imitative artificial limbs in the United States.

Artificial limbs that resemble the limbs they are replacing are recent phenomena. At the beginning of the nineteenth century, imitative prosthetic limbs were uncommon in the United States. Imitative limbs were not mass-produced; anyone desiring an artificial limb would have to arrange to have it made privately. As a result, the peg-leg was the common replacement for a missing leg, the empty sleeve was the replacement for an arm. However, by the end of the nineteenth century imitative artificial limbs were commercially available to the public in abundance (Ott, 2002).

The A.A. Marks Company of New York was one of the leading manufacturers of artificial limbs in the United States following American Civil War (Mihm, 2002). Founded in 1853, the company flourished, particularly after the introduction of the Marks Rubber Foot in 1863. Headed by three partners, A.A. Marks, George E. Marks and William L. Marks, the company had developed an international client base by the time that it was purchased by Winkley Orthotics and Prosthetics in 1957.

The scope of a Master of Arts degree thesis precludes definitively locating the origin of the nineteenth century preference for the imitative (Mihm, 2002). However, it is an interest in this shift towards the imitative that informs this thesis. This project

consists of a textual and visual analysis of three promotional texts produced by the A.A. Marks Company of New York, *A Treatise on Artificial Limbs with Rubber Hands and Feet* (1888), and the *Manual of Artificial Limbs* (2nd ed, 1907, 6th ed 1920). Beyond a critical examination of images and language, this thesis is engaged with issues surrounding how these new imitative limbs represented the body they were built to resemble. The goal of this research is to determine how this turn towards the imitative was deployed and what was at stake for the various participants.

Texts consist of more than the written word. Suitable texts for analysis include conversations, images and printed material. Allied with visual culture, critical discourse analysis' focus on images and codes such as manner and fashion are of particular import to a discussion of imitative artificial limbs. Thus the public presentation of the body, and the codes that govern the reading of that self-presentation, will also serve as objects for analysis (Barthes, 1983).

This thesis brings the concerns of visual culture studies to the history of prosthetics using a modified form of critical discourse analysis in order to interrogate the shift from artificial limbs that attempted to replicate the function of the lost limb, to artificial limbs that attempted to replicate the form of the lost limb. Beginning with a literature review, Chapter 1 of this study of the imitative elucidates the issues at stake for theorists of visual culture and what those concerns offer the nascent field of the history of artificial limbs. Chapter 1 begins with an outline of the scope and purpose of visual culture studies. Visual culture has grown out of the field of art history, but with its focus on the everyday practices of vision (Mirzoeff, 2004), visual culture may be said to operate as a resistance to traditional art history. Visual culture shares many theoretical

concerns with Cultural Studies, but differs in its focus on how the scopic regimes, the culturally contingent means of seeing, are constructed. As a tool of historians, visual culture can be used to trace changes in “both representational practices and in the modes of observation” (Schwartz and Przyblyski, 2004, p. 7). Chapter 1 also includes a review of the work of medical historians with respect to artificial limbs, and concludes with an account of critical discourse analysis. While this field is still in its infancy, it has brought together the concerns of Cultural Studies, History, Sociology, English literature and Disability Studies.

Chapter 2 outlines the methods of critical discourse analysis which best enable this project to address the questions of the imitative discussed above. Drawing on the methodology and method espoused by Norman Fairclough in *Media Discourse* (1995), this thesis harnesses the practices of critical discourse analysis to critically analyze the promotional material of the A.A. Marks Company of New York. Diverging slightly from the centrality of language which marks traditional critical discourse analysis, Fairclough’s method recognizes the role of the non-textual representation in communicative events. His method links the text to the relationships and claims of authority that are constructed between the producer and consumers of the text to the larger sociocultural practices in which those relationships are embedded. Critical discourse analysis is not only engaged in elucidating these relationships and their context, but also in investigating the emancipatory potential for change within the communicative event. While this thesis is skeptical of such utopian aims, in a historical context this method requires showing the potential for agency of the consumers and producers of the text, and the stakes for society as a whole. Visual culture, with its focus on the contextual

specificities of the viewing experience, will be used to enrich and modify this method of analysis.

Chapter 3 provides an account of the events that proceeded the founding of the A.A. Marks Company, and that created the social and physical conditions for the ascendancy of visually imitative limbs. The chapter opens with an etymological history of the terms *artificial*, *limb*, and *prosthetic*. Grounding the visually imitative drive within the tradition of automata making, the chapter cites the conditions of possibility that enabled the A.A. Marks Company to mass-produce artificial limbs, namely a change in weaponry, developments in the medical field, and the policies that resulted from the American Civil War. The chapter includes an account of how the company characterizes and constructs its own authority to define its relationship with its clients.

Taking the promotional catalogues produced by the A.A. Marks Company of New York between 1888 and 1920, *A Treatise on Artificial Limbs with Rubber Hands and Feet* (1888), and the *Manual of Artificial Limbs* (2nd ed, 1907, 6th ed 1920) as the corpus for analysis, Chapter 4 provides an analysis of how the A.A. Marks Company develops a relationship with its clients through its promotional texts. The chapter consists of an exploration of the genres and techniques that the company uses to secure its authority to insist on the use of artificial limbs that resemble the ones that they are replacing.

Chapter 5 consists of an analysis of the images in the A.A. Marks Company's promotional material. While the analysis is primarily visual, it does include references to some of the images described in the text, as well as the technologies of vision mentioned in the text. The chapter situates the relationships and anxieties expressed in the texts within the larger sociocultural context of the time. By focusing on the technology that

the A.A. Marks Company uses to capture images of the body, this chapter situates the company's means of conceiving of its clients within the field of criminal anthropology. The descriptive accounts of amputees provided by the company feed into the tensions around the concealment and display of the amputated body. The chapter concludes with an examination of function the imitative limb as a device that aides the individual without a reified normative body in 'passing' as a non-amputee. Far from being a subjugation, the 'passing' function of imitative limbs is a response to the anxieties about the way the amputee destabilizes the link between innate character and appearance at the turn of the twentieth century.

The conclusion of the research suggests the potential for further studies into the development of prosthetics in the twentieth century. The sixth chapter outlines the shift in imitative limb production ushered in by cybernetic theory during the Second World War. This concluding section questions whether this shift in the means of imitating the body signals a shift in the cultural conception of the body. Any shift in the cultural comprehension of the body separates the twenty-first century from the nineteenth century drive to imitate that resulted in the limbs of manufacturers like the A.A. Marks Company.

The aim of this project is to explicate the way that the necessity of the imitative was framed by one New York City prostheticist. While this aim may seem narrow, this study will add to the growing study of the history of prosthetics, and will illustrate the potential of visual culture studies to enrich historical analysis.

Chapter One

Theoretical Foundations and Literature Review

This project uses the methodology of critical discourse analysis and the theoretical issues raised by visual culture studies in order to interrogate the functioning and motivations behind the nineteenth century move from purely practical artificial limbs, to ones that resembled the part of the body that they were replacing. This chapter will provide an introduction to the issues that are central to visual culture studies, followed by an explanation of how visual culture studies can be used in relation to critical discourse analysis. An overview of the research that has already been done into the history of prosthetics and how that history can be re-conceptualized through visual analysis will demonstrate how this project fits in the burgeoning study of the history of prosthetics.

1.1 Visual Culture

Visual culture enables a specific type of inquiry which other interdisciplinary areas of study, such as Science and Technology Studies or Sociology of the Body, do not. Visual culture studies,¹ like Cultural Studies, have grown out of the imperative of asking questions that may not be possible in more firmly established disciplines. Like Cultural Studies, visual culture studies take everyday objects and actions as objects for analysis. Unlike Cultural Studies, studies in visual culture focus on the effect of the role of the visual in the culture and historic moment in question, as a means of highlighting the

¹ Nicholas Mirzoeff (2002) has made a strong argument for the omission of the term “studies” as it relates to visual culture. He wishes to privilege the enculturated nature of vision, and to make clear that any theory emerging from visual culture (studies) is not operating outside the visual culture (of the society) that produces it. For the purposes of this thesis these two terms be used interchangeably

constructed and culturally contingent nature of vision. An interdisciplinary field of endeavor, visual culture studies has been shaped by Art History, Sociology, English Literature and Anthropology, to name but a few disciplines.

Visual culture is not a subject, or an area of analysis, nor is it strictly a discipline. Visual culture as it is conceived of here is a field. In this case, *field* is meant in its broadest sense: an expanse of theory and of objects of study that spreads across traditional and nontraditional disciplines. Thus visualists, the practitioners of visual culture, come from diverse theoretical and disciplinary backgrounds. Within the respective disciplines outlined above, the objects of interest to visual culture studies will be quite different. Visual culture studies allow a certain cross-fertilization of theory between these disciplines. Raiford Guins et al (2002) have posited that this field of study has the potential to create new cross- disciplinary communities. These communities are not fixed, as they are within a discipline. Rather, these groupings are contingent on the questions that need investigation, and the historical moment of that investigation. Although these communities bring different elements together to form new analytical tools, they are free to disband, expand or re-form based on participants' analytical needs. Visual culture as a field allows for the borders that demarcate academic communities, analytical tools, and objects of study to be drawn and re-drawn (Guins et al 2002).

Interdisciplinarity warrants further definition. It is not simply the application of one discipline's methodology to another discipline's object of study. For example, it would not do to apply the methods used in English literary analysis to critique contemporary sculpture. Interdisciplinary studies are attempting more complex articulation of theoretical issues, methods, and objects for analysis. Roland Barthes

argues in *Jeunes chercheurs* (1972) that to apply the theory and method of several disciplines to a sole object is not interdisciplinary. Rather, interdisciplinary work must find a new object of study, a new text to be read through the use of diverse theories. This new object will be revelatory, a text that has been previously unrecognized as a text (Culler 2001). Visual culture attempts to create new objects of study in order to imbue images, and other visually invested objects, with the theoretical weight often reserved for text.

In the attempt to define visual culture in the broadest possible terms, it is important not to give the impression that this field is simply amorphous, encompassing all theory and objects. Visual culture studies employs a wide range of analytical practices, as defined above, but is it not in danger of encompassing all critical work, in every academic department. Once the scope of visual culture is clear, the key is to illustrate how it is set apart from other fields of study, particularly its closest disciplinary neighbour, Cultural Studies. Although visual culture studies do not have a fixed object for analysis, they could not include investigations that were without a visual element. Since visual culture has no fixed object of study, the best way define it is to examine what it does, rather than to force a rigid definition by asking what it studies (Guins et al 2002). At its core, visual culture investigates how vision is mediated through culture, subjectivity, technology and the senses and how images are interpreted at their sites of production, circulation and consumption.

The premise of visual culture studies is two-fold. Visual culture studies acknowledge the social construction of vision as well as the visual construction of the social world. This dialectic is crucial since “we see the way that we do because we are

social animals [and] our social arrangements take the forms that they do because we are seeing animals” (Mitchell 2002, p.92). Vision is socially constructed, in that it is mediated by the viewer’s culture, past experiences, or other senses. The social world is visually constructed, particularly in western culture which values vision above the other senses (Descartes, 1988) and has consequently based scientific, social and moral schema around it. The resulting scopic regimes - or culturally contingent ways of seeing - are open for deconstruction. Visual culture is therefore invested in epistemological explorations into the cultural correlation between seeing, representation and issues of validity as well as ontological investigations into the creation of viewing subjects and the image-makers. The objects for analysis within visual culture studies are not limited to pictorial images, but also include textual images and immediate artifacts that are mediated only by the viewer.

Borrowing from Cultural Studies, visual culture questions hierarchies that pervade standard visual discourse. There are many persistent visual hierarchies suitable for visualist deconstruction, such as hierarchies of beauty or hierarchies of high art. Indeed, visual culture blurs the lines between high art and popular media. Visual culture has been able to deconstruct Art History’s narrow object of study by asserting that it is only in relation to culturally defined non-art that art has any meaning. As a result, visualists have helped open up the field to include analysis of objects that do not fall under the traditional rubric of art. Visualists take this deconstruction further and investigate how these visual hierarchies are created and maintained and how and when and where they are subject to change.

In addition, in order to grapple with the issues of the visible, visual culture makes the unseen and invisible part of its domain. Visual culture examines the shifting distinctions between the visible and the invisible. Visualist studies have questioned the reliance on vision which is the legacy of the empiricism of the Enlightenment (Mirzoeff, 2002), and the ongoing role of technologies of vision, such as microscopes and telescopes, which have been developed by the empirical tradition. Visualists also investigate which visual cues are attached to specific objects and subject positions. Visualists do not only catalogue these visual cues, but also ask how cues make objects and subject positions visible in one era but invisible in the next. They further complicate the issue by asking how the shift from visibility to invisibility and back relates to these subjects' and objects' shifting sociocultural status (Denisoff, 2004).

Since the central premise of visual culture is the mediated nature of vision, it is important to examine what those mediating forces are, not just on a cultural level but also on a physical level. Visualists argue that the act seeing is not simply a phenomena governed by biology. Although visual culture is not confined to examining the biological workings of vision, it is engaged with issues raised by vision's mediation by the other senses, and by conditions such as blindness and synesthesia – a condition in which two or more senses are linked, resulting in a sense of, for example, numbers being coloured, or sounds having particular shapes (Mitchell, 2002).

Although visual culture is often practiced within Film Studies, Fine Art, Art History, Sociology, and Media Studies, it readily lends itself to other disciplines. Most of these disciplines examine what are traditionally considered visual media (visual art, photography, film and television). However, if visual culture stays solely within these

fields, defined narrowly by these objects of study, then it will simply become a peculiarity of the academic domains listed above. Visual culture need not lose its theoretical potential by being bound to a handful of academic disciplines. Visual culture studies can cross the boundaries of these disciplines as it borrows from epistemologies created by Diaspora studies, disability studies, Cultural Studies as well as queer and gender studies (Guins et al 2002). For example, visual culture studies have provided insights into how sexuality has been made visible in the twentieth century in ways that it was not in the nineteenth century (Denisoff, 2004). Disability studies, as informed by visual culture, have included how the tensions between virile masculinity and visible, recognizable war-related injuries were negotiated following the Second World War (Serlin, 2004).

There is, fortunately, a move to employ the theories of visual culture outside the realm of the traditionally defined visual media. Visual culture is now being practiced under the rubric of English literature (Denisoff, 2004, Gallagher, 2001, Hayes, 2002), Gender and Sexuality Studies (Mulvey, 1989, Smith, 1999, Cherry, 2000), Sociology (Edwards, 2006, Ingold, 2006) and History (Schwartz and Przyblyski, 2004, Curth, 2004, Marchand, 2005). This thesis, as a history of the representation of the body by medical devices, belongs to the latter.

Although it is often institutionally housed in Art History Departments, visual culture has much to offer historians. Visualists are critical of the ornamental use of images in academic writing. Often presented without captions, these images merely decorate articles whose focus is on the analysis of a written text, census or account. Visualists would argue for the importance of the images as texts. Images, as much as

other texts, reflect the society that produced them and can offer insight that may not be available when studying other types of representation (Wilson, 2004). While many scholars who advocate for the analytical potential of visual culture do so in response to a perceived turn towards the visual in late twentieth century western culture (Mirzoeff, 1998), to assume that the sociocultural world has only recently been influenced by the image is ill advised. This study of visually imitative limbs takes this line of analysis further, by expanding the definition of 'image' to include material objects.

Visual Culture is deeply indebted to W.J.T. Mitchell, one of the first theorists to articulate visualist practice in his monograph *Picture Theory* (1994) (Denisoff, 2004). This thesis is informed by Mitchell's debate over the most productive manner to address the relationship between images, texts and the public sphere. Mitchell, who practices within the realm of Art History, is concerned with the disregard for the relationship between pictorial images and written or oral texts. However, despite his focus on the pictorial, his methodological concerns are useful to this thesis' investigation into the relationship between historical period, visual culture and the representation of the body by artificial limbs.

Visual culture studies engage with objects and images outside of the traditionally defined visual media, such as paintings, photographs, film and television. Indeed, W.T.J. Mitchell contests the usefulness of the term "visual media" since all media are mixed and rely on input from other senses and on culturally constructed perceptual practices (2002). Visuality in written texts (a medium that also relies on the vision), fashion and interior design all fall within the domain of visual culture without relying on the traditionally defined visual media. Stemming from the reliance on the visual, which is the legacy of

the Enlightenment, the visual codes are used to signal culturally appropriate modes of interaction (Simmel, 1978). Individuals learn the visual cues from appearance that tell them, for instance, what someone does for a living, or the purpose of a living room, or office, or warehouse, even if they have never visited that space before. Visuality includes more than the response to images, it deeply influences the social world (Mirzoeff, 1998).

Mitchell is critical of comparative methods of analysis between the arts. He does not wish to do away with comparative analysis, but does outline some of its potential shortcomings. He argues that comparative studies tend to reproduce rather than question standard categories of era and artistic movement. Since comparative methods tend to look for analogous use of imagery across the arts, they are more likely to reiterate and entrench narrow understanding of movements within a period in the arts, philosophy, humanities and science.² While Mitchell recognizes that may be useful to illustrate the aesthetic norms of the period under discussion, it may be more fruitful to question the necessary existence of unifying artistic movements in each period. The comparative method is also limited to examining only similarity and difference, between arts and across periods, ignoring the potential of other types of relationship. Finally, Mitchell argues, simple comparison across historical periods entrenches a dialectical and inevitable trajectory of history (Mitchell 1994).

In the analysis of the way the body is represented in artificial limbs and how that representation corresponds to broader social issues, this thesis will do well to avoid the

² For a further critique of this phenomena see "Narrativizing Visual Culture: Towards a Polycentric Aesthetics" (2002) by Ella Shohat and Robert Stam. Shohat and Stam problematize the tendency to associate modernist and postmodernist aesthetic and artistic practices with the European artistic movements of the nineteenth and twentieth centuries. They contest this era-specific reading of modernist and postmodernist practices by citing the longstanding use of modernist and postmodernist practices in sub-Saharan African and South American art and literature.

pit falls that Mitchell has pointed out. In the development and marketing mechanical limbs, there is no necessary symmetry in the relationship between artificial limbs and social trends. Mitchell's interest in other types of relationships, particularly where there is no obvious numerical correlation to measure, will inform this investigation of the representation of the body by artificial limbs at the turn of the nineteenth century.

The weakness of Mitchell's methodology is that it may be used to excuse a-historicity. While Mitchell may not intend to promote a-historical analysis, his admonition against homogenizing artistic expression based on historical movement and artistic period certainly facilitates a-historical analysis. This thesis will negotiate a balance between historical analysis and comparison, without limiting the relationship between prosthetic development in each era to one of inevitability or of simple similarity and difference.

There are theorists whose inquiry into material culture informs the theoretical foundation of this thesis, even though they do not self-identify as visualists. In his introduction to a special issue of *Critical Inquiry*, Bill Brown explores the tension between the "object" and the "thing." He questions how, through these two classifications, some items become markers of identity while others do not. He suggests that objects' materiality is routinely rendered invisible, through western culture's focus on reading objects as signs. Objects become things when they are made opaque to us through a claim on our attention. He suggests that this particular opaque object-subject relationship warrants further investigation. In language, "thing" also marks ambiguity ("that thing") and signifies the non-material object (something, anything, nothing). Brown argues for the study of this relationship, asserting that objects are no less

constructed than subjects. He explores the potential of the surrealist object, the kitsch object, and Baudrillard's postmodern object. If the thing is the object made concrete through observation, this suggests means of classifying of adaptive devices. Objects (drugs, contact lenses) are not deployed in the creation of subject positions whereas things (artificial limbs, wheel chairs) are. It is necessary to refine this distinction further, since Brown argues that objects form iconic signs whereas things do not (Brown, 2001).

Rom Harre continues the analysis of western material culture in his paper *Material Objects in Social Worlds* (2002). He asserts that modern people construct the social through discursive symbolic interaction. He interrogates social substances – those material substances whose meaning is derived from their social context, such as the 'dollar' or the 'communion wafer'. His line of questioning into how these social substances are constructed and what grammar and use is particular to them, can be fruitful in examining any object that has been rendered visible as articulated by Bill Brown (2001).

Finally, this thesis draws on theorists of the body. In his classic essay *Techniques of the Body*, originally published in 1934, Marcel Mauss argues that the way people use their bodies is culturally determined. Although movement is biological, Mauss argues that social and psychological foundations influence it. These foundations are shaped by imitation (social) and who is imitated (psychological). Therefore there is no such thing as natural or innate movement. He concludes his essay with a list of the various techniques with which each culture uses the body, including techniques for walking, sleeping, giving birth, dancing, and eating.

David Turnbull (2002) argues that the spaces humans create and the way that they encourage movement influences perception and knowledge creation. He argues that the notions of time and space and self are interconnected in the way that knowledge is developed and deployed. Citing Foucault, he argues that buildings are performed through movement, as well as through the control of movement and access. In conclusion, space and time and knowledge are linked since acceptable movements (and therefore knowledge) is inherited, and the performance that knowledge people space. Turnbull's thesis is primarily an investigation of architecture, and as such it is of particular import when considering what types of movement adaptive devices allow (whether they are artificial limbs or drugs or implants) and what types of knowledge that movement inhibits or helps to create.

1.2 Critical Discourse Analysis

Critical discourse analysis varies from discourse analysis, in that it is concerned with not only identifying the construction of identities and workings of relations of power, but also in how those relationships can be compelled to change. While some discourse analysis is strictly descriptive, critical discourse analysis describes in order to develop a method for change. Essentially utopian, critical discourse analysts, through their method, hope to unearth the relationships embedded within the text that they are analyzing. They strive to help those who might be exploited in the process develop the tools and insight to change that relationship. Norman Fairclough (1995b) has proposed a study analyzing the working of "quality [discussion] circles," discussion groups in which workers discuss ways to improve workplace efficiency with their supervisors. Fairclough suggests that despite the groups' mandate to empower workers by giving them input into

how supervisors and managers could run the workplace more efficiently, the old hierarchies are reproduced in the groups. Norman Fairclough further suggests that armed with this information, workers could choose not to participate in quality groups, since they provide insight for managers without benefit to employees (1995b).

This methodology for this thesis is a modified version on Norman Fairclough's methodology as outlined in *Media Discourse* (1995). This particular critical discourse method has the most to offer a study of the ascendance of imitative limbs. While most critical discourse analysts perform linguistic analysis at the syntactic level, Fairclough expands critical discourse methodology (1995) to focus on intertextual and sociocultural relations in the texts under analysis. Without leaving the importance of the grammatical level of language behind, this methodology allows for a historically specific analysis that takes into account the social context of text production.

Critical discourse analysis, particularly the method espoused by Norman Fairclough (1995), focuses on the role that language plays in both reflecting and shaping society. This method assumes that language is not simply a neutral communicative tool, but is instead a resource. The access to language and the power to distribute that language is not uniform, but rather is a reflection of the power relations in the larger culture. Therefore, the critical discourse analyst can use language as a barometer to detect shifts in those power relations. For the purposes of this thesis, language will not be examined in an abstract sense, but rather, it will be examined through its use, and through the communicative acts in which it is deployed. Beyond simple linguistics, this method allows for cultural analysis through an examination of the relationship of the text to both discourse practice and sociocultural practice.

Language is historically and socially positioned, both “socially shaped [and] socially shaping” (Fairclough, 1995, p. 55), which gives the historian the task not only of hermeneutic disentanglement, but also provides the opportunity to engage with the practices and discourses surrounding and embedded in the text. It is not enough to ask what the producer of a particular text meant; the sociocultural conditions in which the producers and consumers of the text were embedded must be examined as well. The text is never produced in a vacuum, without the influence of cultural forces. This methodology takes into account the orientations in the text that are “common sense,” taken for granted manifestations of power which are beyond the conscious autonomy of any text producer.

In his methodology Fairclough develops a novel and specific conception of discourse. He preserves the Foucauldian sense of discourse as the dominant paradigm that is used to construct reality which, in turn, informs the dynamics of power relations. In his definition of discourse, he also includes the linguistic sense of discourse as social actions and interaction. While the two senses are not synonymous, the marriage of the two allows discourse to refer to both the actions of individuals (as in the discourse practices outlined below) and as an overarching ideological set that governs how reality is conceived. This hinging of the two senses of discourse acknowledges the concrete effect of construction of reality on the actions and interactions of individuals.

Although Fairclough (1995) advocates approaching the text as an object of study, the entity that is being studied through the text is network of discourses at play in, and adjacent to, the discursive community represented in the text. This network, or order of discourse, is the total of all the discourses used in the context of the text. Whether as

producers or consumers, those who belong to the social domain that the text reaches will need to be familiar not only with the order of discourse used, but also the appropriate context for that usage. While the order of discourse needs to have familiar elements for the individual to orient to text, the boundaries between the various discourses manifest in the order of discourse are not fixed and can be used to create change. While some orders of discourse are static, others may be subject to shifts and creative discourse use. These shifts, Fairclough argues, are signals of the instability in relations of power that critical discourse analysts identify as potential locations of change.

There are two units that constitute the text. The first is the discourse or the way that reality (what can be taken seriously or for granted) framed in the text. The second is the way that the discourse is enacted both through the construction of text, producer and consumer identities and relations, and the genre which informs the concrete structure of the text. Both inform what can be seriously claimed within the text. For example, in a speech to the throne, the discourse is the view constructed by the political beliefs of the speaker and the genre is a political speech, and those two units confine what might seriously be said. What might be seriously said under those circumstances would differ from what might be said at, for example, an evangelical revival, where the discourse and genre are not the same as those in a speech to the throne.

Any text is responsive to and supports or deconstructs existing social identities, social relations and systems of knowledge. Although the analysis of the text might focus on any one of these three categories, it would be a mistake to leave out any of the three all together. In looking for the way in which these categories are addressed, it is important to identify the genres used in the text, and the resulting, reasonable sense-

making strategies of the text. Not all texts rely on one genre, nor do those who deploy multiple genres do so in a conventional manner. Genres may be mixed, allowing for new statements to be made about systems of knowledge, as well as social identities and relations.

Fairclough (1995) recommends a dialectical analysis of both the communicative event and the order of discourse. The communicative event includes the production and consumption of the text within the wider sociocultural context. The order of discourse includes the arrangement of genres and discourses within the text, and their relationship to other adjacent discourses. Critical discourse analysis does not allow for these two facets to be examined in isolation, instead they must be considered in relation to one another.

An examination of the first unit of analysis, the communicative event, consists of the investigation of the relationship between the text in question, its production and consumption and the sociocultural space where that production and consumption takes place. The first facet of the communicative event to be analyzed is the content and structure of the text itself. The text may be analyzed at a macro-level, with a focus on organization and structure, as well as at the micro-level of grammar and syntax. As it is difficult to unhook the form and sense of a text, as one often relies on the other, Fairclough provides a model for analysis that encompasses both the form and the sense of the text. Both the form and the sense are bound up in the construction of the “systems of knowledge and belief” as well as “social relations and social identities” (Fairclough, 1995, p. 58).

The second facet of the communicative event is the production and consumption of the text, or as Fairclough labels it, the discourse practice. This section of the analysis can consider the institutional, habitual, and cultural factors that influence the production and consumption of the text. There are two complimentary potential areas of analysis here, one examining discourse practice as it pertains to the text and the other analyzing discourse practice as it pertains to the sociocultural sphere. The discourse practice will result in the use of normative or conventional genres and senses, or in the use of those genres and senses in creative ways in response to sociocultural complexity and change.

The third facet of the communicative event is the larger sociocultural practice in which the text and its consumers and producers are embedded. The level of investigation of the sociocultural practice can vary from the immediate context surrounding the production and the consumption of the text, to the macro level with an investigation of the wider cultural, political and economic realms of the society in at large.

The second unit for analysis is the order of discourse. The order of discourse can be characterized as the way in which genres and discourses are deployed in relation to surrounding discourses. The order of discourse consists of all the discourses used with in the social arena of which the text is a part. The order of discourse is made up of several discourses which operate in relation to one another in the text. This section of the analysis must examine how a particular order of discourse, as contained within the text, is influenced by, and how it influences surrounding discourses. In outlining the operation of a particular order of discourse, the analyst may account for the stability (indicated by the conventional use of discourses and genres) and or change (indicated by the novel use of genre and discourse) within the order.

Critical discourse analyses may draw on historical sources (Wodak, 2001). The historical study of discourses adjacent to medicine, such as this thesis, serve this critical mandate by destabilizing the normative influence of medicine and health practices by exposing their constructed and changing nature.

1.3 The Emerging History of Artificial Limbs

The majority of scholarly work on the history of artificial limbs focuses on amputees who lost their limbs as the result of war (Galison, 1994, Ott, 2002, Serlin, 2003). While the majority of amputations in the first half of the twentieth century were the result of war, industrial accidents and more recently medical conditions such as diabetes now constitute the majority of causes of amputation (Branswell, 2002). Due to the specific focus of war historians, the scholarship has a tendency to slip into investigations of veterans' concerns, which fails to account for the concerns of the vast number of artificial limb users who did not lose their limbs in combat.

It is only in the last decade that artificial limbs and their users have garnered significant academic attention within social science and the humanities. Recently, there have been several articles published which focus on the chronological development of prosthetic technology. Exploratory research has been done into the chronology of the development of limbs without addressing the relationship between the technology and social forces (Benhamou, 1994, Gutfleisch, 2003, Scott and McLean, 2004). Reed Benhamou seeks to explain the contemporary prevalence of cable-operated artificial arms, which only provide the amputee with the option of an opposable hook, or a motionless cosmetic hand (Benhamou, 1994). Benhamou sets out a genealogy of the development of artificial limbs, with a particular focus on the aesthetic of pre-industrial

artificial limbs. He concludes that in order to design functional and aesthetically pleasing limbs, prosthetic designers should rely on the innovations of automata makers of the seventeenth and eighteenth century, rather than the prostheticians of the last two centuries.

Like Benhamou, Oliver Gutfleisch constructs the chronology of the development of limbs. In doing so, he reminds his readers that researchers are forced to rely on scant records and even popular myths, since the construction of artificial limbs was largely undocumented prior to the 16th century. A great deal of importance has been placed on the on the prosthetic designs of French surgeon Ambrose Pare, whose technical drawings of prostheses are among the few from the 1500s to have survived through to the 21st century. Gutfleisch's work is technical in nature, tracing the development and testing of various materials used to make artificial limbs. Gutfleisch, who lost his right leg following a car accident, approaches the history of prosthetic technology as means of community building for amputees, with a particular focus the development of prostheses for athletes (Gutfleisch, 2003).

McLean and Scott's (2004) chapter in *Powered Upper Limb Prostheses: Control, Implementation and Clinical Application* (Muzumdar, 2004), like the work of Banhamou and Gutfleisch, provides a neat chronology of construction of myoelectric limbs, but is not oriented towards the social. McLean and Scott begin with an outline of the first myoelectric limbs developed in Germany in 1945, through the Russian and American competition to develop limbs in the 1960s, to the present day. In addition to chronologies such as Scott and McLean's, articles and monographs from the medical community constitute a major resource of writings about the history of artificial limbs. They consist

of textbooks as well as technical reports of the experiments and observations of the medical community (Alter, 1966, Branswell, 2002, Muzumdar, 2004).

There is an emergent field of study, to which this thesis belongs, that examines both the prosthetic limb as a cultural artifact, and the context-contingent identity construction of amputees. Researchers in this area of study come from a variety of backgrounds including English (O'Connor) Communication Studies (Serlin, 2002, 2003, 2004), Library Sciences (McDaid 2002) and History (Herschbach, 1997, Ott, 2002, Mihm, 2002). With few exceptions this area of study centres on effects of war in Europe and North America. Primarily, the analysis focuses on the experience of amputees. While some historians have tried to produce a generalizable account of the experiences of amputees (McDaid, 2002, Ott, 2002), others have examined the culturally contingent construction of amputee identity, as it relates to class, gender, sexuality, and memory (Herschbach, 1997, O'Connor, 1997, Mihm, 2002, Serlin, 2003).

This thesis is particularly indebted to the work of Stephen Mihm. In *'A Limb Shall be Presentable in Polite Society'* (2002) he theorizes the role of the imitative limb in the United States' newly industrialized north. Mihm argues that influx of new money destabilized the pre-industrial class system. Money and title were once a matter of inheritance. Among industrialists, a name was no longer proof of class standing. Mihm argues that in the industrialized city, manners were the new marker of social class. Ungainly prostheses put middle class amputee's social standing at risk and thus spurred on the development of imitative prostheses. This thesis builds on his proposition by critically analyzing prosthetic manufacturers' promotional material to provide a more

detailed account of how manufacturers drew on the culture to assure the ascendancy of artificial limbs that resembled the limbs they were replacing.

In her essay *How the One-Legged Rebel Lives* (2002) Jennifer McDaid considers the effect of amputation on former confederate soldiers. While amputated soldiers that had lost limbs in service of the state became a state concern, there was a deficit in care for amputees who had fought on the losing side of the Civil War. In order to end their reliance on the state, these former soldiers were pressed to work, despite the severe shortage of usable artificial limbs in the south. McDaid concludes that from the industrial era onwards the discourse surrounding working class amputees was centered on the amputee's ability to work.

Erin O'Connor (1997) examines the way amputation is represented in Victorian and Edwardian literature. O'Connor traces fictional accounts of amputees following the Civil War through until the turn of the century. In these accounts she identifies a discourse of dismemberment which link soundness of mind to wholeness of body. Without the whole body, the amputee is characterized as one who can neither form a complete identity, nor to enjoy the mental stimulation that accompanies the spatial sense of the whole body. In short, for the Victorians, personhood was dependant on the whole body (O'Connor, 1997, p. 744). O'Connor notes the centrality of masculinity to Victorian personhood. She concludes by exposing the assertion in the literature which suggests that amputation has a feminizing effect on the male body, and how technology has developed as a means of re-masculinizing the amputee.

Perry (2002) analyses the class tensions that carried over into the training and care of amputees in Germany following the First World War. Perry outlines the state policies

concerning prosthetics for post World War One German amputees, to the class of the amputee. The state provided limbs based on the soldier's employment before the War. Middle and upper class amputees were granted imitative limbs, whereas working class amputees were provided with limbs that that did not imitate the body, but instead consisted of tool attachments. The limbs could accommodate multiple attachments, which were chosen in accordance with the task that the amputee was performing. Working class amputees were not granted imitative arms, suggesting that the working class body was meant only for labour. Many of the attachments integrated the amputee with the machine he was working at, and thus were responsible for further injury if they could not be detached in the case of an industrial accident. In addition, amputees were pathologized as lazy and self-pitying. Those that returned to these dangerous working conditions were esteemed, which reinforced the notion that the working class body's only possible function is labour (Arendt, 1997).

David Serlin, a leader in this emerging area of study, and one of the few scholars to publish a monograph on the subject, has written extensively on the social meaning ascribed to amputation, particularly as it relates to sexuality and gender (Serlin 2002, 2003, 2004, 2006). While most of Serlin's work focuses on amputees of Second World War, much of his theorizing of the anxieties about male amputees and masculinity are pertinent to the analysis provided in the following chapters. In his book, *Replaceable you: Engineering the Body in Postwar America*, he argues that post-World War Two American amputated soldiers were made to represent the continued virility of the nation. Publicity and marketing campaigns, endorsed by spokes-amputees such Jimmy Wilson and Harold Russell, stressed male amputees' continued heterosexual vitality. As in

previous eras, war-wounded amputees were a state concern, but for the first time military technology was used by the state and the medical community to produce artificial limbs. It was following this era that cybernetic imitative prostheses would be offered to European and North American amputees.

David Serlin picks up the culturally-determined connection between amputation and gender in his article *Crippling Masculinity: Queerness and Disability in U.S. Military Culture 1800-1945* (2003). Serlin takes the Amputettes as his preliminary group for analysis. The Amputettes were a performing troupe made up of male World War Two amputees who dressed up as women to provide cabaret-style kick line for the troupes. The Amputettes, Serlin argues, were the legacy of a long history of linking disability and non-normative gender performance. Serlin concludes his chronology of the shifting categories of disability which rendered recruits unfit to serve as soldiers with the assertion that the fear of queerness has not always been a response to sexuality, but rather a response to perceived physical difference (Serlin, 2003).

Peter Galison (1994) takes the analysis typical of Serlin further by identifying the conceptual shift ushered in by Norbert Wiener's cybernetic theory and effect it had on weapons technology, prosthetic technology and the western perception of the body following the Second World War. Cybernetic theory, which was developed as a means of predicting the behaviour of enemy aircraft during World War Two, posited that both human and machines were self-correcting goal oriented beings.

In comparison to other fields within the humanities, the study of artificial limbs and amputees within the tradition of the history of medicine has only recently found an academic institutional home. It would be simple to point out gaps in the knowledge

produced by these fields, however it is unfair to expect production from this nascent field to be as comprehensive as it is from more established fields. Studies of artificial limb-users that share this theoretical foundation tend to focus on amputees who lost their limbs as a result of combat. This perspective fails to account for the variety of limb-users and the discursive change from artificial limbs to imitative artificial limbs which dominated the literature on prosthetics during the nineteenth century.

1.4 Visual Culture, Critical Discourse Analysis and the Amputated Body

The foundation of this thesis is that all bodies are culturally constructed and that understanding and living in the body is contingent on those constructions. Visual representation of the body is part of the ongoing construction of the experience of living in a body. The body is culturally constructed and the visual representation of that construction is also “the product of ideas that are culturally and historically specific” (Callen, 2002, p. 603). Socially contingent images and representations of the body feed back into the production of cultural meaning for the body (Smith, 1999, Callen, 2002).

Visual culture provides a fruitful set of tools to examine the era-specific conceptions of the body. Callen argues that images are part of community making, and are tools which communities use to create meaning for the body. Images are seminal

mediators of the lived experience of the body, our own and others, giving us ways of conceptualizing and describing the bodily. In pictorial images we recognize likeness and difference; we identify ourselves or find a different ‘other,’ which equally powerfully, serves to reinforce our image of our bodily existence”

(Callen 2002, p.603)

By examining images, both textual and pictorial, historians have access to some of the material that helped code the 'self' and the 'other' for individuals and communities at the time of their production and consumption.

Since visual culture investigates how vision is mediated through culture, how images are interpreted at their sites of production, circulation and consumption, and how that relates to identity formation, it is particularly compatible with critical discourse analysis. Critical discourse analysis, particularly the method espoused by Norman Fairclough (1995), is engaged with the relationships between producers and consumers of texts and their wider sociocultural context as enumerated by the text being considered. Critical discourse analysis, however, has a broader social mandate of outlining those relationships in order to make emancipatory social change than visual culture studies does. It is critical, in being guided by both, to navigate the compatible and less compatible elements of visual culture studies and critical discourse analysis.

Chapter Two

Methodology

The methodology for this thesis comes from critical discourse analysis as it provides the best method to answer the questions raised in response to the gaps in the literature outlined in the previous chapter. While this thesis is informed by several critical discourse analysts whose foundation is Foucauldian (Jager 2001, Wodak 2006), the central method has been drawn from the work of Norman Fairclough, particularly as outlined in *Media Discourse* (1995). This chapter will illustrate the steps on which the textual and visual analyses of this thesis are based.

As detailed in the last chapter, the less strictly linguistic method of critical discourse analysis proposed by Norman Fairclough (1995), provides an excellent tool for visual culture studies, and for this research project in particular. Fairclough recognizes the potential of visual images and representation, in his particular case, in the study of the conventional media. Unlike the historical investigations of visualists, which specifically address the constructed and changing nature of what can be seen, critical discourse analysis, recognizes the changing relations of power which are central to questions of what can be seen. The scopic regimes -or the culturally contingent means of seeing- of each age that are of critical concern to visualists are analogous to the relations of power that critical discourse analysts are anxious to reconfigure. Visual culture is often engaged in an attempt to re-capture the parameters of the older scopic regimes or in proposing new ways of seeing (Denisoff, 2004). This desire is similar to critical discourse analysts' desire to empower individuals and groups to alter their social relations. Fairclough proposes an elucidation of the communicative chains that result in the output of discourse

practice. This examination of the links formed both within the communicative event and those that originate outside the event and move through it, is analogous to Nicholas Mirzoff's revelation of the chains of visual affiliation used by social minorities to create incoherent subject positions in order to gain the protection of the resulting invisibility in nineteenth century London's imperial culture (2006).

2.1 Critical Discourse Analysis and the Literature of the A.A. Marks Company

This thesis consists of a chronology of the development of artificial limbs up until 1888, and an analysis of the literature of the A.A. Marks Company from 1888 to 1920, and of the wider sociocultural practices at the time that the texts were produced. Central to each of these sections of the thesis is relationship between the communicative event and the adjacent, informing discourses. This thesis draws on the promotional literature produced by the A.A. Marks Company as both a barometer and an instigator of the shift favouring visually imitative limbs over purely practical limbs, which made up one part of the visualist discourse of the time. Working with the premise of critical discourse analysis - that discourses shape social practices - this thesis will ask how social relations of power are reproduced or subverted in the texts under analysis. This thesis will ask what evidence the text provides to help the analyst understand how the use of imitative artificial limbs ascended and eclipsed the use of artificial limbs that did not look like the limbs they were replacing. In addition, this thesis will use critical discourse analysis to illustrate the relationship between the players in the discourse practice and the wider sociocultural practices, and how those relationships shaped the development of imitative artificial limbs.

There are thousands of possible units within the text that may be subject to critical discourse analysis, from the micro level (for example, the syntactic level) to the macro level (for example, the narrative structural level). As a result, no critical discourse analysis can ever include the interpretation of all the structures at work in a text. Bearing this in mind it is crucial to choose a both a corpus and units within that corpus for analysis which are reasonably likely to yield results pertinent to the question at hand (van Dijk, 2001).

The structure of this study follows the method outlined above. Three texts, *A Treatise on Marks Patent Artificial Limbs with Rubber Hands and Feet* (1888), and the second and sixth edition of the *Manual of Artificial Limbs, Copiously Illustrated: An Exhaustive Exposition of Prosthesis* (1907, 1920), form the corpus for analysis in this thesis. While discourse analysis can draw on a large corpus, a large corpus is not suitable if the analyst is interested in specific instances of exercise of power, in a specific temporal and geographical location (van Dijk, 2001).

The interplay between the communicative events and the order of discourse are of principal concern. This thesis consists of an account of the technological developments that made the A.A. Marks Company's work possible, the roles and relationship between producer and consumer encouraged by the texts, and the relationship between the discourse in the text and adjacent discourses. The fifth chapter of this thesis will reconstruct the chains of affiliation suggested by the A.A. Marks Company's imagery in order to demonstrate what was at stake in the use of imitative limbs for the users and producers of limbs, as well as for society as a whole.

The analysis of the communicative event will begin with an examination of the texts themselves, particularly with an examination of the structure of the text and the use of metaphor, hyperbole and graphic images to make the case for imitative artificial limbs. An elucidation of the discourse practice will follow with a particular focus on what the text implies about the producers and consumers of the text, what type of relationship is encouraged between the two, and how the bounds of those relationships are defined. The outline of the sociocultural practice will situate the first two facets of the communicative event within the cultural context in which they were created, with a particular focus on contemporaneous rules of urban sociality, the contemporaneous role of the image, and technological developments in New York City.

2.2 Context of the Project

Amputees who lost their limbs as the result of war make up the subject matter in the majority of historical research in this field. As a result, the scholars in this field tend to situate users of artificial limbs in relation to war related politics and policies. Stephen Mihm (2002) is one of the only researchers who considers the effect of civilian codes of behavior on individuals who use artificial limbs, and even he collapses most users of artificial limb into the category covered by war amputees. The assumption that everyone who used artificial limbs between 1860 and 1920 was a war amputee is the major shortcoming of the current literature. The war amputee may have assumed the dominant subject position in contemporary literature about the period, but it is worth investigating the system of social constraints on individuals who used artificial limbs outside of the context of war and vetranhood in the United States following the Civil War.

This thesis will attempt to fill some of the gaps in this field by examining the place of imitative artificial limbs within the visual discourse of the late nineteenth century using critical discourse analysis. By examining the promotional material published by producers of artificial limbs in the United States between the 1880s and 1920, this thesis will unhook artificial limb use from armed conflict and will examine the discursive forces that come into play in that use. It is beyond the reasonable scope of a Master's thesis to unearth the origins of the shift from purely practical to imitative artificial limbs (Mihm, 2002); however, since this area of analysis is underdeveloped, this research will hopefully enrich the field by illustrating the stakes in the literature that insisted upon the use of imitative artificial limbs.

As outlined previously, Norman Fairclough argues (1995), that the late twentieth century has been disproportionately influenced by images since there is a greater circulation of images now than in previous centuries. However, this study of artificial limbs challenges this assertion. Mass-circulation is not the only barometer by which to measure the influence of the visual in a culture (Denisoff, 2004).

In combining the theoretical concerns of visual culture and the method of critical discourse analysis this thesis is doing more than 'looking at pictures' to gauge the relationship between producers and consumers of artificial limbs and the wider culture. In response to the work already completed in the history of prosthetics, this project will consider not only images of amputees, but also the way that the body is represented in the artificial limbs themselves. It is not possible to create an artificial limb that is visually indistinguishable a natural one, particularly in light of the changing nature of what people

can identify through sight, which leads this investigation to consider why particular imitative elements (for example, colour and texture) but not others (for example, weight).

In order to amend the exclusion of visual culture from many of the current explanations of the development of imitative artificial limbs, this thesis strives to discover how the imitative turn in artificial limbs, identified by Stephen Mihm (2002), was deployed and what was at stake for the various participants in the process.

In order to clarify the effect of the visual culture of late nineteenth century New York on the users of artificial limbs, this thesis will examine not only images and representations of the body in prosthetics, but also sociocultural codes of dress and rules of public deportment. It would be shortsighted to assert that images will necessarily provide clear insight into the past, any more than written text does. However, when images are ignored all together, a rich archive of the past is being ignored as well. If vision is mediated by culture, then the visual representations people produce, what people focus on and what people can actually see in those images is culturally contingent. Visual representations are not simply useful as indexical symbols of the physical presence of the subject, but rather they provide cues to visual hierarchies and the scopic regimes of past ages. Thus visual representations, such as imitative artificial limbs, are important historical objects in the study of the relationship of the individual to their larger sociocultural sphere.

Chapter Three

Historical Context

3.1 Etymological History

Artificial limbs predate the English language. The term *artificial*, according to the Oxford English Dictionary (1989), has carried several meanings which resonate with this study “1. Made by or resulting from art or artifice; contrived, compassed, or brought about by constructive skill, and not spontaneously; not natural. (b) Of natural products or results artificially produced.” This definition also includes “2. Made by art in imitation of, or as substitute for, what is natural or real.” (OED, 1989)

In its first sense, the adjective *artificial* originated in 1382 in the writings of John Wycliffe. The term was meant to suggest an object or state in contrast to the natural order in writings advocating reform of the Roman Catholic Church. By the nineteenth century the term was used to describe phenomena that occurred in nature but had been reproduced through the endeavors of science. According to the Oxford English Dictionary, the term *artificial* was used in 1828 to describe light produced by electromagnetic discharge, and in 1860 was used to describe ice created by a machine. This sense of *artificial* fits with the use of the term by late nineteenth century prostheticists; the imitative limb was meant to resemble the human limb, as though perfect human limbs existed in some reified natural state.

It is in its second sense that the term *artificial* takes on its most important meaning for the purpose of this study. In 1577, William Harrison used it in the following manner “If the colour hold...the stone is thought to be naturall and good: but if it alter...then it is not sound, but rather an artificiall [peece of] practise” (OED, 1989),

suggesting inferiority, the antithesis of good or sound. It is from this latter etymological trail that *artificial* is first used to describe replacements for body parts. In one edition of the London Gazette, published in 1684, it was first used to describe manmade teeth.

There are two suppositions bound up in these definitions. The suppositions are that there is a recognizable natural state in the world and that that naturalness may be reproduced to create an artificial object, but that that artifice will never be confused with the genuine article. The A.A. Marks Company, despite an inability to construct a strict taxonomy of the natural, certainly relies on the first presupposition. There is a particular tension surrounding the artificial and the body as will be seen in both the framing of automata, and the slippage in the A.A. Marks Company's literature between the whole body and the amputated body that uses imitative artificial limbs.

The noun *limb* has a much longer history than the term *artificial*, one that predates modern English. In its most common use *limb* has meant "1. a) A part or member of an animal body distinct from the head or the trunk, e.g. a leg, arm, wing" (OED, 1989). Another meaning for the term comes from Aelfric's Homilies, compiled circa 1000 CE. From 1000 to as late as 1880, limb referred to "any organ or part of the body" (OED 1989).

Finally, *limb* has a distinct place in English metaphors and homilies such as "life and limb," and "limb and land," which suggest an individual in their entirety. In these samples of figurative language, the limb is a stand in for the body as distinct from the state of being alive or from property. The first expression suggests that there is something distinct, or singular about a limb or body that can be divorced from being alive, without connoting a corpse. The second connotes that the body is outside the realm

of what can be considered property and that possessions are part of the individual's entirety. In both cases, *limb* can not stand for the whole individual on its own; the individual is not just made up of a body. As will be demonstrated, the tensions in these expressions are also played out in the A.A. Marks Company's literature, which insists that the addition of an artificial limb provides its user with a seamless return to a reified wholeness.

What the term *artificial limb* does not necessarily connote is a substitution that resembles the lost part, any more than it necessarily connotes a substitution of the lost function. Historically artificial limbs have not encompassed both senses of substitution. The majority of limbs produced prior to the nineteenth century have replaced the function, as best as was possible in the circumstances, without reproducing the appearance of the lost limb. It is only in the nineteenth century that artificial limbs that resembled the limbs that they were replacing were mass-produced (Ott, 2002). This mass production, in and of itself, is not a sufficient explanation for the turn towards imitative prosthetic limbs, but the proliferation of these objects did serve to establish the importance of imitative limbs. Furthermore, as will be demonstrated, the normalization of imitative limbs obscured the stakes for both the producers of artificial limbs, users of artificial limbs and, finally, those who argued for the importance of imitative limbs, whether they belong to one of the proceeding categories or not.

While these meanings are bound up in the term *artificial limb* they are not a fixed part of the potential social understanding of the object that they have come to signify. However, once these terms became affixed to this object, the meanings attached to the term came to shape the object's recognized place in the world, its design, and its use.

It is tempting to include an exhaustive etymological review of the term prosthetic in this section, however, it is not the meaning of the term prosthetic, but the ambivalence of the A.A. Marks Company towards the term that is of interest. *Prosthesis*, dating from 1580, originally denoted a prefix added to a word. Although the term did take on the meaning of an addition to the body, it did not have currency until the twentieth century (OED). *Protheses* are seldom mentioned in the A.A. Marks Company's literature; the preferred term being *artificial limb*. When prostheses are mentioned in the *Treatise* the term does not yet have a standardized spelling, and George Marks feels the need to define the term for his readers:

Prosthetic – a. of Prosthesis, same as Prothesis, The process of adding to the human body some artificial part in place of one that may be wanting.

(Marks, 1888, p. 7).

3.2 Before 1860

The A.A. Marks Company was founded during a social and etymological era distinct from that in which prosthetics are used today. The company was launched in 1853, prior to the advent of antiseptic medicine or the American Civil War. During the antebellum period, the company catered primarily to the residents of New York City (Marks, 1888). The following is an account of the development of imitative prosthesis before the founding of the A.A. Marks Company, leading up until the publication of *The Treatise on Artificial Limbs with Rubber Hands and Feet* in 1888. This chapter will outline the social history that facilitated the social ascendance of the visually imitative artificial limb.

The rhetoric that frames the authority of A.A. Marks and others to insist on the value of the use of artificial limbs descends from the creators of artificial limbs and automata in Europe from the sixteenth century through to the development of antiseptic medical practices in the nineteenth century. Before the establishment of antiseptic medical practices, there were so few survivors of amputation as to render the systematic production of artificial limbs impractical. Although there is evidence that artificial limbs that resembled the limbs that they were replacing were constructed in ancient Egypt (Gutfleisch, 2003), imitative limbs were uncommon until the nineteenth century (Ott, 2002).

French surgeon, Ambrose Pare, who practiced medicine between 1533 and 1590, obtained several prosthesis designs from a locksmith, Le Petit Lorrain, and printed them in a tract, which enabled locksmiths and clockmakers to construct limbs for their clientele (Benhamou, 1994). The designs included a leg whose knee could bend at the press of a switch, and hands that could make a fist. In addition to enabling the construction of imitative limbs, Pare was partially responsible for a change in surgical practice would influence the practices of surgeons during the American Civil War. Pare condemned the common method of cauterizing limbs in the sixteenth century, emersion in boiling oil, in favour of ligature in order to stanch bleeding.

Pare has been credited with a shift in the discourse surrounding surgery, helping to establish its practice as a distinct discipline. As the surgeon to the French royal family, his influence was considerable. Pare also encouraged a shift in the relationship between patients and physicians regarding access to medical knowledge. Unable to speak Latin, Pare wrote in French, which made his findings more accessible to the literate French

population, enabling them to alter the knowledge/power dynamic between patient and physician (Schuyler, 1999).

Before the eighteenth century, the inspiration for the design and materials used in the construction of imitative limbs came from body armor. The development of artificial limbs that resembled the missing limb were largely the pastimes of surgeons and the domain of clockmakers and locksmiths (Benhamou, 1994). The genesis of automata, or robots, stems from the mechanical creations of clockmakers and locksmiths as well.

Automata were “an attempt to copy the human body” (Beaune, 1989, p. 433). Jean-Claude Beaune argues that the drive to replicate the human body and the bodies of animals, by mechanical means is linked to the purpose of all technology: to re-create, reflect and represent the world. Thus automata - or machines that act under their own power - existed as an idea long before humans had the capacity to build them. Since much of the technology in use in the twenty-first century acts under its own power, Beaune’s qualifiers, which characterize automata more precisely, are important when distinguishing an automaton from general machinery. An automaton is mechanistic, individualistic (rather than mass-produced), imitates human or animal biology, and perhaps most importantly, masquerades as the thing it imitates by concealing its own artifice (Beaune, 1989). While there is a philosophical similarity between prosthetists and automata makers, there were automata makers who also specialized in the construction of prosthetics. In 1811, Maelzel, an automata maker famous for building an automated instrument, the panharmonica, boasted the creation of artificial legs that could be used on horse back and while climbing stairs (Benhamou 1994).

It is the philosophical underpinnings that bind imitative prostheticists to their automata making predecessors. Automata are often framed as philosophical toys, machines that seemed so lifelike as to suggest that life might be mechanically reproduced. Opposing this view, some philosophers asserted automata that illustrate the Cartesian dualism - that the mind is non-physical and thus can not be reproduced by mechanical means - citing the failure to bring automata to life (Wood, 2002). A third means of understanding the framing of automata had been proposed by Derek DeSolla Price who argues that instead of the human capacity to make mechanical representations of life leading to a mechanistic theory of life, it is the desire to reduce the natural world to mechanistic principles that lead people to create biologically imitative automata. This earnest desire to replicate and recreate the natural world is a phenomenon that came to peak during the nineteenth century (Mitchell, 1989).

This desire to mechanically reproduce biological life, the necessity of automata to conceal their mechanical nature, and the role of contemporaneous etiquette in that process, is modeled in the controversy surrounding Jacques de Vaucanson's mechanical duck. Vaucanson's automata, which included a life-sized flute player and a drummer, as well as the 'digesting' mechanical duck where first exhibited in 1739. Vaucanson had gone to great lengths to imitate the anatomical structure of the wings of a real duck, and, he claimed, the digestive tract of a real duck. For the pleasure of a paying audience the duck would eat and drink, flap its wings, quack and defecate. In 1783 a German writer, C. F. Nicolai, revealed that Vaucanson's duck did not reproduce the digestive process of a real duck. The mechanical duck 'inhaled' its food with the use of bellows. Then a separate mechanism deposited pre-fabricated droppings on the silver tray placed at the

duck's rear. Although Jean-Eugene Robert-Houdin repaired the duck at the 1844 Exposition Universelle in Paris and confirmed Nicolai's account of the digestive system of the mechanical duck, there is still some contention over whether the duck really converted the food into droppings (Wood, 2002). Silvio Bedini (1964) embraces the notion that the duck was completing the act of digestion on its own. He asserts that the duck was originally displayed without a covering of feathers, based on a drawing of the duck from the era which showed the duck's innards. He claims that the sight of an anatomically correct digestive system was too startling for Vaucanson's delicately nurtured audience, and eventually had to be concealed with metallic feathers (Bedini, 1964). Gaby Wood attributes the illustration that Bedini cites to an American visitor who was simply speculating about the contents of Vaucanson's duck (Wood, 2002).

Rather than join the debate over the digestive powers of Vaucanson's duck, it is more instructive to examine what is at stake in this dispute over the imitative qualities of mechanical representations of biological life. Beaume argues that Vaucanson's duck represents the desire to replicate bodies in order to understand the nature of health. Vaucanson's duck, whether it truly digested food or not, is still an apt example of automata's "paradoxical logic... which plays on endlessly on not being itself in order to assert more effectively its own identity" (Beaune 1989, p. 437). In short, the very nature of mechanical imitations of life is to conceal their own mechanical ontological status. The result is a tension: if artificial limbs are as functional as the real article, then there might be no difference between mechanical and organic life. However the inability to create living automata or limbs, does not disprove the potential to do so, particularly in the minds of Vaucanson's audiences where Vaucanson's creations were displayed. The

legacy of automata on the prosthetic manufacturers of the nineteenth century, beyond that of the mechanical imitation of the organic, is the tensions around concealment and display. Artificial limbs were popular exhibits at fairs and expositions in the second half of the nineteenth century. However, the key function that separated the visually imitative from the purely utilitarian artificial limb was that of concealment. The imitative limb is meant to hide the amputation or deformity that it restores. With both automata and imitative limbs this concealment is not a given, but rather requires the collusion of the viewer and the visual culture to which the viewer belongs.

Imitative limbs were made on commission for specific amputees in the 1700s. It is in the period following the Seven Years War, that manufacturers began to advertise non-custom prosthesis. By 1795, Jean-Frederic Leschot, a French limb maker and student of eminent automata-maker Henri-Louis Jacquet-Droz, had developed a means of building a custom-designed limb without visiting his international clientele. Leschot would request a cast of his client's opposing undamaged limb, with the site of amputation on the other limb marked upon it (Benhamou, 1994).

As a result of the emphasis on the visually imitative, artificial limbs of the late nineteenth century have more in common with automata than they do with non-imitative artificial limbs. This tension will be revisited later in this project, which argues that there is a relationship of colluded concealment between the artificial limb, the amputee and the public spectator. For the amputee, this collusion between the viewer and the viewed takes on a new significance, for in the nineteenth century the exterior of the human body was not just an indicator of biological functions like digestion, it was also an indicator of innate character and immutable social value.

3.3 From 1860 until 1888

The imitative artificial limb did not become the standard prosthetic until after the American Civil War. There were three conditions of possibility that lead to this shift towards the production of visually imitative limbs in the United States: a change in weaponry, developments in the medical field, and the policies that resulted from the American Civil War.

The first condition that facilitated the mass production of artificial limbs was the technological changes that arose during the American Civil War. The war was responsible for a drastic increase in the number of amputations performed in the 1860s in the United States. As a result of this increase 35,000 amputees survived the Civil War (Ott 2002). The cause of the majority of these amputations was the introduction of the minie ball. A bullet developed in France in the 1840s, the minie ball could be loaded quickly enough to make the use of rifles practical in battle. Made from lead, the minie ball would flatten on contact. This flattening resulted in greater damage to the body, but decreased the chance of fatality, than if the bullet had retained its shape. The performance of amputation during the Civil War was not without controversy within the medical community. Soldiers whose limbs were injured by bullets were more likely to endure amputation than those injured by any other weapons. The conditions most likely to require amputation of a limb were gangrene and septicemia (Barnes, 1883), although amputation was often undertaken if a bullet had broken a soldier's bone. This insistence on amputation following a fracture raised the ire of Joseph K. Barnes, the Surgeon General. He was convinced that "a leg should seldom be amputated for a fracture from a

musket ball””. His opinion “seems to have been very generally disregarded by the surgeons of the American civil war” (Barnes, 1883, p.460).

The second condition of possibility was the development of antiseptic surgical techniques. While the introduction of anesthetics in the 1840s had had a profound effect on the type and length of surgery possible in the first half of the nineteenth century, the mortality rate due to infection was prohibitive. Amputees were as likely to die from infection following amputation as they were from infection in the wounds that necessitated amputation; blood poisoning killed almost half of all surgical patients (Schuyler, 1999).

After learning of Louis Pasteur’s theory that rot and decay was caused by living organisms, Joseph Lister, a surgeon and professor at Glasgow University, applied these findings to his work. Lister reasoned that if bacteria were responsible for gangrene and blood poisoning then by killing bacteria on hospital surfaces, instruments and wounds post-operative mortality would decline. In the United States, Oliver Wendell Holmes Sr. was making similar inquiries into the spread of disease and infection among patients (Shoemaker, 1953). The work of the United States Sanitary Commission, a civilian organization that inspected the hygienic conditions of volunteer troupes, resulted in medical care in the field of greater quality than might have been available to union troupes, had they had to rely solely on government funds.

The third of the conditions that enabled the mass production of artificial limbs were the policies that followed the war. The policies instated in the northern United States to provide for those who had lost a limb in the service of the state stimulated the prosthetics industry. Prior to the nineteenth century imitative limbs, even those that were

not custom-made, were the purview of the wealthy. Although the imitative limbs that were developed in the northern United States were still costly, the state mitigated that cost by providing funds to soldiers who had lost their limbs during military service.

Following the War, northern soldiers who had lost a limb in battle was entitled to only one replacement. The policy was amended in 1870, after which point the federal government provided for the cost of a new limb every five years (Marks, 1888).

The A.A. Marks Company was founded in New York City in 1853 by A.A. Marks and his brother, William L. Marks, a medical surgeon (New York Times, 1890). The junior member of the firm, George Marks would eventual author the *Treatise* (1888) and the *Manual* (1st ed., 1905). The demand for prosthetics before the Civil War was low; at the time that the A.A. Marks Company was founded the company only had two competitors in the northern United States, William Selpho of New York and his student, Dr. Benjamin Frank Palmer of Philadelphia (Marks, 1888).

The A.A. Marks Company made two significant changes to the standard artificial legs produced in the United States. The first change was the introduction of a stiff ankle and the second was the addition of a rubber foot. Prosthetic legs of the Civil War era had a hinged ankle that was meant to replicate the action of the anterior and posterior talofibular ligaments, which allow the foot to be raised laterally and to be flexed. There was no commercial manufacture of artificial ankle joints that imitate the talar joint that allows the foot to rock from side to side. The ankle joint on an artificial leg was its weakest point. Specializing in artificial legs, the A.A. Marks Company tested several different types of ankles, before adopting the stiff ankle in 1861. George Marks argues that, despite the company's experiments with both wood and leather sockets, an ankle

joint was far too unpredictable for an amputee to use safely, since the ankle joint would roll if the ground was uneven when the amputee placed his weight on the leg (1888). In addition, he asserts that prosthetic legs without hinged ankles have made fast walking and even running possible for amputee.

The second distinct feature of the A.A. Marks Company's limbs is the rubber foot, which the company patented in 1863 (See figure 1). The A.A. Marks Company's rubber foot has a solid ankle that extends into the larger rubber foot. The heel is rubber and once weight is placed upon it it resists, propelling the weight of the amputee towards the toes. The toes of Marks' foot are solid rubber which allows the amputee to rock forwards onto the toes of the foot as he lifts it off the ground. The toes then spring back in a manner that is meant to parallel the movements of a natural foot when walking.

Artificial limb manufacturers in the first half of the nineteenth century were leaders in the drive to encourage amputees to use imitative limbs. The industry expanded due to the added financial incentive provided by the federal and state governments. The prominent limb manufacturers of the north, including the A.A. Marks Company and Dr. Bly of Rochester, worked to refine and differentiate their designs from one another. These moves to distinguish themselves did not only affect other manufacturers. Their clients, who might once have been able to produce their own artificial limbs (Ott 2002), could not produce limbs that could compete with the newer industrially produced limbs. The artificial limb that could pass in polite society was no longer an object that the amputee could create. Users of artificial limbs were not simply put upon by the strictures of manufacturers. Users filled the roles assigned to them, and as this thesis establishes, their existence created difficulty for both manufactures that espoused the imitative limb

and the society at large whose visual culture provided the impetus to encourage both manufactures and users to adopt and endorse the use of imitative artificial limbs.

Chapter Four

Textual Analysis of the A.A. Marks Company Literature

This chapter will critically deconstruct the textual strategies that the A.A. Marks Company used to define itself and the users of its products within its promotional texts. The corpus for analysis consists of the A.A. Marks Company's promotional literature, *A Treatise on Artificial Limbs with Rubber Hands and Feet* (1888), and the second and sixth editions of the *Manual of Artificial Limbs* (1907, 1920). The texts provide insight into the relationship that the company constructed between itself and its clients, as well as the roles stipulated by that relationship. The company aligns itself with some adjacent discourses and disavows others in order to assume the authority to situate itself and its clients.

The *Treatise* and the *Manual* both combine two genres, that of a textbook and that of a catalogue. While the A.A. Marks Company references the literature's value as a textbook, a repository of knowledge that stands as an authority in the service of its readers, it disavows its catalogue status, despite the long lists of products, their prices and instructions on how to place an order with the company. The two genres are at odds, for a textbook is meant to be a disinterested provider of knowledge, whereas a catalogue is meant to entice potential customers to buy products. The second edition of the *Manual* describes the book as

an authority on the important subject of prothesis [sic], a book of interest and concern to the surgeon and physician as well as the maimed. It contains not only a description of multifarious devices by but [also] such general matter both descriptive and critical, and in away didactic, bearing close relations to the work of the surgeon.
(Marks, 1907, p.16).

The insistence of the company on the literature's textbook status allows for a more prescriptive relationship with its readers than might be permitted otherwise.

4.1 Framing the Amputee

The A.A. Marks Company, and other artificial limb manufacturers, only acquire clients after those clients have been identified by the medical community. The amputee or, to borrow a term from the A.A. Marks Company, the congenitally deformed individual is first identified, or indeed, created by the medical community. The A.A. Marks Company frames itself at as a party at a distance from this identification of potential, listing in *The Treatise* the incidents that have caused their clients to be in need of artificial limbs.³ The company defines its own role as “relieving and helping the maimed and deformed” (Marks, 1907, p. 15), suggesting that its client base is largely serendipitous, rather than the result of the company's active role in promoting the use of industrially-produced limbs that resemble the natural limbs that they are replacing.

The bodies that the A.A. Marks Company constructs in the literature as in need of the company's services are non-normative bodies, or as they are framed in the company literature, any individual with a limb that has been *amputated*, or any individual with a *congenitally deformed* limb. The normal body is reified object in the text, as it is in medicine (Powers, 2001). While the company does offer examples of deformities and amputation, it does not create a strict taxonomy, as the medical community might, but rather creates a fluid set of conditions of non-normativity, and encourages the potential

³ The A.A. Marks Company lists “disease, railroads, wars, falls, sprains and fractures, [being] crushed by falling bodies, farming implements, accidents by firearms, horses and vehicles, manufacturing machinery, mills, mines, boats and accidents on the water, elevators, sharp-edged tools, explosions, frost, malformations, burns, miscellaneous accidents” (Marks, 1888, p. 129) as the items that cause its client to be in need of artificial limbs.

client to recognize themselves in those categories. As a result, the differentiation between the two is largely subjective. Any limb that does not appear normal can be subject to correction by the company's products. The means of testing whether an individual is eligible for an imitative limb range from the tangible (having undergone amputation), to the abstract (having been "the object of pity" once the body is displayed). The chapter headings in both the *Treatise* and the *Manual* suggest a range of conditions, and describe the products available to disguise those conditions. There is an assumption in the literature that there are individuals who would not be in need of these products, that there exists an objective, non-deformed limb. There is, however, no standard unassailable normal limb discussed in the text that can be used for comparative purposes.

As artificial limbs, particularly legs, have often been used to increase mobility, it might be tempting to make any hindrance to mobility caused by the legs the line at which the individual crosses from normative to deformed. However, being subject to the conditions that result in the need of an imitative artificial limb does extend to every body that has difficulty moving. Such a division would beg the question what normal ease of mobility was and how the sufferer of lowered mobility due to, for example, poor circulation or old age could be considered.

It may seem that the non-deformed limb as an object of this discourse is easily identifiable, existing in a binary state, either amputated or not. However an amputation is influenced by the intersection social relations. There is no objective moment at which the body necessarily needs amputation; it is the job of the surgeon to decide when a limb is mangled beyond repair, when gangrene has set in, or when a bone is broken badly

enough to require amputation.⁴ The role of surgeon as expert and of the patient as subject leaves considerable room for the subjective creation of amputees. This process was not without controversy, particularly during the Civil War. The U.S. Surgeon General's Office was of the opinion that many amputations were performed unnecessarily, whereas they were considered necessary by the surgeons who carried them out (Barnes, 1883). Indeed, it is unlikely that the surgeons who performed these amputations were acting in bad faith. Though the amputated limb might be easily identifiable, it was often the contested subject of the discourse of medicine.

4.2 Framing the A.A. Marks Company's Authoritative Language

The A.A. Marks Company goes to great lengths to establish its authority to espouse imitative artificial limbs. In this process the company creates a certain image of itself as the producer of limbs. In addition to framing the company and its (potential) clients, the A.A. Marks Company also draws on the textbook genre to suggest roles for itself and the consumers of artificial limbs in that text. The company delineates those roles, and manufactures its right to do so, by drawing on testimonials, medicine, history, and awards as indicators of its authority. In each of the successive texts, the A.A. Marks Company creates a greater distance between itself and its clients, in addition to widening the communicative gap between clients. In the process the company addresses its clients in an increasing pejorative manner.

The A.A. Marks Company's texts include three categories of testimonials. The *Treatise* includes accounts of the excellent service provided by the company's artificial limbs from the press, from doctors, and from patrons. By contrast, the *Manual* only

⁴ These standards have changed over time, resulting in fewer amputations due to accident in the late twentieth century, than were performed due to accidents in the late nineteenth century (Ott, 2002)

includes endorsements from physicians and users of the A.A. Marks Company's products. Each category provides a different voice in the text, even though each is mediated by the selections made by the company in the production process.

There is a considerable shift in tone between the text written by the A.A. Marks Company and the text collected from journalists, doctors and patrons. All of the testimonials have been compiled by the company, but they have been arranged to suggest that individuals who might have multiple viewpoints on the company's products have been consulted. This tactic creates an aura of objectivity. However, all the articles in the *Treatise* are unanimous in praise for the A.A. Marks Company's limbs. Many of the articles espouse the company's insistence on the use of, and indeed necessity of, artificial limbs that resemble the limbs they are replacing.

The articles included in the *Treatise* fall into one of two categories, they are either accounts of the revolutionary workings of the artificial limbs or they are narratives about the extraordinary mobility of those who use the A.A. Marks Company's products. There are accounts of a gymnast (158) and cyclist (199) who with the aide of the A.A. Marks Company's products are unhindered in the activities they have chosen. One article, entitled "Deft Rubber Hands – the Unfortunate Walter Alexander and His New Hands" (Marks, 1888, p.162), details the fantastic story of a young man who has his hands crushed in a rubber factory. Following amputation he is fitted with the A.A. Marks Company's artificial hands becomes a stenographer. Another account from the *Minok Blade* details the miraculous recovery of a Civil War veteran who "frequently forgets that his feet are those made by Marks, and not those that nature gave him" (Marks, 1888, p.167).

The company benefits from suggesting that it is a contributor to medical discourse. The A.A. Marks Company borrows its authority from the medical community, while expressing certain ambivalence, particularly towards surgeons. The A.A. Marks Company variably criticizes and extols the actions of doctors and surgeons, in bids to appear as authoritative as, and in some cases more knowledgeable than, the medical community.

In the *Treatise* the A.A. Marks Company reproduces endorsements from physicians. The *Treatise* incorporates the voices of three physicians through direct quotations. Two of the doctors give their opinion, one in support of the company's stance on the length of time an amputee should wait before applying an artificial limb, and the other on the advisability of artificial limbs for children. The third physician's endorsement takes the form of a case study of a patient given at Bellevue Hospital in New York City in 1877 (p.152). Along with the endorsements embedded in the text, the company provides a list of doctors and surgeons who "have witnessed the operation of the rubber hand, foot (or both), and acknowledge that they possess exceptional merit" (p.173). These endorsements suggest that the company is not speaking solely on their own authority, but have a virtual army of support.

Rather than simply borrowing authority from the medical profession, in the *Treatise* the company offers advice to surgeons. The literature condemns surgeons who amputate without considering the compatibility between the resulting stump and prostheses. Marks attacks such surgeons suggesting that this oversight "always provokes unpleasant criticism on the ability of the surgeon, and is frequently exhibited as an evidence of his lack of skill" (Marks, 1888, p.100). The literature goes on to propose

various issues that the surgeon should keep in mind, going so far as to add that there are some common surgical practices which “ought alone to debar [surgeons] from practice” (Marks, 1888, p.104). These attacks on the medical community, whose language Marks has adopted, sets the company up as a better equipped than the medical community to meet the needs of amputees.

The final endorsements that the A.A. Marks Company uses to assert their superiority in the field is that of patron testimonials. In the *Treatise* the company includes a copy of the form letter that was sent out to clients to request their endorsement. Each of the seven hundred testimonials reproduced in the text is dated and many are illustrated. Testimonials include accounts of the mobility, and the concealment of any deformity or amputation, that the Marks Company products have afforded their wearers. Mr. E.F. Bennet of Pennsylvania reports that he “can climb good-sized trees, ... can skate on ice and roller skates [and can] walk so perfectly that any who is not acquainted with [his] misfortune can detect that [he] is a wearer of an artificial limb” (p.333). Mr. J. McKenzie of New York City assures readers that “my friends, acquaintances and strangers ... could not be convinced [that his leg was prosthetic] until exhibited... so near it was to perfection and nature... I feel a whole man again” (232). Readers of the *Treatise* are encouraged to contact any of the clients who have offered testimonials for confirmation of further information.

In the *Manual* the suggestion of authority comes from borrowing language from the discourse of medicine and from referencing the practices of this discourse. The A.A. Marks Company makes no claim to diagnose client’s initial condition, rather it defers to the medical community. However, the company does claim for itself the authority to

explain clients' conditions to them in statements such as "[a]n amputation at any point above the ankle and below the knee produces a tibial stump, so termed by the surgical profession, because the tibia or shin bone has partly been saved" (Marks, 1907, p.45).

Each of the texts delineates the parameters of different types of amputees and deformed individuals. Attributes of each group are described in order to assign bodies a place within the schema produced by the A.A. Marks Company, based on lists of potential of artificial limbs. The classifications provided in the literature encourage clients to understand their bodies as belong to a particular class of prosthetic limb wearer.

In both the *Treatise* and the *Manual*, amputees and those with congenital deformities are called to recognize themselves in the literature and, by extension, in relation to products of the A.A. Marks Company. These potential clients are given a list of conditions within whose parameters they must fall. The acceptable types of amputation or deformity include "long tibial stumps...contracted knee joints...short leg...ununited fractures" (Marks, 1907, pp. 6-8). In the literature these conditions are meant to encompass all individuals who might be amputees or congenitally deformed.

The A.A. Marks Company does not simply address every individual who emerged as a "cripple...amputee or malformed" (1888) following an encounter with the medical community. While there may have been conditions that emerged from the medical community that could have used other products, if those products were not made by Marks, then the condition is not given the possibility of existence in the literature.

In *The Treatise* (1888), potential clients are defined solely in relation to the products made by the A.A. Marks Company. *The Treatise* lists the limbs made by the company and then the clients who would best conform to them. For example, the

Treatise subchapter titles include “Legs for extended and anchylosed knees” and “Arms for wrist-joint amputations.” (Marks, 1888, p.3). Press notices reproduced in the *Treatise*, but not in the 1907 and 1920 editions of the *Manual*. However, in the *Manual* the A.A. Marks Company does reproduce endorsements from physicians. In the *Manual* the only physician who endorses the A.A. Marks Company’s products is Dr. J. Law, by providing the introduction to the *Manual*’s first edition. Although the introduction is reproduced in its entirety in the sixth edition of the *Manual* the date is omitted, presumably to uphold the myth of the text’s currency.

The second edition of the *Manual* (1907) does not bear any mention of a request for endorsement, but rather, suggests that the testimonials were sent to the company without inducement. Rather cryptically readers of the *Manual* are discouraged from contacting the endorsers since “among the eight hundred [endorsers], a large proportion change their addresses every year and can not be reached by the old address” (1907, p.257). Instead, readers are urged to send their requests for addresses to the A.A. Marks Company who will forward patrons’ current addresses.

The sixth edition of the *Manual* (1920) reproduces many of the letters contained in earlier editions, and yet purports to have received all the testimonials recently, despite not providing the dates of the endorsements. The A.A. Marks Company masks the purpose of these testimonials:

One object of publishing a testimonial is to put the writer on record and to make it possible for anyone to communicate with or interview him, not only today but any time in the future. An address that can only be depended upon but for only a brief time should only be given out for immediate use. It is therefore better that our records be consulted before the investigating reader starts his inquiries.

Marks, 1920, p.257

The A.A. Marks Company attempts to retain the benefits of including testimonials while reducing the transparency of the testimonial gathering and verifying process. This strategy, despite the pejorative attitude that it shows towards potential clients, did not ruin the A.A. Marks Company, who continued manufacturing limbs until 1957 when it was bought by Winkley Orthotics and Prosthetics.

In the *Manual*, the A.A. Marks Company is not as openly critical of medical practice. While the *Manual* does mention which points of amputation can bear the most weight, it does not openly address surgeons; rather the creators of these amputations are addressed in the passive voice. As the A.A. Marks Company becomes less and less candid with its clients, it attempts to ally itself further with the medical profession. By the time the A.A. Marks Company publishes the second edition of the *Manual* in 1907, they classify clients not directly in terms of the products available, but in terms of the amputation. The *Manual* included chapters entitled “Hip-joint Amputations” and “Partial Hand Amputations” (Marks, 1907, pp. 8-10). It is in the *Manual* that the greatest distinction is between the amputee and the malformed is presented. The amputee is addressed in terms of their amputation, whereas the malformed, the aged and children are categorized based on the products available to them. In the *Manual* individuals with congenital deformities are still overtly identified through the products that the Marks Company produces in the chapter entitled “Artificial Feet and Legs for Deformities, Paralysis, Excisions, Arrested Growth, Shortened Growth etc” (Marks, 1907, p.8). The only other groups addressed in this way in the *Manual* are youth (“Artificial Legs for the Infants and Children”) and the elderly (“Artificial Legs for the Aged”) (Marks, 1907,

p.9). Although it is tempting to mark this as a significant emancipatory change in the means of naming amputees, as individuals for whom limbs are made and not the other way around, such an assertion would be premature.

4.3 Framing of the A.A. Marks Company as Socially Valuable

Not only does the A.A. Marks Company ally itself with the authority of the medical community, but it also asserts that it is a valuable and altruistic member of the community. The A.A. Marks Company was funded by the payments made to it by civilian amputees, and by the provisions that the government made for amputee veterans. The Civil War provided a windfall for the company, a detail that is never acknowledged in the text. Instead, as will be demonstrated below, the company frames itself as a well-recognized contributor to the venerable tradition of creating artificial limbs.

The A.A. Marks Company situates its promotion of imitative artificial limbs within world history. The *Treatise* in particular makes a case for the company's significance by suggesting that the A.A. Marks Company belongs to a noble lineage. The *Treatise* opens with an account of imitative prosthesis from literature and from the past. Beginning with an account of the imitative artificial limbs of ancient Greece and Rome, the A.A. Marks Company suggests that its company's endeavors are not the result of a lone enterprise, but rather are part of a longstanding and honourable tradition. The company's invocation of the ancient Greeks and Romans would have resonated with Marks' audience. Americans had long invoked the Greeks and Romans as their political and cultural inspiration (Winterer, 2005).

Not only does George Marks link the company's craft to ancient Greece, he also links it to American nationalism. He gives an account of one of the first post-industrial

imitative legs, the Anglesey leg, which was designed in Britain in 1800s and “received by little improvement until the venturesome [limb manufacturer, William] Selpho introduced it into this country...here it met with American enterprise and began to thrive” (Marks, 1888, p.9). This pro-American sentiment befits a firm who had proudly exhibited their products at the Centennial Exhibition in 1876 (1888). Although there had been improvements made to the design of imitative artificial limbs by the company’s American rivals, including The Winkley Artificial Limb Company (later renamed Winkley Orthotics and Prosthetics) of Minneapolis Minnesota and Dr. Bly of Rochester, New York, in a linguistic move typical of advertising, the company fails to mention its rivals by name, while assuring its readers that the rivals and their products are inferior. The language of the text is unequivocal in its positioning of the company: “We have never been vanquished, but have always been conquerors” (1888, p. 143).

The *Treatise* was compiled by the younger partners in the firm, George and William Marks, with the explanation that “the senior member of the firm [A.A. Marks] has for a number of years withdrawn from an active position [however] his judgment is consulted on matters of peculiar importance” (1888, p. 2). A.A. Marks visually presides over the text: the front piece of the *Treatise* is a portrait of the founder of the firm, accompanied by copy of a handwritten “Yours Truly” and his signature “A.A. Marks.” (1888, p.i) A.A. Marks’ voice is present in the text, but only its own discrete and well-demarcated space. The active members of the firm include an account of the invention of the rubber foot as written by A.A. Marks and published in earlier pamphlet, presented in quotations. Throughout both the *Manual* and the *Treatise*, the founder of the firm is

always referred to as “A.A. Marks.” Nowhere in the text, nor in the outside sources that inform this project, is the elder Marks identified by his first name.

In the second edition of the *Manual* A. A. Marks is no longer given an active individual voice, nor does his likeness accompany the text. The firm is made to speak as “we” and “us.” While this collectivity is expressed via language choices in the sixth edition of the *Manual*, this last text simultaneously situates A.A. Marks as the perennial head of the firm, including an introduction to the testimonials which concludes “Sincerely yours, A.A. Marks” (1920, p.257). While the company does place itself among great prostheticists of history, the sixth edition creates an a-historical head of company, resurrecting A.A. Marks as a symbolic figurehead or mascot.

All of the A.A. Marks Company literature includes appendices which enumerate the awards won by the company. In the *Treatise* (1888) the awards are not simply described, they include accounts of the judges rulings and “fac-similes” (p.135) of the medals that accompany the awards. The *Treatise* lists the awards chronologically, which serves to illustrate the A.A. Marks Company’s expanding geographical sphere of influence. The chapter devoted to ceremonial recognition begins with the firms’ first award from the American Institute of New York in 1865, thirteen years after the firm was founded. In 1876 the A.A. Marks Company won the first premium award for limbs with rubber hands and feet at the Centennial Exhibition in Philadelphia. In 1881 and 1885, the firm won gold medals at the International Cotton Exposition in Atlanta and The World’s Industrial and Cotton Centennial Exhibition in New Orleans, respectively. Many of the awards were given out following “pedesrial” tests, in which amputees would parade

before the judges or race as a means of determining which company was “entitled to the highest commendations” (p.141).

Through the inclusion of testimonials from doctors, journalists, panelists and clients the A.A. Marks Company assembles a mass of supporters. To question the authority and value of the A.A. Marks Company would be an assault on the credibility of the multiple sources that the company has assembled. Once this authority is secured, the company is able to prescribe their products.

Chapter Five

Visual Analysis of the A.A. Marks Company Literature

As outlined in the previous chapter, the A.A. Marks Company went to great lengths to ally itself with discourses that would give it the authority to insist on the value of imitative artificial limbs. This chapter will illustrate how that authority was deployed, in addition to what was at stake for the players involved, including the producers and consumers of imitative limbs, and those individuals who populate the sociocultural sphere in which those producers and consumers operated. This chapter will end with an outline the potential for agency of the consumers imitative limbs. These consumers, as will be argued, were not simply oppressed by the scopic regimes of their culture, instead they presented a very real threat to that scopic regime.

Although there was an increase in the numbers of wearers of artificial limbs, due to the conditions outlined in Chapter 3, it would be short sighted to relate amputees' (even war-amputees') experience of the social world solely to the American Civil and First World Wars. The A.A. Marks Company literature does assume that the majority of its clients, particularly in 1888, are war amputees. And, although it does include some mention of female amputees, the company expresses itself as though it has a predominately male readership. In the literature most hypothetical client are constructed as male, and the company asserts that its products are useful when performing stereotypically male jobs.

Combining critical discourse analysis and the method used by Nicholas Mirzoeff (2006), this analysis reveals the chains of affiliation associated with the technologies of vision the *Treatise* and the *Manual*. The following chapter draws on the practices of

criminal anthropology, of exhibitions. and the development of film to account for the imitative imperative evident in the A.A. Marks Company's text.

5.1 Composite Photography

In *A Treatise on Artificial Limbs with Rubber Hands and Feet* (1888) the A.A. Marks Company proclaims that the addition of rubber hands and feet to artificial limbs is a revolutionary improvement. In addition, it asserts that prosthetic legs without hinged ankles have made fast walking and even running possible for amputees who use the company's products. In the *Treatise*, the A.A. Marks Company provides etchings that illustrate the positions of the natural foot when it is being used for walking. The illustrations have been copied from "instantaneous photographs" taken of several men in the process of walking. Instantaneous photography shortened the amount of time that the photographic plate had to be exposed to light, which allowed the photographer to capture a sharp image, even if the subject of the photograph was in motion.

The positions that the natural foot takes on during this process are "very curious" indeed, as the A.A. Marks Company points out the positions are "such that one would scarcely dream of, and appear more grotesque than natural; [but] they are never the less true" (1888, p.16). The company then proceeds to create a textual rather than pictorial image of the walking style of a man wearing an artificial limb with an articulated ankle joint. With an ankle joint, the foot of the artificial limb lands on the ground with a "thud" and requires so much effort to lift it from the ground as to "produce[] an awkwardness and a limp" (Marks 1888, p.16). In contrast, the company's rubber foot is framed as lending the amputee "an easy and graceful manner." The company compares the natural

ankle, the hinged artificial ankle, and the Marks rubber foot, and comes to the following conclusion:

A comparison of the two methods in artificial legs, with and without an ankle joint, will show that with the artificial ankle joint the interval that the plantar surface rests on the ground is greater than that of the natural foot, while with the rubber foot and stiff ankle the interval is approximately the same, or possibly at trifle less.

(Marks, 1888, p.17).

In this section of the promotional literature, the company is using several tropes, all image related, to champion their rubber foot. Before making any direct arguments in favour of the rubber foot, the company offers its readers illustrations, composites of photographs of men walking. Providing composites rather than photographs of one particular man walking adds a certain statistical weight to the illustrations. This is the walk of men in general; this is the normative walk (see figure 2).

The illustrations drawn from instantaneous photographs are reminiscent of the motion studies made by Etienne-Jules Marey and Eadweard Muybridge. A precursor to the film, the photographic processes used by these two men resembled modern stop-motion photography. Principally concerned with anatomy and physiology, Marey's photographic studies of humans would eventually be linked to notions of efficiency and motion in the workplace (Braun, 1992). While it might be fruitful to follow this line of inquiry, Marey's photographic interests are not those most mirrored in the company's texts. As will be demonstrated below, the A.A. Marks Company was particularly invested in the interiority of their clients. This investment most closely resembles the motivation to use of photography that drove nineteenth century criminologists.

Nineteenth century criminologists had long used photographs to try to discern the physical commonalities of particular criminal 'types.' Appearance was a means of

community making, a means of differentiating between the classes. This differentiation, which used to rely on inherited wealth or title, was made increasingly difficult with the influx of new money that accompanied industrialization (Mihm, 2002). The mass circulation of photographs made it possible to standardize the appropriate physical appearance of the classes.

Beginning in the mid-nineteenth century, American police forces kept photographic records of convicted criminals. Shawn Smith (1999) argues that the prevalence of ‘mug shots’ gave the respectable middle classes the opportunity to define themselves physically in opposition to the criminal classes. In 1886, the New York City police department published *Professional Criminals of America*, a volume of photographs of American criminals that could be studied in the privacy of the middle class home. Knowing what criminals looked like gave the middle class the tools to discipline their own appearance to erase any suspicion on criminal interiority (Smith, 1999).

In 1877, Sir Francis Galton, an eminent criminologist and eugenicist, introduced composite photography as a means to identify the appearance of the statistically average criminal (see figure 3). Composite photography, and the production of the mug shot, was type of portraiture, and “the portraitist [has] a moral obligation to reveal the inner spiritual qualities [of the sitter]” (Margaret Cameron quoted in Denisoff, 2004, p.4).

Galton would expose a photographic plate to multiple negatives of criminals convicted of the same crime. The result, he asserted, was a photograph in which the facial traits common to particular types of criminal was evident. Galton argued that his process was less biased than an artistic rendering. He was convinced that the “merit of

the photographic composite is its mechanical precision” (Galton, 1879, p.134). Such images provided the middle classes with a visual referent of what they were not (Smith, 1999).

Like Galton, the A.A. Marks Company uses composite photography to create an illustration that does not represent one specific individual, but rather is a representation of a ‘type.’ While Galton was attempting to create a visual representation of the average criminal type, the company is applying Galton’s techniques to the normative body.

Since the text includes both pictorial and textual images of the normative walk, while only providing textual images of the non-normative walk, it is tempting to assert that the company is privileging the normative body. However, by subjecting the normative body to the same scrutiny and blending generally reserved for (non-normative) criminals, the literature rejects the superiority of the normative body in relation to the amputated body.

The A.A. Marks Company suggests that under the close inspection made possible by photography the normative body appears “grotesque” rather than “natural.” The normative walk is indeed “very curious” and thus warrants the intense scrutiny that it is subjected to through the process of “instantaneous photography” (Marks, 1888, p. 16). Published in New York two years after *Professional Criminals of America*, the *Treatise* captures the image of the normative walk and makes it available to potential clients of the company.

While the company is critical of the normative body, it is not suggesting that the amputated body is superior. Without the right access to technology, in this case the rubber foot and stiff ankle, the gait of the amputee wearing an artificial limb is

characterized in the text as “awkward.” The makers of prostheses with hinged ankles were attempting to replicate the natural leg too closely.

The A.A. Marks Company is not valorizing the amputated body or the normative human body, but rather, is valorizing technology. The A.A. Marks Company, like Galton, has already lauded the precision of photography in contrast to the human eye, for its ability to capture an image that human eye cannot capture itself. Galton used photography to capture and represent the exterior of the individual with innate, he assumed, criminal interiority. The company uses photography to capture the curiously grotesque natural walk. Marks’ rubber foot is an improvement on the natural foot in the way that photography is an improvement on natural vision which does not allow the viewer to see the positions of the walking body revealed by instantaneous photography. An artificial foot with a hinged ankle rests on the ground for too long with each step. The natural foot rests on the ground for less time. The rubber foot rests on the ground for “a trifle less” time than the natural foot does, propelling the amputee forward faster, and better, than the normative foot does.

In the *Treatise*, technology has the power to reveal the grotesquery of the normative body. In the *Manual* the natural walk is not captured by instantaneous photography. George Marks claims that the images in the *Manual* are produced using kinetoscopic photography

5.2 Kinetoscopic Photography

Similar to the *Treatise on Artificial Limbs with Rubber Hands and Feet* (1888), the *Manual* includes a sequence of images of an able-bodied man walking. The *Treatise*

marvels at how instantaneous photography has made these illustrations possible. In contrast, the *Manual* attributes the images to kinetoscopic photography.

The Marks Company's technological references switch from photographic to cinematic. When the *Treatise* (1888) was published Philadelphia was the American hub for the development of photographic technology. The switch in the company literature reference the firm's native city, New York, where the kinetoscope was first marketed.

The kinetoscope was the result of long development process, beginning with the creation of the phonograph, which Thomas Alva Edison patented in 1878. Billed as an addition to modern office, the phonograph was marketed as a tireless stenographer that would take perfect dictation. However, as Charles Musser has noted (1990), the machine was a failure as a business tool, but was widely appreciated for its entertainment value (New York Times, 1878). By the end of the 1880s public lectures and concerts featuring phonographs were popular and storefront phonograph parlors had proliferated in New York City.

Edison's first attempt to create the illusion of movement was based on the mechanism of the phonograph. Edison mounted a series of still photographs on a cylinder that could be viewed through a microscope. As the cylinder turned the variation between the images were read as motion. The micro-kinetoscope, as the instrument was called, produced the desired sense of motion, however the curve of the cylinder produced significant distortion.

Edison applied for a patent for the kinetoscope (the viewing device) and for the kinetograph (the camera used to capture the kinetoscopic images) in August of 1891. Edison made several revisions before he produced a marketable kinetoscope. Although

it was first exhibited at the Brooklyn Institute of Arts and Sciences in May of 1893, the first kinetoscopic parlors would not open until April of the following year. They provided a semi-private diversion, an escape from the depression that followed the stock market crash in May of 1893 (Kasson, 2001, p.23). Edison's Kinetoscope Company's first ten kinetoscopes were installed in a storefront at 1155 Broadway, north of the A.A. Marks Company factory at 701 Broadway. New York's first kinetoscope parlor was tremendously lucrative, producing a 200% profit in its first month in operation. Following the opening of the first parlor, a more modest one was opened at 587 Broadway (Musser 1990).

The kinetoscope did not project film. The mechanism was housed in a wooden casing eight inches across and standing roughly five feet tall. On the side of the box there was room to display the name of the film inside, and at one end of the top of the casing a double eyepiece allowed the viewer to peer into the machine. The machine could only accommodate one viewer at a time. Inside the kinetoscope the film was fed vertically under the eyepiece at roughly forty frames per second (Musser, 1990).

The first film subjects to be displayed using these devices, were taken from the vaudeville tradition and included dancing girls, a contortionist, and animal acts. One film featured Austrian strongman Eugene Sandow, stripped down to a loincloth in a series of poses meant to establish his strength.

By the time that first edition the *Manual* was published in 1905 projected moving images were far more common than private viewing machines such as the kinetoscope. Edison's first film projector, the Vitascope, debuted in New York in 1896. Despite the prevalence of projected moving images that showed the body in motion, in the *Manual*

(1907) the illustrations that show an able bodied man walking are accredited to “[k]inetoscopic photography [which] affords the most valuable aid to an investigation of the actions of the knee and ankle joints when performing their functions” (Marks, 1907, p17) (see figure 4).

“Kinetoscopic photography” is not a term that can be accredited to Edison but rather was coined by the A.A. Marks Company. Edison’s kinetograph was the device that recorded the negative of the film; the kinetoscope did not capture images, it was merely the viewing device for kinetographic displays. Since the kinetoscope was outdated by 1905, and the juxtaposition of “kinetoscope” and “photography” is technologically incorrect, it is judicious to inquire what the A.A. Marks Company stood to gain from use of the the term “kinetoscopic photography.”

While the kinetoscope was obsolete in by 1905, it had reached the height of its popularity a decade earlier and would be familiar to Marks’ audience. The A.A. Marks Company was so confident that this invocation of the kinetoscope would resonate with its clients, that the term “kinetoscopic photography” was maintained through the *Manual’s* sixth edition in 1920.

The kinetoscopic technology differed from the vitascope in one important respect. Vitascope film was projected and could be viewed by a group of people all at the same time. While kinetoscopes were set up in publicly accessible parlors, kinetoscopic films could only be viewed by one person at a time. The viewing experience was private even if the parlor was a public venue. This tension between what can be seen publicly and privately resonates, as we will see below, with the rhetoric of concealment and display

that permeated the discourse surrounding imitative artificial limbs and their users in the United States in the late nineteenth century.

While the company is no longer lauding “instantaneous photography” in the *Manual of Artificial Limbs*, it does still retain photography as a central technology. There is a certain tension at play in the company’s terminology. The kinetoscope displayed moving images, while the photograph’s subject is rendered motionless. The term kinetoscopic photography, which at first glance seems oxymoronic, is apt to describe the sense of motion suggested in the *Manual*. The man depicted in the illustration is meant to be walking, but each image is static.

In the *Manual* the images do not retain the same sense of the statistically average walk that was so striking in the *Treatise* (1888). The later literature does not stress the composite, or averaged, nature of the images, but instead offers illustrations of “a man.” By the 1900s the potential of composite photography to capture the statistically average human type had fallen out of fashion (Gillham, 2001). Although the A.A. Marks Company is still keen to align itself with visual technologies, it distances itself from composite photography once the scientific potential of criminal composite photography had been abandoned.

When the company first published the *Manual* in 1905, the content of the vitascope films varied considerably from the kinetoscopic films referenced in the literature. While the vitascope films had storylines, kinetoscopic films simply displayed bodies in motion.

The earliest kinetoscopic films were produced by men for a largely male audience. The early test films such as the *Blacksmith Scene* (1893), shown at the

Brooklyn Institute for Arts and Sciences, and the *Edison Kinetoscopic Record of a Sneeze* (1894) had male subjects. The content of the early films also suggests a male audience.

The first female film subjects were vaudeville actresses performing suggestive dances in such films such as *Annabelle Serpentine Dance* (1894) and *Dance De Ventre* (1894).

The film *Carmencita* (1894), which featured a young woman whirling about for the camera while lifting her skirt to the knees to reveal her legs, raised the ire of the Society for the Suppression of Vice in San Francisco, and was banned by the mayor of Ashbury Park in New Jersey (Musser, 1990).

Revealing dances by women were not the only controversial kinetoscopic subject. Boxing, another display aimed at a male audience, was a popular kineoscopic film subject. Although prize-fighting was prohibited in the United States, Edison and his producers managed to evade litigation by the state. Films such as *Corbett and Courtney Before the Kinetograph* (1894), also known as *The Corbett-Courtney Fight*, and *The Leonard-Cushing Fight* (1894) offered rounds of prize fighting to audiences who might not otherwise have access to boxing matches.

However, it is Edison's film *Sandow* (1894), that that encapsulates an orientation towards the body that is consistent with the A.A. Marks Company's promotional literature. The film featured Eugene Sandow, the Austrian strongman, dressed only in a loincloth, flexing for the kinetograph.

Sandow (1894) was filmed at Edison's studio, the Black Maria, in West Orange, New Jersey. Edison's secretary Alfred O. Tate had had that studio built only a year before. Ready for production by May of 1893, the Black Maria - named after the police wagon which it resembled - was designed to allow the film crews to use the light of the

sun to illuminate their subject. The studio was the size of small farmhouse. The roof could be removed to illuminate the actors below, and the whole studio rotated in order to take advantage of the sun as it moved through the sky (Musser, 1990, p. 77).

In May of 1894, Sandow posed for the kinetograph in the Black Maria. The film opens with Eugene Sandow facing the camera squarely, naked but for a loincloth, his arms raised with his hands behind his head. At first glance the film looks like a still photograph – Sandow is not jumping about like the dancers and gymnasts who had been kinetographed in the preceding year. He begins to flex his biceps, left then right then left again. He sighs, frowns, crosses his arms, looking off camera menacingly. Then he begins the series of poses that he had made famous in his vaudeville act. He flexes his stomach. He turns away from the camera stretching his arms out to display his back muscles. Turning back to the camera glowers and flexes, holding each position for a moment, as though creating series of stills. The film has no narrative, and like most kinetographic films, it simply shows the body in action.

Sandow was filmed in May of 1894, when his career was at its height. After years of vaudeville in England, he arrived in the United States in June of 1893 and enjoyed unremitting popularity on the American stage until he returned to permanently to England after being granted British citizenship in 1906. Touring the United States, Sandow performed a two part act. He would strike poses meant to suggest the civility of Greek and Roman statuary, followed by demonstrations of his strength. John Kasson, who specializes in American cultural history, has argued that Sandow elevated the status of the strongman from the sideshow entertainer “who might be mistaken for a blacksmith, but never for a gentleman ... [to] icon of the hypermasculine who with his extraordinary

muscular development literally embodied characteristics that...men and women believed where threatened by modern life” (2001, p. 29).

“Sandow, [who] emerged as the most brilliant performer of manhood in the 1890s” (Kasson, 2001, p. 23), was as skilled at self promotion as he was at quasi-classical posing. He published his first book *Sandow on Physical Training* in 1894. *Sandow on Physical Training* (1894) is both a co-authored autobiography and self-help manual meant to encourage those men “whose weakness of body could not withstand the mental and bodily strain the struggle of life” (Adam, 1894, p.5). As Kasson points out, Sandow had altered many of the biographic details of his childhood (2001, p.32), in order to maintain his public persona of a man with a strong body that supported a strong mind. The fictional autobiography plays on the fears of the deterioration of white masculinity, only to provide a redemption narrative that encourages men to develop their on physiques (Kasson, 2001). In his youth, according to *Sandow on Physical Training*, he was “slight...and [had a] rather delicate constitution” (1894, p.23) and his family members were of average build. The account depicts Sandow as a studious young man, whose passion for physical fitness was not roused until he was exposed to Greek and Roman sculptures on a trip with his father to Rome. *Sandow on Physical Training* recounts how he turned from the chiseled physiques of the statues in wonder to ask his father ““Had the race deteriorated, or were the figures before him only the ideal creation of god-like men?”” To which his father replied that “the race,” presumably white European

‘had suffered physical decline, and even in its choicest individual specimens had fallen grievously from its once mighty estate’...Eugene [sic], contrasting his own slight figure with the mighty thews and graceful forms of the statued heroes about him, conceived the idea to train his body to ...approach... the ancient ideal of physical power and beauty.

(Adam, 1894, p.25)

This sacrin tale of inspiration at the feet of ancient statutes belies his actual childhood as the son of a grocer who spent years doing menial work for traveling circuses before attaining fame in the 1890s.

The kinetograph is symbolically useful to the A.A. Marks Company, not only because it evokes ease of movement, but also because it evokes the values embodied by Eugene Sandow. Sociocultural anxieties about amputation included a fear of emasculation (Serlin, 2004) and the personhood of the feminized male amputee (O'Connor, 1997). If there was a general concern about the era's threat to masculinity, and a particular concern about the feminizing effect of amputation, then there is no better way for the A.A. Marks Company to allay the fears of its male clients than by referencing the kinetograph. To the nineteenth century amputee, as will be argued next, the ability to conceal amputation was paramount. While kinetoscopes were set up in publicly accessible parlors, rather than in private residences, kinetoscopic films could only be viewed by one person at a time. The viewing experience was private even if the parlor was a public venue. This construction of the walk resonates, as will be argued below, with the rhetoric of concealment and display that permeated the discourse surrounding artificial limbs and their users and the perils of public space.

At play in both the reference to the kinetograph and to the composite photography used by criminologists are tensions about the concealment and display of the amputated body. While the kinetoscope provided a private glimpse of the illicit (women's legs, illegal boxing matches) in a public space, the composite photograph was meant to make inner criminality publicly recognizable. Throughout *A Treatise on Artificial Limbs with*

Rubber Hands and Feet (1888) and the *Manual of Artificial Limbs* (1907, 1920), the company stresses that an amputee using Marks' artificial legs is indistinguishable from the individual using normative legs.

5.3 Concealment and Exhibition

Part of the purpose of the imitative, rather than purely functional, artificial limb is that of concealment. Marks can imagine "nothing so distressing, especially to the sensitive person, as the exhibition of any imperfection in his anatomy" (Marks 1907, p.183). The artificial limb must conceal any deformity and in order to do so must conceal itself. The *Treatise* describes the effort involved in creating a foot that would be silent. The literature is critical of the articulated ankle: even "if [the ankle did] not... break, there would be a squeak or a grinding noise when it was in use" (1888, p10).

As Bryan Turner asserts in *The Body and Society* "to be born and embodied does not ensure social membership" (Turner 1984, p.205). Turner cites Christopher Boorse's distinctions within the category of 'unhealth.' According to Boorse, the individual that varies from the biological norm is diseased, the individual who senses unhealth is ill, and the individual that expresses unhealth in a socially recognisable manner is sick (Turner p.207). According to Turner's model, the mentally ill are read as sick because they act in socially unacceptable ways. Although Turner is using the term 'sick' to refer to the socially undesirable behavior of the culturally contingent mentally ill, his label is useful to understand Marks' instance on the importance of concealing amputation and the use of an artificial limb.

According to the A.A. Marks Company, an amputee's stump was likely to become "effete," prone to "nervous disturbances...in accordance with physiological and

psychological laws” (Marks, 1907, p.185) if not provided with an artificial limb. Erin O’Connor has argued that even though the stump is not autonomous from the body, the company is suggesting that it is prone to mental illness (1997). If behaviour is an indicator of mental illness, as suggested by Turner, then the assertion in the literature that distal end is showing “psychological” imbalances unrelated to the psyche of the amputee is well founded. Accordingly the amputee with a limp, a clattering ankle joint, a twitching stump or a knee that does not articulate is also sick, for he is certainly not presenting his body in way that is socially acceptable. To present the appearance of a whole body through the use of an imitative limb, allows the amputee to no longer be ‘sick.’

The strictures of the medical community were not the only forces brought to bear on users of artificial limbs. The imitative imperative in the design of artificial limbs was a response to the norms of self-presentation. The public self-presentation of a normative body had more repercussions than simply the appearance of good health. A man’s walk at the time that the company published his *Treatise* was a marker of his social status. In the *Manual of Artificial Limbs* (1907), the company re-affirms the meaning attributed to an individual’s walk.

The uniformity of and regularity [of the motion of the leg’s component parts] all form a part of [a man’s] individuality and make it possible to distinguish a friend from a stranger long before his features have come into vision... A man of good health walks differently from an invalid, a farmer can be distinguished from a merchant, a bookkeeper from a railroad conductor, the sprightliness of youth, the infirmities of age are reflected in every step taken.

(Marks, 1907, p.17)

The A.A. Marks Company is not simply inventing an arbitrary standard gait in order to create fears of social exclusion in its clients. It may be playing on their fears, but

the company is not the originator of these standards of self-presentation. Gait had long been an exterior marker of interior refinement. For example, according to *The Mentor: A Little Book for the Guidance of Such Men and Boys as Would Appear to Advantage in the Society of Persons of the Better Sort* (1884), "...a man's walk [is] an index of his character and the grade of his culture ... There is the thoughtful walk and the thoughtless walk, the responsible walk and the careless walk, the worker's walk, the idler's walk, the ingenuous walk, the insidious walk and so on" (quoted in Kasson 1990, p.132). The static appearance, captured in photographs, or the moving appearance, captured by the kinetograph, were indices of interiority. An individual's walk served as a similar index.

The A.A. Marks Company suggests that using an imitative limb is also a marker of a refined interiority. Exhibiting amputation, through the use of crutches or a peg leg is distressing to the "sensitive person." The middle classes used "Rogues Galleries" to distinguish their own appearance, and inferred refined interiority, from the appearance and innate criminality of the criminal classes. Similarly, the amputee who uses an imitative prosthesis, which infers certain sensitivity, can draw a distinction between himself and the evidently insensitive amputee who uses crutches or a wheelchair.

In order to conceal amputation, artificial limbs had to be constructed to conceal themselves. The A.A. Marks Company asserts that the inability to conceal the amputation, and by extension the artificial limb, would make an "exhibit [of the amputee's] condition to those from whom he wished to conceal it" (1888, p.10). Amputees' endorsements of the company's rubber foot often reference the feeling of being on display when their limbs made by the company's competitors ceased to work properly. One man's limb splintered which "furnished a crowd of the curious which

looked piteously upon” him (Marks, 1888, p.11). Other amputees are derisive about the “rattling, ... unpleasant noise,”(p.221) “clicking ankle” (p.226) or “click-clack of other patents,” (Marks 1888, p 218). In contrast, the company’s rubber foot keeps amputees from being on display.

Repeatedly in the testimonials that conclude the *Treatise* amputees stress the importance of not giving off the visual cues that suggest amputation. Herein lies the ontological parallel between the automata and the imitative artificial limb: they are both constructed to conceal their construction. One amputee asserts that “people generally do not observe that I wear an artificial leg” (p.217), and another that Marks legs provide such excellent concealment that “there are scores of people with whom I have been acquainted for fifteen or twenty years who do not know that I have lost a leg” (Marks, 1888, p.228).

This stress on the capacity of the company’s limbs to conceal amputation belies the frequent display of artificial limbs and pictorial images of amputees in the exhibitions, museums and fairs of the nineteenth century.

5.4 The Visual Representation of Amputation in Public Spaces

Opened in 1862, the U.S. Army Medical Museum served as a space to both preserve and display pictorial representations of medical discoveries, particularly as they related to the American Civil War. The Museum housed over four hundred surgical photographs that recorded the bodies of soldiers before and after amputation. The museum also contained an exhibit consisting of hospital beds and mannequin patients (Brown, 2001). Twenty-nine of the U.S. Army Medical Museum’s photographs of amputees were loaned to the Centennial Exhibition held in Philadelphia to mark the

United States' hundredth anniversary. William Bell, a double amputee and veteran of the Civil War, was one of the amputees whose photograph was on display at the Centennial Exhibition (Brown, 2001). Dressed in a shirt, jacket and loincloth, reminiscent of Eugene Sandow, his amputation is on display much as the strong man's muscles had been in Edison's kinetoscopic film (see figure 5).

Artificial limbs, displayed without their amputated owners, were popular exhibits in the United States during the second half of the nineteenth century. In addition, artificial limbs were often tested before the public. Amputees wearing limbs made by various manufacturers would race or walk before a crowd or a panel of judges. Prosthetic representations of the body, artificial limbs, hid amputation. At exhibits photographic representations of amputation displayed the amputated body. With slightly fewer than 9 million visitors, the amputated body at the Centennial exhibition was certainly not concealed. The A.A. Marks Company displayed the artificial limbs at exhibitions in New York, Atlanta and Chicago. The A.A. Marks Company was not the only company to exhibit its products at fairs and expositions. The Bly artificial leg was featured at the New York State Fair in 1858, and the Clement artificial leg was displayed at the Centennial Exhibition in 1876 (Mihm, 2002).

Visualist have theorized the museum as a peculiarity of western culture. Tony Bennett in his monograph *The Birth of the Museum* (1995), theorizes the place of the museum in relation to nineteenth century imperialism. Rather than theorizing the museum or exhibition as the strict reversal of the panopticon, he reads the architecture of exhibitionary structures as technology which, like the scaffold, serves to display the manifestation of power. The visitor to the exhibition is not all seeing like the observer in

the panopticon. The viewer is more closely aligned with the spectator of a public punishment: the viewer identifies with the power to organize and classify as part of the public good. Bennett argues, for the museum viewer's experience differs in one important respect from the experience of the scaffold viewer. The scaffold viewers are meant to realize that they too might be subject to this display. The museum's viewers are allied with the power to display, they are "complicit" with rather than "submissive" to this display of power. The viewer, Bennett argues, is thus subjugated through the flattery of inclusion on the side of power (Bennett, 1995).

Bennett does include an analysis of the subjects of the power to order and create hierarchies, but only as it applies to anthropological displays of indigenous cultures. What Bennett's framework lacks are the tools to address the subjectivity of the non-indigenous people on display. Amputees on exhibit at the Centennial Exhibition were put on display in photographs rather than in 'villages' as those from other cultures were, but, none the less, they too were subject to display.

Through this process the amputee is left with a double subjectivity, which is not offered to the aborigine on display. The amputee is both subject to the coordinating principles of the exhibition, but is also invited to be a member of the spectatorship, provided that the amputee can pass as non-artificial limb user.

The artificial limb was also a popular display at exhibitions. The limbs themselves were displayed as the end result of technological advancement. As exhibitions stopped serving as a tool to educate about the processes of production, and rather, focused on the products produced by those processes instead (Bennett, 1995), they helped remove the possibility of self-sufficient limb production. Through the

exhibitionary impulse, the amputee becomes subject to the gaze and is encouraged to alleviate the pressure of that gaze through the consumption of imitative limbs produced by manufacturers like the A.A. Marks Company.

Timothy Mitchell describes the function of exhibits in relation to the outside world. Exhibition and representation are not limited to the museum or exposition, but rather, permeates the western world outside the museum's walls. The need to organize the view in the nineteenth century was part of public life. From the model farm to the shopping arcade, this western proclivity for pre-arranging what can be seen, creates a spectator out of every normative individual who occupies public space (Mitchell, 1989).

The A.A. Marks Company acknowledges that there is a certain deception in the creation of imitative limbs; however this deception, rather than being avoided, can go undetected through the repeated redesign of the limbs. The *Treatise* reproduces an article which asserts "even when artificial legs were first introduced they were so imperfect that no one was deceived by them" (1888, p.150). Detection, this article suggests, is more problematic than deception.

The A.A. Marks Company had three potential venues for display: exhibitions, catalogues and limbs. The company did commercially exploit the opportunity to display their wares at public exhibitions. The company's literature did not make a public display of amputees and artificial limbs, as it was meant to be consumed in private. The artificial limbs themselves, far from revealing amputation, were meant to conceal amputation from the constant spectators who share the public space with amputees.

5.5 The Whole Body

The A.A. Marks Company's concealment of amputation in its most extreme manifestation is marked by a slippage between the amputated body and the whole, or normative, body. There is a simple type of mathematics at work in the literature: Marks' artificial limbs as an addition to the amputee results in a whole human. It suggests that the body of an amputee that uses Marks' prosthetics will be read by the ever-viewing public as a normative body.

The A.A. Marks Company offers to make the amputee into a natural whole human, to bring the missing or damaged limb back to good working condition. The *Manual* "clearly describes how [missing extremities] may be repaired by artificial methods" (Marks, 1907, p.3). The amputated body part is not simply being replaced with a mechanical visual imitation of the body; it is being repaired. One article in commendation of the company's limbs states that "[f]ormerly a cripple was a cripple, and hobbled through the world as an object of pity...[but] such improvements have been made...[that] only an expert can detect [an artificial limb]" (Marks, 1888, p.150). Underlying this praise is the assumption that the addition of an artificial limb transforms the cripple. Due to the elimination of the visual cue (hobbling) the public would never recognize as an amputee.

Not only does the company assure amputees that its artificial limbs will not attract attention through undue noise, they will also permit amputees to maintain their social standing, without revealing the amputation. The literature includes an account of the experience of a railway worker with two artificial legs, of whom "it never occurs to anyone that his lower extremities are not real, and his actions never betray that fact"

(Marks, 1907, p. 109). The A.A. Marks Company makes similar arguments in favour of artificial arms which “restore a natural appearance to the person, avoid observation and comment, and ... will become companionable and necessary to the wearer’s mental comfort” (Marks, 1907, p.184). The literature recommends artificial limbs for an amputee child so that “he” may be “the picture of symmetry...No one would suspect that anything unusual had occurred to him, his artificial leg performs the functions of the lost one...[he] is not denied a single privilege belonging to those in possession of their natural extremities (Marks, 1907, p. 154).

According to The A.A. Marks Company there is an entitlement to privilege inherent in having a normative body. However, a body that is publicly and visually indistinguishable from a normative body has access to the same privileges available to the physically normative individual. Eventually, this public wholeness will result in greater mental comfort, although whether this is comfort due to passing as normative individual, or comfort because the amputee now *is* a normative individual is not immediately clear. In her dissertation, Lisa Herschbach argues for the latter conclusion because “as far as prosthesis was concerned, a man need only be outwardly whole in order to recuperate his interior integrity” (Herschbach, 1997, p.113).

The amputee is not simply constructed in the *Treatise* and the *Manual* as a passive, non-threatening consumer of the A.A. Marks Company’s products. As the visual references made in the text reveal, the attempts to produce artificial limbs that resembled the limbs that they were replacing, was an exercise driven by anxieties of the era. Amputees, particularly those that osculated between hiding and revealing their amputated state, present a danger to the social codes of the turn of the nineteenth century. It is in

the slippage between the whole normative body and the amputee that the argument that links interiority to physical appearance begins to break down. Middle class Americans, whether they were amputees or not, used visual cues to infer interiority (Smith, 1999). Through the constant visual policing of public space (Mitchell, 1989) individuals of questionable character could easily be detected. This public space was dangerous terrain for the amputee, since not only physical appearance, but also gait, was a marker of interiority. Through addition of Marks' artificial limb, the amputee's gait would be normative, suggesting that the amputee had a refined interiority. However, the amputee destabilizes the connection between innate internal character and appearance. Since the amputee could remove his artificial limb, he could produce two types of gait, suggesting two types of interiority. It is crucial for the company and others to assert the importance of using artificial limbs that best imitate the body; if amputees constantly shifted between two appearances, such shifting through addition might be available to both the middle class and the criminal classes, which would undermine the innateness of the link between appearance and character. The capacity to alter appearance and gait would allow people of all classes to slip, like the amputee, between normative and non-normative worlds.

Chapter Six

Conclusion

In order to reconstruct the chains of affiliation in which imitative artificial limbs where first mass-produced and marketed, this project has merged the methods espoused by visualists (Mirzoeff, 2006) and critical discourse analysts (Fairclough, 1995). The amalgamation of these two methods has allowed for an inquiry into the new imitative imperative that was evident in the social discourse surrounding artificial limbs at the end of the nineteenth century (Mihm, 2002). This thesis has demonstrated the how technologies of vision, specifically instantaneous photography and kinoscopic film, were invoked by the A.A. Marks Company in constructing a good, imitative limb-wearing client. The invocation of these technologies reveals the deeper concerns of the era surrounding masculinity, display and the ability of the amputee to transgress socially defined reified rules of appearance, which were all bound up in the ascendance of imitative artificial limbs.

The project contributes to the emerging field of the history of prosthetics. With only one subject, the A.A. Marks Company, this particular study is limited in scope. This project has provided insight into the concern with the visual of one prostheticist at the turn of the twentieth century. However, these findings cannot necessarily be generalized to the work of all limb manufacturers of the era. A survey of the literature produced by the A.A. Marks Company's rivals, and the self-reports of artificial limb consumers, would provide an engaging point of comparison. It would be engaging to ascertain how the imitative limb was framed in different parts of the United States, as well as across genders and socioeconomic classes.

As garnered from the literature the study of the history of prosthetics is a relatively new field. The popularization of cybernetic limbs is one particularly under-theorized development. With the change in the sense of the body that accompanies cybernetic theory, further research in this area would be fruitful.

6.1 Potential for Future Research: Imitative Cybernetic Limbs

The proceeding analysis revealed that A.A. Marks Company literature reflected and reinforced the methods used at the turn of the twentieth century to manage social anxieties about appearance and innate character. Since the sixth edition of the *Manual* was published in 1920 there have been both cultural and technological changes regarding imitative limbs which warrant further visualist analysis.

The A.A. Marks Company produced mechanical prosthetic technology at the end of the nineteenth century. In contrast to the A.A. Marks Company's limbs, advanced artificial limbs from the end of the twentieth century are run on cybernetic principles.

Cybernetic theory suggests that both humans and servo-mechanical machines operate based on stimulation from their surroundings. Cybernetic systems are self-regulating; when there is a change in the stimulus the system will alter itself in relation to that stimulus, to ensure that the system can continue to function. Cybernetic theory posits that 'smart' machines can use feedback as means to guide their actions. During the Second World War Norbert Wiener suggested the humans acted in exactly the same way – gathering feedback from the environment around them, determining whether they are in a position to reach their goal, and adjusting their actions accordingly (Galison, 1994).

Cybernetic theory is also used to guide robotic of artificial limbs. The limb responds to changes in the electrical currents produced by the muscles in an amputee's distal end.

The cybernetic limb continues to perform a specific task, while checking for changes in stimulus, once a change is detected the limb alters the task it is engaged in.

In the spirit of historical specificity, any inquiry in to the disparity between these two types of limbs would have to investigate the sociocultural climate in which they were produced. While cybernetic theory was developed by Wiener, it was his physician Dr. Melvin Glimcher, who applied it to artificial limbs. Glimcher traveled to Russia in 1961 to observe the USSR's prosthetic development, which included experiments with servo-mechanical systems. Glimcher was much impressed. Upon his return to the United States he struck up a partnership with Robert Mann, Amar Bose from MIT and one of Bose's graduate students Ralph Alter. They sought to develop a working and practical myoelectric arm for Liberty Mutual, of which Glimcher was the Associate Medical Director of the Medical Services Centre. The MIT team developed the 'Liberty Arm,' also known as the 'Boston Elbow.'

Glimcher was influenced by Norbert Wiener's cybernetic theory. Wiener did more to contribute to the development of prostheses than blurring the line between the self-regulation of humans and machines. In the 1950s he conferred with Dr Melvin Glimcher, suggesting that the electrical impulses in the distal end of an amputee's arm could provide the feedback needed to direct the movement of a prosthetic hand. In return that hand could provide sensory feedback to the amputee, much a natural arm did. Wiener's prosthetic imitation of the body is based on behaviourist principles, while Marks' prosthetic imitation of the body is base on aesthetic principles. These dissimilarities warrant further investigation. Mechanical prostheses and cybernetic prostheses are meant to replicate and imitate the body and yet operate on different

principles. Since these imitations of the body vary, it is possible to ask what they reveal about the contemporaneous conception of the body that they imitate.

Appendix Images

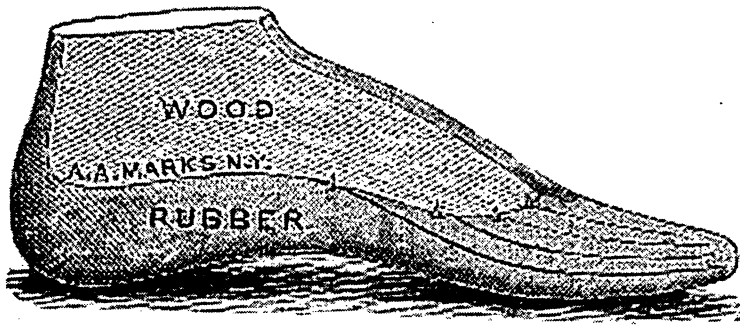


Figure 1. The A.A. Marks Company Patent Rubber Foot.
(Marks, 1888, p. 23)



Figure 2. Walking captured by instantaneous photography.
(Marks, 1888, p. 15)



Figure 3. *Prevalent Types of Features among Men Convicted of Larceny*
By Sir Francis Galton

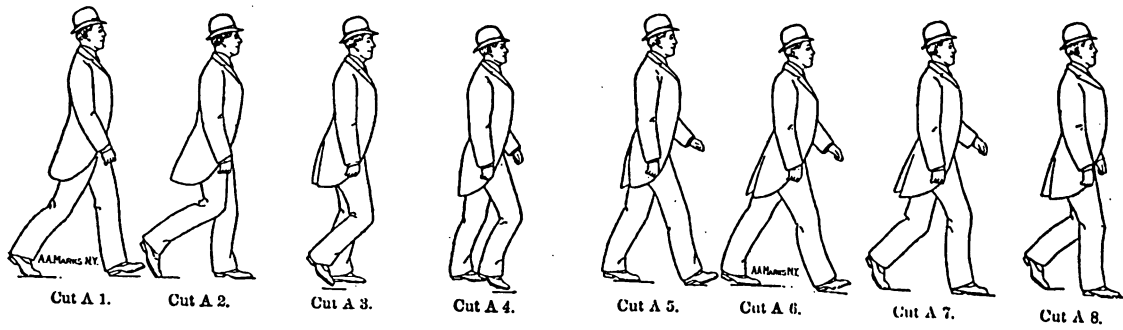


Figure 4. Walking captured by kintoscopic photography.
(Marks, 1907, p. 18)



Figure 5. *Private Columbus Rush*
By William Bell on behalf of the U.S. Army Medical Museum
The photograph on the left was loaned to the Centennial Exhibition in 1876 (Brown, 2001)

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