

Locating the Hand and Sense of Touch in Sixteenth-Century Surgical Writings of Ambrose Paré and Hans von Gersdorff*

On Altıncı Yüzyıl Cerrahi Yazılarında El ve Dokunma Duyusunun Yeri: Ambrose Paré ve Hans von Gersdorff Örnekleri
Jameson Bradley Kismet Bellⁱ

ⁱPh.D, Boğaziçi University, Faculty of Arts and Sciences, Department of Western Languages & Literatures
<https://orcid.org/0000-0003-1488-599X>

ABSTRACT

Objective: This article offers two case studies of sixteenth-century surgical approaches to the hand and definitions of the sense of touch in works by Frenchman Ambrose Paré and German Hans von Gersdorff.

Method: Through comparative analysis, this article studies references to and treatments of hand ailments in the sixteenth-century surgical manuals printed by Ambrose Paré and Hans von Gersdorff. Research was conducted between 2012-2014, updated in 2023, and focuses specifically on digital versions of Ambrose Paré's vernacular French "Ten Books of Surgery" collected in his *Opera Omnia* (1575) held at the Bibliothèque nationale de France and Hans von Gersdorff's *Feldtbuch der Wundartzney* (1517) held at the University of Heidelberg, Germany.

Results: The human hand in the sixteenth century was both a natural and symbolic object whereby the hand offered individuals the immediacy of the sense of touch, established the boundary between those that exercised their hands (manual practitioners), and those who abstained from manual labor in favor of intellectual pursuits (theoreticians). Through discussions of limb amputation, Ambrose Paré located the sense of touch in the soul and not an amputated limb. In contrast, Hans von Gersdorff located the sense of touch in the hand itself, which retained a special power after amputation.

Conclusion: The increased reliance on dissection and anatomy, visual arts, personal experience, and publishing in sixteenth-century Europe offers historians a series of divergent surgical rituals and interpretations of the body, specifically the hand and sense of touch. Contemporary theories of embodied cognition mirror the problem of the location of the sense of touch in the mind or in the organ itself found in Paré and Gersdorff's writings.

Keywords: History, Surgical Amputation, Sensation, Phantom Limbs, Sixteenth Century

ÖZET

Amaç: Bu makalede, Fransız Ambrose Paré ve Alman Hans von Gersdorff'un eserlerindeki on altıncı yüzyıl cerrahi yaklaşımlarına ve dokunma duyusunun tanımlarına ilişkin iki örnek sunulmaktadır.

Yöntem: Bu makalede, karşılaştırmalı analiz yoluyla Ambrose Paré ve Hans von Gersdorff tarafından basılan on altıncı yüzyıl cerrahi el kitaplarında el hastalıklarına ve bunların tedavilerine yapılan atıflar incelenmiştir. Araştırma 2012-2014 yılları arasında yapılmıştır ve 2023'te güncellenmiştir. Araştırmada, Ambrose Paré'nin Fransa'daki Bibliothèque nationale de France'ta bulunan *Opera Omnia* (1575) adlı eserinde derlenen, yalın bir Fransızcayla kaleme aldığı "Cerrahinin On Kitabı" eseri ile Hans von Gersdorff'un Almanya'daki Heidelberg Üniversitesi'nde bulunan *Feldtbuch der Wundartzney* (1517) adlı eserinin dijital sürümleri üzerine odaklanılmıştır.

Bulgular: On altıncı yüzyılda hem doğal hem de sembolik bir nesne olan insan eli, bireylere dokunma duyusunun yakınlık ve dolaysızlığını sunarken, aynı zamanda ellerini işleri için kullananlar (örneğin cerrahlar) ile ellerini kullanmak yerine entelektüel faaliyetleri tercih edenler (teorisyenler) arasındaki ayrımı ortaya koyar. Uzun kesimi tartışmalarında Ambrose Paré, dokunma duyusunu kesilmiş uzuvda değil, ruhta konumlandırır. Bunun aksine Hans von Gersdorff, elin ampüte edildikten sonra bile özel bir güç taşımaya devam ettiğini belirterek dokunma duyusunu elin kendisinde konumlandırır.

Sonuç: On altıncı yüzyıl Avrupa'sında diseksiyon ve anatomiden, görsel sanatlardan, kişisel deneyimlerden ve yayıncılıktan giderek daha fazla yararlanılması, tarihçilere özellikle el ve dokunma hissine ilişkin çeşitli cerrahi ritüeller ve beden hakkında yorumlamalar sunar. Paré ve Gersdorff'un yazıları, dokunma duyusunun yerinin zihinde mi yoksa organın kendisinde mi olduğu sorgulamasında, bedenlenmiş biliş üzerine yapılmış çağdaş teoriler ile benzerlik göstermektedir.

Anahtar Kelimeler: Tarih, Cerrahi Ampütasyon, Dokunma Duyusu, Hayalet Uzuvarlar, On Altıncı Yüzyıl

*Mersin Üniversitesi Tıp Fakültesi Lokman Hekim Tıp Tarihi ve Folklorik Tıp Dergisi 2023;13(3):592-599

DOI: 10.31020/mutfd.1285933

e-ISSN: 1309-8004

Geliş Tarihi – Received: 19 April 2023; Kabul Tarihi – Accepted: 07 August 2023

İletişim – Correspondence Author: Jameson Bradley Kismet Bell <j.kismetbell@boun.edu.tr>

Introduction

This article traces the definition and uses of the hand and the sense of touch in the writings of two mid-sixteenth century French and German surgeons, Ambroise Paré (ca. 1510-1590) from Laval and eventually Paris, and Hans von Gersdorff (ca. 1450-1530) from Strasbourg. These two men provide a historical picture of manual (*manus*- Latin for “hand”) labor while also introducing new knowledge to a broad spectrum of practitioners in the sixteenth-century surgical milieu. Untrained barbers, apprentices, masters, and academic surgeons read and used their printed books. Paré and Gersdorff’s similar definitions of surgery and the importance of the hand, yet contradictory locations of the sense of touch, leave historians in a tough place.^{1,2} In their discussion of anatomy and amputation, Paré and Gersdorff reframed the definition of the hand and the sense of touch through the following central questions: where and by what power is the sense of touch? Is the sense of touch in the limb’s flesh (particularly the hand) or the soul? Through the new art of anatomy, printing, and sharing once-secret guild knowledge, and the technique of limb amputations, both Paré and Gersdorff provide unique answers to these questions. Paré located the sense of touch in the soul or mind, while Gersdorff located the sense of touch in the limb itself.

Method

By comparing Paré and Gersdorff’s writings on the hand and sense of touch, this article studies references to and treatments of hand ailments, amputations, and the sense of touch in their sixteenth-century surgical manuals.³⁻⁵ I first offer biographies of the authors, discuss surgery in the sixteenth century, and then compare their writings and treatments of ailments, injuries to the hand and sense of touch, and amputations.

Research was conducted between 2012-2014, updated in 2023, and focuses specifically on a digital version of Ambrose Paré’s vernacular French “Ten Books of Surgery” collected in his *Opera Omnia* (1575) held at the Bibliothèque nationale de France. English translations are taken from Linker and Womack’s translation from 2010 and Thomas’ translation from 1634.^{4,5}

Hans von Gersdorff’s vernacular German *Feldtbuch der Wundartzney* (Field Book of Surgery: 1517) is held and available in digital form at the University of Heidelberg, Germany. Translations from German to English are my own.

Starting first with Ambroise Paré, he is well-known in the history of medicine and surgery for his pleasing writing style.⁶ He began his career as an apprentice barber at the Hôtel-Dieu in Paris, thereafter becoming a military surgeon during battles in northern Italy. Paré obtained the title of royal surgeon to four successive kings of France. Gersdorff, the master-surgeon of the town of Strasbourg, which boasted a growing Alsace and South-West German medical guild, participated as a military surgeon in multiple late fifteenth-century wars with the Kingdom of Burgundy. Through their surgical texts that each received multiple reprints, Paré and Gersdorff are known for introducing anatomy to surgery, the use of printing and visually accurate images to share their art, and the first references to the treatment of gunshot wounds and application of tourniquets, among other discoveries.²

Historical Context

By the sixteenth century, surgery was considered the least important of the three medieval medical arts—along with the academic physician’s diet and prophylactic regimens and the apothecary’s *materia medica*—that specifically required manual intervention to heal a patient.⁷ Whereas the university-trained physician used scholastic medical theory and the apothecaries specialized in herbal remedies to rebalance a sick patient, a surgeon’s name determines their duty, claimed both Paré and Gersdorff in their books on surgery, which comes from the Greek “cheir” and “ergon,” meaning “hand work.”^{3,4} A surgeon’s duty was manual, as

can be seen in the following well-known definition from Paré, which briefly mentions that a surgeon's hands should actively, "eliminate that which is superfluous, restore that which has been dislocated, separate that which has been united, join that which has been divided, and repair the defects of nature."³

Like the quote above, both Paré and Gersdorff introduced new audiences to the manual art of surgery through their printed vernacular texts, both of which copied mainly from the medieval surgeon Guy de Chauliac (1300-1368). Paré wrote and published his *De chirugica* in French in 1564, which was expanded into his *Dix livres de la chirurgie* (Ten Books of Surgery) and were later combined with his other autobiographical writings in his *Opera Omnia* in 1575.⁴ Since the Hôtel-Dieu was considered an extension of the Faculté de Médecine of the University of Paris, which was in a power struggle with the Fraternity of Surgeons of Saint Cosmo, Paré's French publication received censure from both the university and from the fraternity.⁶ Gersdorff's *Feldtbuch der Wundartzney* (Fieldbook of Surgery) first appeared in 1517 and went through at least six reprints throughout the sixteenth century.⁸ Since there was no university in southern Germany, and thus little competition outside of his own guild, his book was an immediate success and copied widely. For both authors, publishing in the vernacular French and German provided an alternative audience to the Latin and Greek-based university teachings of the physician and educated master surgeon.

Surgeons in the early and middle of the sixteenth century needed skilled hands to distinguish themselves from the theoretical university physician who did not touch, and the untrained barber whose hands almost always dissected corpses. This newly created professional surgeon was skilled, knowledgeable, and focused on helping the patient in contrast to academic doctors who desired academic status or quick money. Gersdorff writes about this new profession in the introduction to his surgical tract: "The surgeon has the proper training to use his hands (*Chir-* in Greek, *Manus-* Latin, *Hand-*German) which differentiates him from the physician who does not use his hands."³ Paré provides a similar definition, which combines a skilled hand, training, and the knowledge of final causes. Paré defines surgery as, "the quick motion of an intrepid hand joyned with experience; or an artificial action by the hand used by physick for some convenient intent."⁴

Sixteenth-Century Anatomy

In relation to the hand, we see that this new surgeon was a liminal figure with both manual skill and intelligence, rather than one or the other, as seen in the university professor or barber. An important addition to the repertoire of the properly trained surgeon was anatomical knowledge. Anatomical knowledge, traditionally based both on the writings of Galen of Pergamon (129-216 A.D.) that were transmitted through the medieval surgeon Guy de Chauliac, was increasingly combined with personal experience. Gersdorff writes about blending anatomical knowledge with expert skill in the following quote,

"Only through knowledge of anatomy can a surgeon perform the art of surgery and discern which member is twisted or broken, for what reason it is broken or twisted, and what treatment is to be applied. Without anatomy, which I offer here from Guy de Chauliac and my own experience, the untrained surgeon will surely injure the patient."³

Such anatomical knowledge is not neutral observation, nor does Gersdorff envision a body as passive material to be separated with the knife, listed in a chart, represented in an image, and categorized into parts. The detached, modern medical gaze described by Jonathan Sawday was not yet established.⁹ For Sawday, the mid-sixteenth century was a time of epistemological transition in anatomical knowledge, where "sight" slowly became the most important sense. For Gersdorff and Paré, however, their emphasis on the sense of sound and touch causes us to pause and reflect on the hierarchy of senses, as well as a definition of knowledge where the knower is her/himself affected by that which they know. Through proximity with objects around us, the sense of touch is both the most dangerous and most fruitful.

Paré and Gersdorff's Writings on the Hand

Medieval anatomy considered the body as a “whole,” made from the essence or collective usefulness of all the parts. In this context, to know the hand as a part is to know the hand in relation to the entire body. This is in contrast to modern comparative anatomy, where parts and organs such as hands, hearts, and heads are compared to other hands, hearts, and heads to create an ideal, or neutral object through comparative similarities and differences. Instead, each part of the human body must be known in relation to the whole of the human body, which transmits Aristotelian causes through Galenic anatomy. Paré writes,

Galen fitly lays the parts of man's body before the eyes, to the sense. But here he teaches to know them, not to see them; for he shows why, and for what use they are made. Following Aristotle, we must then know the division of the body from general to the particular and compound to the simple.⁴

The hand, in particular, was understood in its relation to anatomy of the entire body. Namely, both Paré and Gersdorff cite Aristotle's definition of the hand as a tool for grasping and giving the soul knowledge of the world outside the body. Aristotle writes, “the primacy of the hand in the physical world derives from its role in the service of intellect.”¹⁰ The hand has the sense of touch, which is nourished by the four complexions of hot, cold, moist, and dry. To touch is to come in contact with these temperaments in an object outside the body. Through sympathetic knowledge, hot moist flesh will know a hot moist object through what Aristotle calls, “like acting upon like.”¹⁰ The other senses—especially sight, sound, and smell—mediate knowledge over distance and do not offer immediate contact with the four temperaments. The intimacy of touch allowed the intellectual soul to know the world outside the body and extend itself indefinitely through other tools.

This power of intimacy of the sense of touch and extension of the hand allowed Paré and Gersdorff to borrow Aristotle's maxim that the hand was the *architectonic* tool, or “instrument of instruments.”^{5,10} In relation to sensations of pain and pleasure, however, these were not extremes of one or the other of these senses, but separate emotions that could enter or leave the body. For Aristotle, pleasure and pain were moral decisions of the vital soul; to gain more pleasure or avoid pain was the function of location and mobility. If one desires to gain pleasure or avoid pain, such decisions must be made in relation to the betterment of the soul. One “feels” pain or pleasure because of a disturbance in the sensitive soul, which is not a sensation itself. The hand then should be used in service of the rational soul, to cause bodily motion to get pleasure and avoid pain only in relation to the betterment of the rational soul, not the sensitive soul.¹¹

Because both Paré and Gersdorff cite Aristotle in their definition of the hand, the sense of touch, and knowledge, we should look at their references to see how this hand and sense of touch functioned. The hand, for Aristotle, was a human's primary instrument to engage the physical world because of its role in the service of the intellectual soul, which mirrored God's artistic hand in creation.¹² Aristotle emphasized the relationship between the hand and the rational soul because of the hand's obligations to the two other nutritive and vital souls. In his discussion of the soul in Book II of *de Anima*, Aristotle offers his clearest definition of the soul as a tripart unity of nutritive (stomach/genitals), vital (heart), and rational soul (head).¹³

In order to explain this tri-part form, Aristotle presents an analogy of the hand to show the relationship between the matter and form of an object. He states, “If we [humans] were only hand, then the purpose of soul would be to touch.”^{13,14} All souls, for Aristotle, are made of the combination of both matter, which is potentiality, and form, which is actuality. Since, for Aristotle, touch is the form or actuality of the hand, then the purpose of the matter of the hand is to touch and all parts of the hand are related to this purpose. He continues by stating that we, obviously, are not merely hands. The example of the analogy of “hand to touch” is used heuristically to show the relationship of potentiality to actuality. If the hand's purpose is to touch, then the material of the hand is oriented towards touching. Analogously, since the human soul's purpose is

intellectual, then all instruments of the body, including the hand, are oriented toward this intellectual purpose. To use the hand, specifically the sense of touch, is to gather data for the intellectual soul. The alternate uses of the hand, namely to gather food for the nutritive soul, or motion for the vital soul, are only secondary to the hand's primary, rational purpose.

As I mentioned in the introduction, the immediacy of the sense of touch meant that there is no medium between the instrument and the sense organ. To touch an object is to be touched by that object. In contrast, vision, smell, and hearing require the medium of air between the organ and object, which distances sensation from intimate knowledge. Paré and Gersdorff both write about this immediacy in metaphorical terms that “to have something in the hand” or “hand haben” (handy) is to know.^{3,4} The sense of touch was also a direct pathway to divine intervention, where God, Jesus, and Christian Saints often healed through touching. Surgeons in the Middle Ages were not afraid to cite the New Testament and Jesus' many healing practices that used the hand and the sense of touch. Through the power of touch, Paré cites Jesus who had touched and healed the eyes of the blind, the ears and tongue of the deaf and dumb, legs and hands of a cripple, and lepers.⁴ Gersdorff likens the surgeon to Saint Jerome, including a picture of a young cripple boy touching Jerome's cloak for its healing powers.³

Yet, of all the potential material and spiritual good brought about by the hand and sense of touch, as one of the three parts to medieval practical medicine—regiments, pharmacology, and surgery—the use of hands was normally a last resort.^{3,4} To touch a patient was an act with serious implications and consequences. First, it meant that doctors and apothecaries had been unsuccessful and the patient was close to death. Second, touching brought the surgeon in contact with the imbalance through the patient's disease or injury. This intimacy with an unhealthy body brought with it the social stigma associated with the disease and imbalance itself. In addition, if the patient died after a surgeon's intervention, this could bring the newly developing professional surgeon into disrepute, costing future patients/customers.

A second negative characteristic of touch appeared through the practice of dissections, which were increasingly performed during the sixteenth century. The immediacy of the surgeon and the corpse brought with it stories of necromancy, witchcraft, and other unseemly acts.⁹ The dissector was often associated with the executioner and torturer, since they both touched and cut the dead, usually criminal bodies. In order to mediate the social taboo of proximity, public dissections took place in the winter and were often associated with carnival periods where social and moral transgressions were acceptable.¹⁴ Specific redemptive rituals of pleasure balanced the punitive gestures of cutting and dissection.^{14,15} The public nature of dissection and open invitation was also a means of controlling how and when dissectors could manually engage the body.

Paré and Gersdorff's Writings on Touch: In the Limb or Soul?

In the sixteenth century, minor procedures and major surgery such as amputations were a dangerous practice. Gersdorff writes that if a surgical procedure, such as an amputation, is required (after all else is done to forestall it), specific non-surgical pre-operative steps should be taken. First, one should pray to God with clergy and the patient should be given the sacraments before one attempts to cut. As a prophylactic measure, the surgeon should go to mass daily so that God will give him grace in his work.³ Given the low success rate of amputations, and that the surgeon was introduced to patients only after all else had failed, these suggestions were part of the medieval art of dying well, or *ars moriendi*, that was taught well into the seventeenth century.^{16,17}

The unclear relationship between a divine blessing, the touch of death, and the surgeon's manual dexterity can be seen in many places throughout Gersdorff's surgical manual. From these references and a comparison of the works, one can see an alternate relationship between the sense of touch and the hand in Gersdorff

and Paré. For example, when a limb needed amputation because of gangrene or Saint Anthony's Fire (ergotism), various amulets were used to protect both surgeon and patient. The letter 'T' (tau) of the Greek alphabet was considered an ideal focal point of healing powers. Saint Anthony, the patron saint of Strasbourg and the surgeon's guild, also offers special protection.¹⁸ Readers of *Feldtbuch der Wundartzney* can see these symbols in two places. First, at the end of the second tract of surgical procedures, the Tau appears in an image with a description of an amputation. Gersdorff boldly claims he has performed over 200 amputations without anesthesia in the courtyard outside Saint Anthony's hospital. In a picture accompanying a description of the amputation procedure, an apprentice dutifully holds the patient's leg (with tourniquet) while the surgeon cuts below the knee. A basin sits below the point of contact to catch the blood and in the background, a survivor of a lower arm amputation wears an amulet of the Tau around his neck for continued protection.^{3,19}

Performing the amputation within proximity of St. Anthony's church was also more than a coincidental geographical location. The church yard was a holy location with healing powers that helped guide the surgeon's hands in the medical procedure. The text reads like a master speaking to a student through the procedure. A. Hayum has shown how an altarpiece found at the Antonite cloister in Isenheim (Cloister for Saint Anthony) near Strasbourg became the model for some of the woodcut images in Gersdorff's text. The altarpiece at Isenheim, commissioned in 1506 and finished in 1516, also functioned as spiritual protection like the courtyard of Saint Anthony's church, Saint Jerome's cloak, and the Tau amulet. It gains even more importance when one considers witness testimony that limbs from successful amputations were kept in a drawer as relics with healing powers.^{18,19}

What one sees in Gersdorff's writing is that the power of touch resides *in the limb*, rather than in the soul. In contrast, Paré's description of the art of amputation contradicts Gersdorff on several procedural accounts even though he follows the same surgical routine. Paré suggests plans for one of the first tourniquet and clamps or "crows beak" to stop blood, rather than cauterize the wound as Gersdorff suggests.^{3,4} Paré and Gersdorff offer alternate opinions to anesthesia, where Gersdorff declines the use of anesthesia during surgical procedures for fear of harming the patient. Paré offers two suggestions; first, ligatures can be used for their anesthetic and numbing property; second, depending the complexion of the patient, opiate mixtures can be given to stop pain during and after procedures.⁴

Besides these differences, one sees an alternate orientation to the success or failure of the art of amputation in Paré than Gersdorff. Paré writes that, whether amputating hands and arms, feet and legs, each injury should be evaluated and compared individually with the life of the patient after the surgery. The employment of the patient should also be considered so that a prosthesis can be fashioned for the patient's postoperative comfort. To trust a patient's description of the immediacy of the problem is not a wise practice because, Paré says in the following quote, patients do not know the signs that come from their own body:

"I entreat the young surgeon, be not deceived about the loss of sense to the part if the patient contracts gangrene. To trust the patient who speaks of the sense of touch is not wise because patients, if pricked in the injured part will say they have a bigger pain. This pain, however, is based on the fear of pain and not on pain itself. Or, such patients say they have pain in the member months after operation even after the member has been removed. Don't let either of these stories cause you fear. These procedures are necessary for the future of the patient."⁴

These stories have often been discussed as the first account of "phantom limb pain" (PLP) named by the nineteenth century American civil war doctor Silas Weir Mitchell and recently popularized in the 1990s by the neuroscientist Vilayanur Ramachandran, among others.²¹ While this early description of PLP is fascinating, it points to the problem of defining the location of the sense of touch and the body member.²¹

Unlike Gersdorff, Paré argued that the sense of touch remains in the patient after the limb has been amputated. For evidence, he provided two anecdotes to show the difference in lower arm and lower leg amputation. Traditionally, amputations were done on the limb's living flesh as close to the wound as possible, so that any necrosis would not spread and the patient would keep as much of the limb as possible. However, Paré provides a story where one soldier was shot in his ankle. Rather than keep as much flesh of the lower leg as possible, Paré amputated five fingers below the knee for stability and the sake of the patient's comfort in a prosthesis. With the prosthesis, this patient could extend his body and feel the leg, even though the leg was removed.⁴

Another soldier was shot with a musket in the wrist and developed gangrene to the elbow. For Paré, these were all telltale signs of coming death. However, rather than take his own advice and avoid treating terminal patients, Paré was moved by the soldier's friend's entreaty and helped the wounded man. Paré amputated the arm below the elbow so the soldier could have use of both upper and lower arm after the procedure. After the patient survived many complications, Paré applied cauteries to heal the wound and remove scar tissue. Paré noted that the patient found the heat of the cautery pleasurable because of a tickling that ran the entire length of his arm, even the part that had been amputated. Paré emphasized that the normal sense of touch does not receive pleasure from fire, but this soldier did, as well as many others he had treated at the Paris hospital. Like the soldier who felt pain in his leg after the member was removed, this soldier felt a tingling in his arm after the member was removed. The absence of the arm but continuation of the sense of touch allowed Paré to argue that the sense is not in the limb, but in the patient's soul.⁴

Results and Discussion

In both their printed texts, Paré and Gersdorff attempt to create a new surgical professional that was not limited by scholastic theory or uneducated cutting. By exploring the hand, the sense of touch, and limb amputation, I have shown how these men carved out a new domain for the professional surgeon to touch and know. Whereas Gersdorff incorporated the hidden, secret knowledge of religion and the guild, which can be associated with a power of touch that remained in a member after it has been amputated, Paré focused on the patient, not the object. He thus recategorized the sense of touch as belonging only to a living body. Such a reclassification brought with it strong criticism, but it also allowed him to focus on the quality of life of the patient after amputation.

While Gersdorff's location of sensation in an amputated limb seems strange today, the phenomena of experiencing pain away from one's body, as well as locating symbolic power in disembodied objects, corresponds to recent studies of embodied or distributed knowledge,²⁰⁻²² cerebral plasticity,²⁰⁻²² and changes in neural matrices and homuncular body mapping.^{20,21,23} Future research on historical antecedents to contemporary medical and surgical theories is suggested.

Acknowledgements

The author has no conflict of interest to declare.

Article presented at the International Society for Cultural History Annual Conference. It took place in Istanbul, Turkey from 11-14.09.2013. The paper was titled, "Manual Misappropriation: Amputating the Hand in the 16th Century" and The Panel was titled, "Zweckentfremdung: Mis-Appropriation as Cultural Practice and Epistemological Challenge."

References

1. Pouchelle MC. The body and surgery in the middle ages. Morris R, translator. New Brunswick (NJ): Rutgers University Press; 1990.
2. Gurlt EJ. Geschichte der Chirurgie. Berlin: Hirschwald; 1898.
3. Gersdorff Hv. Feldtbuch der Wundartzney. Strassburg: Schott; 1517.

4. Paré A. Ten books of surgery with the magazine of the instruments necessary for it. Linker RW, Womack N, translators. Athens (GA): University of Georgia Press; 2010.
5. Paré A. The works of that famous chirurgion ambrose parey translated out of latine and compared with the french. Young R, translator. London: Thomas, J; 1634.
6. Paget S. Ambroise paré and his times: 1510-1590. New York (NY): Putnam's Sons; 1897.
7. Siraisi N. Medieval and early renaissance medicine. Chicago (IL): University of Chicago Press; 1990.
8. Panse M. Hans von gersdorffs "feldbuch der wundarznei": production, präsentation und rezeption von wissen. Wiesbaden: Reichert; 2012.
9. Sawday J. The body emblazoned: dissection and the human body in renaissance culture. London (UK): Routledge; 1995.
10. Aristotle. On the parts of animals. In: Collected works. Ogle W, translator. Oxford (UK): Oxford University Press; 1908-1954. Book IV.
11. Aristotle. Nichomachean ethics. In: Collected works. Smith JA, translator. Oxford: Oxford Press; 1908-1954. Book II.
12. Rowe K. God's handy worke. In: Hillman D, Mazzio C, editors. The body in parts: fantasies of corporeality in early modern europe. New York (NY): Routledge; 1997. pp:285-305.
13. Aristotle. De anima. In: Collected works. Ogle W, translator. Oxford: Oxford Press; 1908-1954. Book II.
14. Klestinec A. Theatrical dissections and dancing cadavers: andreas vesalius and 16th century popular culture. [dissertation]. Chicago (IL): University of Chicago; 2001.
15. Park K. Secrets of women: gender, generation, and the origins of human dissection. New York (NY): Zone; 2010.
16. Binski P. Medieval death: ritual and representation. Ithaca (NY): Cornell University Press; 1996.
17. Spinrad P. The summons of death on the medieval and Renaissance English stage. Columbus (OH): Ohio State University Press; 1987.
18. Hayum A. The meaning and function of the isenheim altarpiece: the hospital context revisited. Art Bull 1977;59(4):501-517.
19. Kismet Bell J. Performing the sixteenth-century brain: beyond word and image inscriptions. Berlin: Lit Verlag; 2018.
20. Ramachandran, VS, & Blakeslee, S. Phantoms in the Brain. New York (NY): William Morrow, 1998.
21. Giummarra MJ, Moseley GL. Phantom limb pain and bodily awareness: current concepts and future directions. Curr Opin Anaesthesiol 2011;24(5):524-31. doi: 10.1097/ACO.0b013e32834a105f.
22. Clark A. Natural born cyborgs: minds, technologies, and the future of human intelligence. Oxford (UK): Oxford University Press; 2003.
23. Melzak R. Phantom limbs: the self and the brain. The D.O. Hebb memorial lecture. Canadian Psychology 1989;30(1):1-16.