Invisible Hands: Labour in the Seventeenth-Century Foundry and the Making of the *Cathedra Petri* in St. Peter's Basilica

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Abstract
The *Cathedra Petri,* designed by Gian Lorenzo Bernini (1598-1680), is a technological marvel. The *Cathedra* commands the apse of St. Peter's Basilica and is a reliquary for the original wooden *Chair of St. Peter,* from the medieval period. In the 1650s, Pope Alexander VII awarded the commission of this monument to Bernini, who already had a longstanding relationship with multiple Popes before this time. His design for this monument aimed to match or surpass his earliest large-scale bronze achievement, the *Baldacchino,* commissioned by Pope Urban VIII in the 1620s. Both the *Baldacchino* and the *Cathedra* necessitated large teams of sculptural assistants. The *Cathedra* embodies the technical mastery of the Fabbrica di San Pietro's foundry team, which comprised sculptors, founders, goldsmiths, ironworkers, brass workers, and other specialists. Few seventeenth-century sculptors cast their own bronzes; it was commonplace for sculptors to hire founders and foundry teams to bring their designs into reality. As a highly technical and complex process, bronze casting demanded knowledge and experience. In part due to an aversion to manual labour and the established social dynamics and hierarchies of sculptural workshops, the foundry worker has been erased from the narrative of the *Cathedra Petri*'s manufacture. It is well-known that Bernini managed a large sculptural workshop of assistants. The bronze casting specialists, however, were left out of seventeenth textual sources, and continue to be overlooked by scholarship today. Reinterpreting archival documents, I uncover the identities and experiences of foundry workers to highlight their intellectual and physical contributions to the *Cathedra* project.

Resumé
La *Cathedra Petri*, conçue par Gian Lorenzo Bernini (1598-1680), est une merveille technologique. La Cathedra commande l'abside de la basilique Saint-Pierre et est un reliquaire de la chaise en bois originale de Saint-Pierre, de l'époque médiévale. Dans les années 1650, le pape Alexandre VII a confié la commande de ce monument au Bernin, qui entretenait déjà une relation de longue date avec plusieurs papes avant cette époque. Sa conception de ce monument visait à égaler ou à surpasser sa première réalisation en bronze à grande échelle, le *Baldacchino*, commandé par le pape Urbain VIII dans les années 1620. Le *Baldacchino* et la *Cathedra* ont nécessité de grandes équipes d'assistants sculpturaux. La *Cathedra* incarne la maîtrise technique de l'équipe de fonderie de la Fabbrica di San Pietro, qui comprenait des sculpteurs, des fondeurs, des orfèvres, des ferronniers, des dinandiers et d'autres spécialistes. Peu de sculpteurs du XVIIe siècle fondent eux-mêmes leurs bronzes; il était courant pour les sculpteurs d'embaucher des fondeurs et des équipes de fonderie pour concrétiser leurs conceptions. En tant que processus hautement technique et complexe, la coulée du bronze exigeait des connaissances et de l'expérience. En partie en raison d'une aversion pour le travail manuel et de la dynamique sociale et des hiérarchies établies des ateliers de sculpture, le fondeur a été effacé du récit de la fabrication de *Cathedra Petri*. Il est bien connu que Bernini a dirigé un atelier grand d'assistants sculpteurs. Ses équipes sculpturales en bronze, cependant, ont été exclues des sources textuelles du XVIIe et continuent d'être négligées par l'érudition aujourd'hui. Réinterprétant des documents d'archives, je découvre les identités et les expériences des fondeurs et les assistants des fondeurs pour mettre en évidence leurs contributions intellectuelles et physiques au projet *Cathedra*.

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Introduction

Writing about the overlooked contributions of bronze founders, art historian Jennifer Montagu notes, "It is worth looking at the metal sculpture of baroque Rome from the point of view of these men, once so justly admired, but now largely forgotten in our celebration of inventive genius."[1] Even more forgotten, and arguably never justly admired or acknowledged, are those who worked under the founder: the foundry workers. A bronze founder is an expert metalworker capable of casting bronze goods such as doors, bells, cannons, medals, and sculptures. Specialized artisans and craftsmen, foundry workers are assistants to the founder who perform essential tasks before and after the casting. Without foundry workers, large sculptural projects in bronze would not have been possible. This group of labourers, however, has been left out of the history of bronze sculpture and, more specifically, the history of the famed Italian baroque sculptor, Gian Lorenzo Bernini (1598-1680). Central to this thesis is an investigation of the hierarchical organization and social dynamics of the seventeenth-century Italian bronze foundry. In this environment, I explore how relationships between sculptor, founder, and foundry worker reveal the importance of technical knowledge and practical experience.

Many factors contributed to the invisibility of bronze workers. They occupied a lower status as subordinate assistants in the foundry environment where they most often worked under both a master founder and a principal artist, like Bernini. Moreover, in the bronze casting process, it was imperative that the hands of the foundry workers remained undetectable, and that each man's work blended seamlessly into the next to create a coherent finished work, despite the number of hands involved in a sculpture. The contributions of foundry workers have also been characterized as menial manual labour, leading to the assumption that the foundry worker was

[1] Jennifer Montagu, *Roman Baroque Sculpture: The Industry of Art* (New Haven: Yale University Press, 1989), 48.

not important to seventeenth-century bronze sculpture. Without acknowledging the labour force that brought Bernini's designs into reality, scholarship risks perpetuating the idea that monumental projects were solely produced by Bernini or by a single founder. I counter the assignment of credit for large-scale bronze works to a single master artist and argue that the foundry worker was integral to the production of Bernini's largest and most impressive sculptures. This thesis explores the idea that Bernini was much less physically involved in his sculptures than previously thought by examining who possessed the key knowledge and skills required to work in the foundry. Bernini was neither a founder nor a foundry worker and he had to rely heavily on teams of foundrymen to execute his designs. Yet, the artist has received the credit for the making of the Cathedra and the foundry worker has been overlooked.

The focus of my study is the *Chair of St. Peter,* or *Cathedra Petri*, and its manufacture in the Papal foundries in the 1660s. Commissioned by Pope Alexander VII (r. 1655-1667), the large and complex monument commands the apse of St. Peter's Basilica (fig. 1). The *Cathedra Petri* comprises bronze (four church doctors, a highly decorated seat reliquary, two putti, two angels, four Chigi coats of arms),[2] stucco (gilded stucco golden *Glory* – the dynamic and bustling scene above the bronze, including angels, putti, clouds, and rays of sunshine emanating from a small, central window), glass (a small window with a painting of the Holy Dove), and marble (large pedestal). Each of these different materials necessitated its own group of specialized workers. Only a few multi-talented individuals contributed to different areas across media. The overall size of the monument from the marble pedestal to the top of the stucco *Glory* is over twenty-five metres.[3] The scale and complexities of the monument demanded a large team of model-makers,

[2] This list is only partial as there are also bronze angels that were gilded and hidden in the *Glory*. On the hidden putti see Roberto Battaglia, *La Cattedra Berniniana di San Pietro* (Rome: Reale Istituto di Studi Romani, 1943), 23-24.
[3] Clare I. Rogan, "Representing the Seat of Papal Authority: A Rediscovered Drawing for the Chair of Saint Peter by the Workshop of Gian Lorenzo Bernini," *Bulletin of the Detroit Institute of Arts* 94, no. 1 (2020): 41.

sculptors, founders, and foundry workers. The bronze components were cast in two foundries operated by the Fabric of St. Peter's (Fabbrica di San Pietro): the Santa Marta and the Belvedere foundries.[4] The Fabric, called the Fabbrica throughout this thesis, is the body of officials responsible for St. Peter's Basilica's artistic program, maintenance, and conservation.[5] The Fabbrica was responsible for the oversight of the *Cathedra* project, its contracts and documentation, and with providing workers to operate the two foundries.

The central feature of the monument is the seat, which was cast in multiple pieces. In total, the seat is seven metres tall and weighs around sixty thousand pounds.[6] The four figures flanking the seat represent the four doctors of the Catholic church: Saint Augustine, Saint Ambrose, Saint John Chrysostom, and Saint Athanasius (figs. 2 and 3). These figures will be referred to throughout this thesis by their Italian names, S. Agostino, S. Ambrogio, S. Giovanni Crisostomo, and S. Atanasio. Each church doctor statue is five metres tall and weighs an average of twenty-nine thousand pounds.[7] At five-metres tall, the *Cathedra's* doctors are the largest bronzes Bernini ever designed.

Bronze casting is a complex, multistep process. Bernini's preliminary designs would have been realized in drawings and small three-dimensional sketches in clay, called *bozzetti*. The drawings and *bozzetti* would have given rise to small and large models in clay, completed to a higher level of finish. Wood models at the scale of the finished monument were placed in situ to test the scale of the overall work. Following the approval of the final design by the patron, the wax-modelling process began, which marked the beginning of the casting process. Wax inter-

[4] For more on the Santa Marta and Belvedere Foundries, see Emmanuel Lamouche, "Fondeurs, artistes et artisans du bronze à Rome: 1585-1625," (Ph.D. Diss., Université de Picardie Jules Verne, 2013), 162-172.
[5] For more on the Fabbrica, see Louise Rice, *The Altars and Altarpieces of New St. Peter's: Outfitting the Basilica, 1621-1666* (Cambridge: Cambridge University Press, 1998), 7-12.
[6] Battaglia, *La Cattedra Berniniana,* 233, doc. #507.
[7] Battaglia, *La Cattedra Berniniana,* 233, doc. #507. The heaviest doctor is S. Giovanni Crisostomo at 34,023 lbs, and the lightest is S. Atanasio at 23652 lbs.

models were to-scale models of the final sculpture made over a clay core. The surface of the wax was modelled to a highly finished state, and its thickness was carefully monitored. Metal pins were inserted into the core through the wax to ensure the core remained in place in the later stages. Wax tubes, called sprues, were attached to specific areas of the sculpture to provide channels for the molten metal to flow through, vents for the off-gasses to escape, and an exit for the melted wax. When the wax model was properly prepared, it was encased in a layer of investment material, often terracotta, and heated in a furnace to fire the investment clay and melt out the wax. This left a void between the interior surface of the mold and the core, which was then filled with liquid bronze. After the pour of the metals, the cast was left to cool inside its mold and then was broken out. When the cast was out of its mold, finishing processes called fettling and chasing began in order to remove unwanted bronze fragments, repair flaws, improve surface textures, and emphasize details that may have been lost. These tasks can be grouped under the term "cold-work", referencing the work done to the metal after it had cooled.[8] Fettling involves the cutting off of the metal sprues, once wax tubes, in which hot metal flowed and then cooled, as well as the removal of unwanted pieces of metal that may have accidentally escaped seams in the mold, and the removal of the inner core material.[9] Every cast needed fettling, but some bronzes were left without significant chasing to maintain its as-cast surfaces and textures. Chasing involves filing and smoothing surfaces and enhancing textures and lines with punches or chisels.[10] When the bronze cast was finished to the desired visual effect, it could be prepared for gilding. For each stage of these processes, a team of numerous skilled individuals was required.

[8] Richard E. Stone, "Italian Renaissance and Baroque Sculptors in Bronze: The Differentiation of Their Hands through the Study of Their Casting Techniques," In *Italian Renaissance and Baroque Bronzes in the Metropolitan Museum of Art*, ed. by Denise Allen, et. al. (New York: Metropolitan Museum of Art, 2022), 28.
[9] Francesca Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," (Ph.D. Diss., University College London, 1996), 53.
[10] Stone, "Italian Renaissance and Baroque Sculptors in Bronze," 40.

This thesis demonstrates an intersection between social history and art history in which the understanding of an art work's manufacture is enriched by acknowledging the individuals and groups who contributed significant time and labour. Increasing veneration of the status of the master artist and a general aversion to manual labour – that is to say labour that is perceived to be void of intellectual or creative merit – has rendered the foundry worker essentially invisible. Bernini may be mischaracterized as the *Cathedra*'s maker rather than its designer. Design or *disegno* was a celebrated concept in the seventeenth century largely due to Giorgio Vasari's biographical writing which centres greatness and artistic practice upon the artist's ability to create new and innovative concepts or designs. By perpetuating the image of Bernini as an artist-genius, his bronze works appear to be miraculous creations that are produced with minimal intervention from the hands of others. To acknowledge the foundry worker is to acknowledge that Bernini required significant assistance from numerous individuals each with the specialized knowledge required to cast bronzes. Very few scholars describe the details of the *Cathedra*'s production and the labour force necessary to bring it to fruition. The goal of this thesis is to reframe the narrative of the *Cathedra Petri's* creation with a focus on labour, supported by a new interpretation of archival documents. This thesis identifies and defines foundry workers, describes case studies of notable members of the bronze team, and explores working dynamics and social hierarchies of early modern sculptural workshop. By recognizing these foundrymen left in the shadow cast by Bernini's celebrity status, I elevate the contributions of those with the technical skills and embodied knowledge of bronze casting.

Key sources on Sixteenth-Century Bronze Founding

To situate Bernini's practice within the long history of bronze casting, it is useful to consider some of the sculptor-founders who preceded him. Evidence of Italian foundry workers and their relationships to master founders can be found in written sources from the sixteenth century.

Benvenuto Cellini's autobiography details his experiences in the foundry and includes descriptions of his foundry team.[11] As a sculptor and founder, Cellini was capable of casting his own bronzes, a skill that Bernini and many early modern sculptors lacked. Even so, Cellini hired a team to assist him in his workshop. Examination of Cellini's autobiography for details on workshop practices and foundry workers reveals the compelling description of his casting of the *Perseus Holding the Head of Medusa* (fig. 4). Cellini provides a description of the workers that he employed for this project, writing that his team comprised "*maestri di fonder bronzo e manovali e contadini a mia lavoranti particulari di bottega*" (master bronze founders, hand-workers, peasants, and my own special workers).[12] If Cellini used "*lavoranti particolari di bottega*" to mean specialized foundry workers, this terminology points to the individualized expertise brought by each of his "*lavoranti*" in the context of bronze casting. Each man thus contributed a unique skillset to the foundry. Michael Cole's assessment of Cellini's account books from the *Perseus Holding the Head of Medusa* casting reveals more specific details on Cellini's team. He states that Cellini's team comprised:

> three professional bronze casters to help pour the figures, nine gold-smiths to clean and chase them, four marble sculptors to execute the base, as well as three blacksmiths, two masons, four other stoneworkers, and a host of unnamed assistants whose activities are less easy to specify.[13]

[11] In English: Benvenuto Cellini, *The Life of Benvenuto Cellini by Himself,* trans. John Addington Symonds, (New York: Liveright Publishing Corp, 1942); In Italian: Benvenuto Cellini, *Vita*, (Milano: Rizzoli, 1985).
[12] Cellini, *Vita*, 568, translated to English by Jennifer Liu.
[13] Michael Cole, *Ambitious Form: Giambologna, Ammanati, and Danti in Florence* (Princeton: Princeton University Press, 2011), 21. Cole does not provide a citation for these "account books". Here he uses the terms "clean and chase", rather than fettle and chase, but we can assume that fettling took place as well.

Not only does Cole significantly expand on the list provided by Cellini, but he remarkably mentions a group of anonymous, unnamed workers. Cellini perhaps minimized the contributions of this large team to bolster his own image as the master founder. Archival documents analyzed by Cole uncover a clearer picture of Cellini's workshop and support. Cole also claims that for large sculptures, "Cellini, no less than Michelangelo and Leonardo, always relied on specialists when it came time to pour."[14]

According to his autobiography, Cellini initially spoke kindly to his workers during the making of the *Perseus*, indicating a good relationship between founder and assistant. As he left his *Perseus* – the most important work of his life – in their hands, he gave them advice and attempted to inspire them with his confidence. He says to an assistant named Bernardino Mannellini, "You cannot go wrong; these honest men will get the channels ready; you will easily be able to drive back the two plugs with this pair of iron crooks; and I am sure that my mould will fill miraculously."[15] Here, Cellini takes credit for the mold, but has left the channels (sprues) and the pouring of the metals up to the foundry workers. He also characterizes this work as 'miraculous', indicating the technical achievement and challenge of this sculpture and the seemingly supernatural powers of the artist. Soon, Cellini's attitude towards his foundrymen shifted. When they were unable to keep the metal in its liquid form, Cellini had to rise from his sickbed to correct their mistakes. His foundrymen then are described as "traitors" ("*traditori*") and "enviers" ("*invidiosi*").[16] This does not paint a flattering picture of the Renaissance foundry worker. Cellini's relationship to the other "master founders" of his workshop is not necessarily one of equal status, camaraderie, and collaboration. Cellini is a striking example of sculptor-

[14] Michael Cole, *Cellini and the Principles of Sculpture*, (Cambridge: Cambridge University Press, 2002), 46.
[15] Cellini, *The Life of Benvenuto Cellini by Himself,* 432.
[16] Cellini, *The Life of Benvenuto Cellini by Himself,* 433; Cellini, *Vita,* 568.

founder who leads a foundry team with almost total control and authority. His autobiography, however, may have been embellished for dramatic effect.[17] His account of saving the *Perseus* metals by raising the dead – the dead meaning the hardened metals – can be read as self-inflating. Still, his writing helps us to understand the dynamic of a Renaissance foundry that was run by one principal artist, in this case an artist-founder, who was assisted by a group of foundry workers and other master founders. In describing his shifting attitudes towards his assistants, Cellini provides us with one example of how an artist-founder felt towards his helpers.

Another key sixteenth-century source on the innerworkings of a Renaissance foundry is Vannoccio Biringuccio's treatise, *De La Pirotechnia,* or *On Pirotechnics,* of 1540.[18] Biringuccio was an Italian metallurgist with a diverse knowledge of metal – casting processes of different industries, such as cannons, bells, and statues – and metallurgical processes like assaying and alloying.[19] According to Francesca Bewer, the treatise *De La Pirotechnia* may have been written for an educated gentleman.[20] Comparing Biringuccio's text – one which was intended for a more lay-audience – to other metallurgical treatises, Bewer says, "[Birnguccio] is the only sixteenth century writer, except for Leonardo da Vinci, to approach the subject [of metallurgical processes] with a broader perspective on the materials and techniques that resulted from being an experienced foundryman."[21] Here, Bewer brings the founder closer to the centre of the thesis of Biringuccio's text, and foregrounds the place of experiential knowledge in a technical treatise.

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[17] Michael Cole, "Cellini's Blood." *The Art Bulletin* 81, no. 2 (1999): 222.
[18] Vannoccio Biringuccio, *The Pirotechnia of Vannoccio Biringuccio: The Classic Sixteenth-Century Treatise on Metals and Metallurgy*, trans. Cyril Stanley Smith and Martha Teach Gnudi (Mineola: Dover Publications, 2005).
[19] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 11.
[20] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 10.
[21] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 11. Even though Leonardo was interested in technical processes, Michael Cole argues that he did not participate in bronze casting beyond the model-making stage. See Cole, *Cellini and the Principles of Sculpture,* 45.

When it is not possible to know the identities of early modern foundry workers, Biringuccio's treatise may fill in some gaps. In his "Preface to the Sixth Book: Concerning the Art of Casting in General and Particular," Biringuccio paints a colourful picture of what was required of a Renaissance bronze founder.[22] He outlines the dangers of casting and the foundry and emphasizes that not all men were well-suited for the work: "if one is not made of marble", he writes, he will not be able to handle the challenges of the job.[23] Essential characteristics of a founder include strength of body and mind, resilience, and attention to detail. These requirements centralize the spirit and character of the foundryman almost more than his physical strength. Biringuccio makes few references to the relationship between a master founder and his assistants. One passage indicates the importance of *not* relying on one's assistants, for they do not have the eyes or hands of a master.[24] Here, Biringuccio prioritizes first-hand experience and positions the master founder well-above the foundry worker in terms of knowledge level and social hierarchies. Since his text makes few references to his foundry team, it is possible that his level of concern for his assistants was quite low.

Biringuccio also includes illustrations in his treatise. Two in particular show an older man with a younger man working together, which suggests one may be the master founder and the other his helper or apprentice. These important illustrations are "Goldbeaters at Work on a Duplex Plate of Gold and Silver", and "Recovery of Mercury with a Distilling Bell" (fig. 5 and 6). In such images, interestingly, the young apprentice seems to be more actively participating in the work at hand. For example, in "Goldbeaters" (fig. 5), the older man is only holding a gold plate while the young apprentice is the active goldbeater. Cellini and Biringuccio's writing

[22] Biringuccio, *The Pirotechnia of Vannoccio Biringuccio,* 213-17.
[23] Biringuccio, *The Pirotechnia of Vannoccio Biringuccio,* 214. What a great reference to another sculptural medium.
[24] Biringuccio, *The Pirotechnia of Vannoccio Biringuccio,* 215-16.

provide detailed first-hand accounts of the Italian foundry in the Renaissance period. Their texts reveal the kinds of social dynamics at play in this environment from the perspective of knowledgeable founders.

The Presence and Absence of Foundry Workers in Bernini Scholarship

Bernini's sculptural oeuvre has been extensively studied. The monographic study of the *Cathedra Petri* published by Roberto Battaglia is an early attempt to capture the monument's conception and manufacture. Along with a full corpus of the *Cathedra*'s documents, Battaglia included a chapter concerning the *Cathedra*'s chronology, called the "Cronista", which analyzes and interprets the documents to develop a comprehensive timeline of events over the course of nearly ten years of sculptural production.[25] Battaglia is one of the first scholars to name and group collaborators and assistants of Bernini by their contributions to the project. Select foundry workers are credited for work on the *Cathedra,* but Battaglia is not complete in his listings and groupings. There are names from the documents that he seemingly judged to be insignificant and left out of the "Cronista". Despite this, Battaglia's book is very detailed and offers an in-depth look at the *Cathedra* that few authors are able to achieve. My work builds upon Battaglia's foundation of research and looks more critically at how the *Cathedra* was made and by whom.

In publications on seventeenth-century Roman sculpture such as "Bernini Sculptures not by Bernini", *Roman Baroque Sculpture. The Industry of Art,* and *Gold, Silver and Bronze: Metal Sculpture of the Roman Baroque*, Jennifer Montagu exposes how little Bernini was physically involved in his sculptures.[26] The emphatic title "Bernini Sculptures not by Bernini" clearly states

[25] Battaglia, *La Cattedra Berniniana,* 7-61.
[26] Jennifer Montagu, "Bernini Sculptures Not by Bernini," in *Gianlorenzo Bernini: New Aspects of His Art and Thought*, ed. Irving Lavin (University Park: Pennsylvania State University Press, 1985), 25-61; Montagu, *Roman Baroque Sculpture;* Jennifer Montagu, *Gold, Silver, and Bronze: Metal Sculpture of the Roman Baroque* (Princeton: Princeton University Press, 1996).

Montagu's intent to dismantle the illusion that Bernini was the sculptor of his own works of art. Her publications foreground lesser-known artists who were responsible for executing Bernini's designs and she argues that these sculptural workers, who contributed so much to Bernini's opus, have not been recognized sufficiently. In *Roman Baroque Sculpture* she states: "These sculptors, many of whom have been virtually forgotten by the history of art, were responsible for the realization of many of the master's conceptions and for the creation of much of what we see today as constituting the fabric of Rome."[27] *Roman Baroque Sculpture* is perhaps one of the most important sources for my research and approach, second only to Battaglia. In this publication, Montagu explores the nature of sculptural production in both marble and bronze, although she focuses primarily on marble. The third chapter, "Sculptors and Founders," highlights the importance of founders in seventeenth-century Rome and characterizes their relationships with patrons and other artists. She treats the founders as equal to Bernini's assistants; like the workshop assistant who sculpted Bernini's works from his design or model, the founder too brought Bernini's bronze designs into material form.

In her sixth chapter titled "The Boys", Montagu explores an important group of sculptural workers in subordinate positions to a principal artist, sometimes called *garzoni* or *giovane,* meaning 'boys' Italian. She defines this labour group as:

> men who were prepared to work in a subordinate position, taking orders, fulfilling a scheme devised by someone else, and they made up the 'lump', the pool of available sculptural talent which men like Virgilio Spade, Gianlorenzo Bernini, or some other architect, could draw on to execute the major works of baroque decoration which required many hands, and which all too often had to be completed in a hurry.[28]

[27] Montagu, "Bernini Sculptures Not by Bernini," 25.
[28] Montagu, *Roman Baroque Sculpture,* 126.

Her definition of 'the boys' is written only in the context of architectural and marble workshops, but it should be extended to bronze sculptural workshops as well. In the context of a bronze foundry, whether a papal foundry or an independent Roman foundry, these 'boys' – some of whom may have been adults – would have been foundry workers.

No study of Bernini can be complete without consultation of the impressive monograph by Rudolph Wittkower. Wittkower's entry on the *Cathedra Petri* characterizes the monument as "the climax of Bernini's career".[29] He outlines his method of summarizing the designing and making of the *Cathedra* through drawings, *bozzetti* (small-scale and rough three-dimensional sketches in terracotta), and archival documents.[30] Using these sources, Wittkower generally describes the *Cathedra's* model-making and casting processes. He provides a basic timeline that was typical for the ordering of the casts and subsequent phases of production. Wittkower scarcely mentions any contributions by foundry workers. He names a handful of collaborators of Bernini who are more well-known and established in Rome at the time. The only acknowledgement of Bernini's team is a single sentence: "In addition to an army of subordinate helpers, about thirty-five collaborators were engaged on the execution, some of them continuously over a number of years."[31] Wittkower repeatedly simplifies bronze casting and its labour force. In this monograph, the entry on the *Cathedra* is quite brief; Wittkower himself even calls it a "skeleton key".[32] The entry constructs an aura of confusion and unanswered questions that surround the *Cathedra*. Wittkower shows an effort to investigate such a complex monument but does not delve into the detailed processes of bronze manufacture.

[29] Rudolf Wittkower, *Bernini: The Sculptor of the Roman Baroque* (London: Phaidon Press, 1997), 278.
[30] Wittkower, *Bernini,* 278.
[31] Wittkower, *Bernini,* 279-80.
[32] Wittkower, *Bernini,* 278.

Chandler Kirwin's monolithic publication on Bernini's *Baldacchino* is an inspiration to my thesis in its focus on a singular monument and detailed analysis of its manufacture. Through a more technical and scientific lens, Kirwin's approach recognizes that, because the *Baldacchino* was Bernini's first bronze commission, he did not have the knowledge required to execute such an ambitious project. Thus, Kirwin argues that the artist relied on specialized workers and experts to support him and provide the necessary expertise. He effectively challenges the notion that Bernini was the sole designer and "inspiratory genius" of the *Baldacchino* by assigning some authorship to his collaborators, which included other artists, architects, founders, and engineers.[33] Kirwin argues that the *Baldacchino* was a "collaborative venture" in terms of its design, conception, and intellectual basis.[34] He specifically says:

> Much as some would like to see Bernini as the sole inventor of the Baldachin's columns with their extremely complicated external and internal structural systems…much of it lay well beyond his architectural and engineering skills at the time.[35]

It is interesting to note that Kirwin makes no mention of Bernini's sculptural or artistic skills in this quotation; for a project as complex as the *Baldacchino*, it was architectural and engineering knowledge that was more critical. Still, only Bernini receives the credit for the design of this monument even with his inexperience in bronze and reliance on others in both the designing and casting of the columns. *Powers Matchless* reveals that the *Baldacchino* was the combined design of Bernini as the principal artist, and papal founders and engineers who provided the specialized knowledge that he lacked.

[33] Kirwin, *Powers Matchless,* 1.
[34] Kirwin, *Powers Matchless,* 127.
[35] Kirwin, *Powers Matchless,* 120.

While Kirwin's study of the *Baldacchino* is an excellent introduction to Bernini's beginnings in bronze-working, it shows little concern for the foundry worker, instead focusing on the mastery and intellectual or technical contributions of the founders and other specialists. The value and importance of the founder, as an intellectual contributor to this project, is emphasized over the foundry worker. *Powers Matchless* also provides a wonderfully vivid picture of the papal foundries. Kirwin asserts that the foundry would have caught the attention of all in its vicinity with its sights and smells.[36] At the peak of its productivity, Kirwin says it resembled a "madhouse of frenzied activity".[37] We can imagine that the casting of the *Cathedra,* an operation of a similar scale to the *Baldacchino*, produced the same kind of spectacle of man and metal.

Michael Cole has written numerous publications on fifteenth-, sixteenth-, and seventeenth-century Italian art. In his book *Ambitious Form: Giambologna, Ammanati, and Danti in Florence,* he states his goal to "look for one artist who took the responsibility for the work's conception, and assistants who were given the more menial tasks of carrying it out."[38] He aims to unite two methodologies of art historical study: one which focuses on the 'makers' and the other on the 'designers' of sculptures. He claims, "The two approaches are complimentary; together they sustain the idea of a singular artist's role in works acknowledged to be collaborative, organizing different kinds of labour according to hierarchy."[39] This organization of labour through a hierarchy is central to my thesis. However, I challenge Cole's characterization of the assistants' work as 'menial', as it continues to prioritize the artist's inventive genius over the technical knowledge of specialized workers. In *Cellini and the*

[36] Kirwin, *Powers Matchless,* 127.
[37] Kirwin, *Powers Matchless,* 127, 129.
[38] Cole, *Ambitious Form,* 23.
[39] Cole, *Ambitious Form,* 23.

Principles of Sculpture, Cole examines the sculptural workshop and production practices of Benvenuto Cellini. Cole demonstrates the Florentine artist's reliance on other specialists and workers, despite being a master goldsmith and bronze founder himself. Cole uncovers key details of workshop and foundry practices in Italy and navigates ideas of authorship, invention, and the materiality of bronze.

Pamela Smith's extensive work on making and knowing has produced an influential methodological approach to early modern sculpture. In multiple publications, Smith explores the use of artistic creation as a means of investigation and knowledge generation.[40] She writes, "above all else, craft is productive knowledge, and its products are records of practices as well as repositories of knowledge."[41] Smith's methodology is applicable to Italian sculpture production in the seventeenth century, and to the experiences of bronze foundry workers. The idea that sculptures are indices of their maker's knowledge is especially evident in the study of Bernini's bronzes where he was not the primary maker, and he did not possess the knowledge required to make them. Smith's methodology foregrounds the maker, in my case the foundry worker, as a vessel for embodied knowledge, rather than as a mundane labourer acting on the instruction of an artist-genius.

Evidenced by Bernini's biographies, the status of the master artist was never in question, despite his lack of foundry skills and reliance on others. Bernini's biographers illustrate a clear

[40] Pamela H. Smith, *From Lived Experience to the Written Word: Reconstructing Practical Knowledge in the Early Modern World* (Chicago: University of Chicago Press, 2022); Pamela H. Smith, "Historians in the Laboratory: Reconstruction of Renaissance Art and Technology in the Making and Knowing Project," *Art History* 39, no. 2 (2016): 211–33; Pamela H. Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago: University of Chicago Press, 2018); Pamela H. Smith, Amy RW Meyers, and Harold J. Cook, eds. *Ways of Making and Knowing: The Material Culture of Empirical Knowledge* (New York: Bard Graduate Centre, 2017).
[41] Pamela H. Smith, "Making as Knowing: Craft as Natural Philosophy, in *Ways of Making and Knowing: The Material Culture of Empirical Knowledge,* ed. Pamela Smith, Amy RW Meyers, and Harold J. Cook (New York: Bard Graduate Centre, 2017), 20.

image of the artist's career, fame, and legacy while partially acknowledging his workshop.[42] Filippo Baldinucci's biography of Bernini, first published in 1682, offers a relatively well-rounded account of Bernini's life and work and helpful perspectives on the artist's character and status.[43] It is unsurprising, however, that in his biography, the foundry worker receives no attention.

Baldinucci perpetuates an idea of Bernini as an artist-genius and argues that he was imbued with immeasurable talents by nature at his birth that rendered him almost otherworldly. He discusses how the young artist studied the ancient sculptures around Rome and learned first from his father Pietro Bernini (1562-1629).[44] Baldinucci's biography, not unlike Cellini's autobiography, goes on to inflate Bernini's character and his talents to elevate his status. This is especially evident in the last section of his text where Baldinucci valiantly defends Bernini, against "stupid people" who challenged Bernini's genius in their critiques.[45] Baldinucci constructs the artistic persona of Bernini as a genius in all areas of the arts, including sculpture, painting, and architecture. He uses natural talents and genius to distinguish Bernini from his contemporaries. It is this genius that elevates his talent to that of preeminent artists such as Leonardo da Vinci (1452-1519) and Michelangelo Buonarotti (1475-1564). The artist's *disegno* or ability to design or produce innovative ideas elevated the status of the artist to a genius in that

[42] Those named in Bernini's biographies are his most prolific assistants, who often operated their own sculptural workshops as well.
[43] Filippo Baldinucci, *The Life of Bernini,* trans. Catherine Enggass, 2nd ed (University Park: The Pennsylvania State University Press, 2006); My focus is on the earlier biography by Baldinucci, as some have argued that Domenico Bernini's biography is derivative of Baldinucci's. For Domenico's biography see Domenico Bernini, and Franco Mormando, *The Life of Gian Lorenzo Bernini* (University Park: The Pennsylvania State University Press, 2012). A comparison of the two can be found in the introduction of the 2006 Enggass translation, written by Maarten Delbeke, Evonne Levy, and Steven F. Ostrow. See Maarten Delbeke, Evonne Levy, and Steven Ostrow, "Introduction," in *The Life of Bernini,* trans. Catherine Enggass (University Park: The Pennsylvania State University Press, 2006), vii-xxxii.
[44] Baldinucci, *The Life of Bernini,* 8, 15.
[45] Baldinucci, *The Life of Bernini,* 89.

their intellectual abilities that surpassed their technical or manual artistic skills. Of course, artists like Bernini still had an incredible level of artistic skill, evidenced by his early sculptures carved by his own hand, as well as autograph drawings and sketches that are extant and celebrated today.

Notably, Baldinucci's characterizations of the artist's bronze production processes are vague or non-existent. On the *Cathedra Petri*, Baldinucci only mentions Bernini's patience when he had to remake the terracotta models to adjust the scale of the monument,[46] his ability to "make do with little" when having to accommodate the existing window above the apse in his designs,[47] and the invention of his son Luigi di Pietro Bernini who was able to measure the weights of the massive bronze statues with a new device that was "highly applauded by artists and everyone".[48] Beyond this, Baldinucci does not touch on the casting process, Bernini's knowledge of bronze, or the founders and foundry workers with whom he collaborated. In fact, Baldinucci repeats a preference for marble throughout his text. He states that "Before Bernini's and our own day there was perhaps never anyone who manipulated marble with more facility and boldness," but fails to mention the scope of Bernini's successes in bronze.[49] The fact that Baldinucci avoids bronze, in general and in his discussions of Bernini's mastery of various media, could indicate his own unfamiliarity with the medium and its difficult nature. On the other hand, Baldinucci also wrote a dictionary-type publication called the *Vocabolario toscano dell'arte del disegno* (*Tuscan Vocabulary of the Art of Design*) in 1682 which includes some technical terminology related to bronze casting and indicates his knowledge of the medium.[50]

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[46] Baldinucci, *The Life of Bernini,* 44.
[47] Baldinucci, *The Life of Bernini,* 80.
[48] Baldinucci, *The Life of Bernini,* 87.
[49] Baldinucci, *The Life of Bernini,* 74.
[50] Filippo Baldinucci, *Vocabolario Toscano dell'Arte del Disegno, nel quale si explicano i propri termini e voci, non solo della Pittura, Scultura, & Architettura; ma ancora di altre Arti a quelle subordinate, e che abbiano per fondamento il Disegno* (Florence: per Santi Franchi al segno della Passione, 1681).

Still, Baldinucci appears to actively avoid detailed descriptions of bronze and its manufacturing in his biography. As Maarten Delbeke, Evonne Levy, and Steven F. Ostrow argue, *ekphrasis*, a Greek term meaning the literary description of visual art, was not Baldinucci's goal throughout the biography.[51] Further, the founders of Bernini's bronze projects of either small-scale (busts, statuettes, medals) nor large scale (monuments) are never named by Baldinucci.

It is important to note that some of Bernini's assistants working in marble did receive recognition for their carving of sculptures and monuments. Andrea Bacchi, in *Bernini Sculpting in Clay,* affirms that "during Bernini's lifetime, the assistants who carved the large figures of the *Fountain of the Four Rivers* in Piazza Navona were being identified in guidebooks and biographies."[52] We may consider this a possibility for Bernini's largest bronze monuments; however, the foundry worker was not awarded the same status as marble sculptors, and therefore was not likely to be credited in such sources. If seventeenth-century guidebooks made note of anyone on Bernini's bronze team, it would have been the model-makers or founders. For example, Filippo Titi's *Descrizione delle pitture, sculture e architetture esposte al pubblico in Roma: Volume 1,* first published in 1674 and again in 1731 and 1763, has just a short paragraph on the *Cathedra* that names only two people: Bernini and Giovanni Artusi, the master founder.[53] Admittedly, a guidebook is not the type of publication where the author could unpack the complexities of bronze and the full scope of the team involved. The nature of the relationships and hierarchies in Bernini's workshop, and more specifically, the foundry, are not clear from seventeenth-century sources like this guidebook or Baldinucci's biography. To uncover more

[51] Delbeke, Levy, and Ostrow, "Introduction," xxiv.
[52] Andrea Bacchi, "The Role of Terracotta Models in Bernini's Workshop," in *Bernini: Sculpting in Clay*, ed. Claude Douglas Dickerson (III), Anthony Sigel, and Ian Wardropper (New York: Metropolitan Museum of Art, 2012), 48.
[53] Filippo Titi, *Descrizione delle pitture, sculture e architetture esposte al pubblico in Roma,* vol. 1 (Rome: Nella Stamperia di M. Pagliarini, 1763), 14-15.

details on the working dynamics of Bernini's sculptural teams and the processes of making, we must look elsewhere.

Building from the sources discussed, I approach the *Cathedra Petri* from a new perspective to focus on the foundry worker group. This team of workers has not been studied in art historical scholarship. Their specialized knowledge compensated for Bernini's absence from the foundry – he was working on other sculptural commissions and left Rome for France in 1665 – as well as his inadequate knowledge of bronze casting. To address this omission, I turn to archival documents pertaining to the *Cathedra Petri* and other monumental, multi-component bronzes. These sources reveal that a large team was assembled to aid the founder in his pre- and post-casting tasks, and that Bernini did not play a significant role in the foundry. The sheer size of the *Cathedra*'s bronzes would not have been possible for one man to produce. The artworks that contributed to the celebrity and praise of Bernini owe much to the invisible, often nameless workers who are seldom acknowledged. Little is known about Bernini's attitudes towards his founders or foundry workers, as documents do not reveal specific details of the relationships between them. We are left to wonder how much or how little contact the foundry worker had with the artist. The foundry worker was likely most closely linked to the founder rather than the artist, and it was from the founder that the foundry workers learned and developed their technical skills. It is important to acknowledge the team of workers behind Bernini to better understand how sculptures were made after the moment of inception by the artist. With this approach, we can develop a clearer sense of how the seventeenth-century sculpture workshop functioned in terms of its power dynamics and the hierarchical relationships between workers of different status.

Method and Approach

The focus of this thesis is the monuments of St. Peter's Basilica and the division of labour within the Vatican's foundries. This thesis draws on the wealth of documents archived by the Fabbrica, most of which have been published by Battaglia in *La Cattedra Berniniana di San Pietro.*[54] Because of these documents, we are able to understand the inner workings of Papal commissions, labour within the Fabbrica and its foundries, and the execution of major sculptural projects. From these documents, I have compiled a list of foundry workers to bring the identities (names and titles) of those responsible for the *Cathedra* into focus and out of anonymity. In the case of the *Cathedra Petri,* I estimate that a group of fifteen named and forty-one unnamed skilled bronze workers were responsible for the making of the bronze casts of the monument (tables 1 and 2).

I have consulted a number of biographical encyclopedias such as the *Allgemeines Lexikon der bildenden Künstler von der Antike bis zur Gegenwart* (*General Encyclopedia of Visual Artists from Antiquity to the Present*) by Ulrich Thieme, Felix Becker, Fred C. Willis, and Hans Vollmer.[55] In this *Lexicon*, the entries on the *Cathedra*'s foundrymen are short and rarely reveal significant details about the workers' training or career. Out of the group of fifteen named foundry workers on the *Cathedra Petri,* six have biographies in the *Lexicon.* Other important sources include the *Dizionario Biografico degli Italiani (Biographic Dictionary of Italians)* published by the *Istituto dell'Enciclopedia Italiana*, and Antoni Bertolotti's various publications

[54] Battaglia, *La Cattedra Berniniana,* 159-233.
[55] Antonio da Monza-Bassan.Ulrich Thieme, Hans Vollmer, Fred C. Willis, and Felix Becker, *Allgemeines Lexikon Der Bildenden Künstler von Der Antike Bis Zur Gegenwart,* 37 vols. (Leipzig: W. Engelmann, 1907-1950). This lexicon is referred to by its first two authors, as Thieme-Becker or the Thieme-Becker *Lexicon*.

on artists in Rome.[56] With a specific focus on important Italian figures, the *Dizionario* provides more detailed biographies than the *Lexicon.* Also, since they were written more recently than the *Lexicon,* the biographies also feature fuller bibliographies. Further, their searchable interface allows for the cross-referencing of names in other biographies. Of the named workers, two have full biographies, and five are mentioned by name in other biographies.

In the nineteenth century, Bertolotti wrote numerous books on fifteenth-, sixteenth-, and seventeenth-century artists in Rome and the Vatican who originated from different areas of Italy or other countries.[57] His research is rooted in archival sources such as payment documents, contracts, and correspondences. Each publication is sectioned by century, then further by medium or area of expertise to compile the biographies of artist-types.[58] Additionally, at the end of each section, Bertolotti includes lengthy lists of names of artists for whom there is little archived information available, inviting scholars to investigate these men. From Bertolotti's publications, I have identified five references to named workers from the *Cathedra* team. While some of these biographic sources are incomplete or lacking in full biographies, each contributes to an investigation of the identities of these foundry workers.

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[56] *Dizionario Biografico degli Italiani,* 2nd ed., 100 vols. (Rome: Istituto della Enciclopedia Italiana, 1960-2020). The *Dizionario* is available online at https://www.treccani.it/biografico/; Antonio Bertolotti's various books are available online on the Hathi Trust.

[57] Antonino Bertolotti, *Artisti Francesi in Roma Nei Secoli XV, XVI e XVII; Ricerche e Studi Negli Archivi Romani.* (Mantova: G. Mondovi, 1886); Antonino Bertolotti, *Artisti Bolognesi, Ferraresi Ed Alcuni Altri Del Già Stato Pontificio in Roma Nei Secoli XV, XVI e XVII; Studi e Ricerche Tratte Dagli Archivi Romani,* (Bologna: Regia tipografia, 1886); Antonino Bertolotti, *Artisti Lombardi a Roma Nei Secoli XV, XVI, e XVII: Studi e Ricerche Negli Archivi Romani* (Milano: U. Hoepli, 1881); Antonino Bertolotti, *Artisti Modenesi, Parmensi e Della Lunigiana in Roma Nei Secoli Xv, Xvi e Xvii: Ricerche e Studi Negli Archivi Romani* (Modena: G.T. Vincenzi, 1882); Antonino Bertolotti, *Artisti Subalpini in Roma Nei Secoli XV, XVI e XVII* (Torino: Stamperia reale di G.B. Paravia e comp., 1877).; Antonino Bertolotti, *Artisti Svizzeri in Roma Nei Secoli XV, XVI, e XVII* (Bellinzona: Tipografia e litografia Colombi, 1886); Antonino Bertolotti, *Artisti Veneti in Roma Nei Secoli XV, XVI e XVII; Ricerche e Studi Negli Archivi Romani* (Bologna: A. Forni, 1965).

[58] Groupings range from sculptors and founders ("*scultori e fonditori"*), to musicians ("*musici*"), to more niche groups like typographers, booksellers, and printers ("*tipographi librai stampatori*").

While it is important to expand the list of known artists and foundrymen who worked on this project, one of the limitations of my study of the foundry workers is the fact that there is a large group of workers who are unnamed in the documents. References in numerous archival documents indicate payments that were made to groups of unnamed men. It is possible that some of the forty-one anonymous workers are named elsewhere in the documents, but it is difficult to ascertain with certainty if they are unique individuals or repeat employees. None of these men have received recognition for their work on the *Cathedra* and no scholars have made note of their contributions. While their work may have been small, indicated by the amount of money (scudi) they were paid, they still contributed to the foundry team that cast Bernini's bronze designs and performed essential tasks that supported both the artist and the project's founder, Giovanni Artusi. The anonymity of the foundry workers no doubt indicates the hierarchical organization of the seventeenth-century foundry, with anonymous workers occupying the lowest strata. In drawing attention to this group, and to the larger group of foundry workers who were named in the *Cathedra's* documents, this thesis calls attention to the erasure of numerous skilled labourers and specialized workers, and acknowledges their contributions for the first time.

My count of the specialized workers hired for the *Cathedra* is well over the number reported by Wittkower.[59] In Wittkower's entry, he makes a distinction between the "army of subordinate helpers" and "thirty-five collaborators", without defining either group.[60] It would have been helpful for Wittkower to define "subordinate helpers" and "collaborators" to give a clearer understanding of what type of labourer he includes. It is interesting to note that the helpers were described by Wittkower as subordinates to Bernini, but the collaborators were not. Wittkower's terminology demonstrates a hierarchy between intellectual collaboration and

[59] Wittkower, *Bernini,* 279-80.
[60] Wittkower, *Bernini,* 279-80.

manual labour or help. It is difficult to understand the nuances of foundry dynamics from Wittkower's study, and I argue that the foundry worker could be considered both a helper and a collaborator based upon their contributions to the project. Thus, my focus includes both the "army" of workers hired by the Fabbrica to assist the artist and considers how groups of workers were situated in the power dynamics and social hierarchy of the foundry.

Foundry Workers as Described in the Bronze Manufacturing Process

This section examines the role of the foundry worker in the creation of the *Cathedra Petri*. In the investigation of the foundry worker, there are ties to the model-making process that precedes the technical work of casting bronzes. Model-makers are not generally considered members of the foundry team, yet valuable observations can still be drawn from the model-making phase of the *Cathedra Petri.* The main model-makers on this project were sculptors Ercole Ferrata, Antonio Raggi, Lazzaro Morelli, and Pietro Verpooten (spelled in various ways in the documents).[61] Each of these men were titled *scultore,* or sculptor, in the documents and many also worked with Bernini on various projects before and after the *Cathedra*.

Even in the model-making stage, Bernini left most of the work in the hands of his assistants. Ferrata, Raggi, Morelli, and Verpooten were responsible for both the small and large terracotta models of the four doctors, the seat, the angels, and putti. Jessica Boehman suggests that Morelli was brought onto the model-making team to produce the large-scale models in a short period of time after the decision to increase the size of the overall monument, and after Verpooten died in 1659.[62] This team of four was paid handsomely for their work on the

[61] Battaglia, *La Cattedra Berniniana,* 159-164, docs. #17-61; For issues related to the spelling of Verpooten, see Battaglia, *La Cattedra Berniniana,* 15. On page 16, Battaglia also tell us that Verpooten, a student of Jean Lucas Faydherbe, has worked with Bernini since 1656 on various bronze projects.
[62] Jessica Boehman, "Maestro Ercole Ferrata," (Ph.D Diss, University of Pennsylvania, 2009), 280. On the increase in scale, see Battaglia, *La Cattedra Berniniana,* 23 and Wittkower, *Bernini*, 278-79.

presentation models. In total, the group was paid over 2000 scudi for their model-making. According to a document that summarizes the cost of the entire monument, the model-making phase cost, in total, 2867.30 scudi.[63] Montagu tells us that the seventeenth-century Roman scudo was made of silver and weighed 31.788 grams.[64] The total price for the model-making phase reveals how much the four primary model-makers contributed, compared to other artists. Many extant models can be found in institutions today such as the seat at the Detroit Institute of Arts Museum (fig. 7), and S. Ambrogio in the Harvard Art Museum (fig. 8).[65] Design studies on paper attributed to Bernini's hand, some of which are in the Royal Collection Trust in Windsor (figs. 9-10), pre-date the models and capture his experimentation with composition, drapery, and scale.

Cosimo Carcani, a woodworker (*falegname*), was responsible for the full-scale wooden models of the *Cathedra*, erected in the apse in 1659.[66] For this portion of the models, he was paid over 600 scudi.[67] Given the large scale of these models, we may assume that Carcani was not working alone, but there are no references to Carcani's assistants in the documents. The multimedia model-making process likely took place in the same foundries where the bronzes were to be cast, as Andrea Bacchi describes Santa Marta as not only a foundry but also as a versatile sculptural workshop.[68] The casting process began after the terracotta and wood models

[63] Battaglia, *La Cattedra Berniniana,* 231-31, doc. #506.
[64] Montagu, *Roman Baroque Sculpture,* xi.
[65] For extensive studies of the models see *Bernini: Sculpting in Clay*, eds. Claude Douglas Dickerson (III), Anthony Sigel, and Ian Wardropper (New York: Metropolitan Museum of Art, 2012), 244-253. Other models include large-scale angels at the Museo Vaticano, as well as two heads of S. Giovanni Crisostomo and S. Atanasio, also at the Museo Vaticano.
[66] Battaglia, *La Cattedra Berniniana,* 160, doc. #20 and 184, doc. #205.
[67] Battaglia, *La Cattedra Berniniana,* 160, doc. #20 and 184, doc. #205. Cosimo Carcani's son Filippo became an apprentice to Ercole Ferrata at age fifteen. It is likely that the Feratta the *scultore* and Cosimo the *falegname* became acquainted during the *Cathedra's* model-making process, and from this relationship, Filippo was introduced into Ferrata's workshop. Filippo was one of Ferrata's earliest assistants. This development of a workshop or studio points to Ferrata's transition from an assistant to a master, who had his own assistants and apprentices. For more on Ferrata see Boehman, "Maestro Ercole Ferrata," specifically "Appendix 3: Ferrata's Students," 344-369.
[68] Bacchi, "The Role of Terracotta Models in Bernini's Workshop," 50.

were completed with the making and cleaning of wax inter-models. Here, we see the introduction of specialized foundry workers with technical knowledge of the casting process.

There are two main methods of casting in the seventeenth century: indirect and direct lost-wax casting. On the casting of large sculptures, Jane Bassett says, "Because of the tremendous amount of time and materials needed to create a piece mold and a separate model for casting, the indirect technique may be impractical for large sculptures or those with complex compositions that include deep undercuts."[69] For these reasons, I argue that the *Cathedra* was likely cast in the direct method, where neither the mold nor the model could be saved. To cast directly, a full-scale model of terracotta was made and covered in wax to make the inter-model.[70] In both methods, a thin layer of wax is sculpted in the exact size, shape, and finish of the intended bronze sculpture. It is at this point that we see numerous documents relating to the 'cleaning' or '*rinettatura*' of the waxes. When the wax inter-model was finished to the desired effect, the foundry team would install various wax tubes, called sprues,[71] and core pins to secure the core within the mold. After these additions, the entire object was encased in either plaster or clay investment material and fired to 'cook' the investment material and melt the wax out of the mold, hence the name 'lost-wax'.

Payments for wax cleaning appear in the *Cathedra*'s records for the period between 1660 and 1664, indicating that wax models were not all made at once. Founders would likely want to have close contact with their wax inter-models to ensure the proper casting of the bronze. As the

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[69] Jane Bassett, Peggy Fogelman, David A. Scott, and Ronald C. Schmidtling, *The Craftsman Revealed: Adriaen de Vries*, (Los Angeles: Getty Publications, 2008), 12.

[70] For a more complete description of direct casting see Richard E. Stone, "Italian Renaissance and Baroque Sculptors in Bronze: The Differentiation of Their Hands through the Study of Their Casting Techniques," In *Italian Renaissance and Baroque Bronzes in the Metropolitan Museum of Art*, ed. Denise Allen, et. al. (New York: Metropolitan Museum of Art, 2022), 28-30.

[71] Wax sprues create channels for the wax to melt out, off gasses to escape, and a route for the molten metal to flow which reaches every area of the sculpture.

founder, Artusi would be aware of the wax's thickness, and locations of sprues, and core pins. Other experienced team members likely had the expertise to perform these tasks as well. A team of twelve men, named and unnamed, were credited with the making and cleaning of the waxes. The six named workers who made up the wax cleaning team include Lazzaro Morelli, Bartolommeo Cennini, Angelo Pellegrini, Niccolò Artusi, and Giovanni Rinaldi (*Monsu. Gio*)[72]. On June 3, 1664, a small payment of 9 scudi and 70 baiocchi was made to six unnamed men or "*uomini",* for their cleaning of wax models.[73] This is a small amount of money for six people to share, which suggests that the cleaning performed by these *uomini* may have been minor. For reference, the overall price of the wax making and cleaning was over 500 scudi.[74] Despite being a vital stage in the crafting of a bronze sculpture, there is no documentary evidence that suggests Bernini worked on the wax models. After the waxes, when the casting process grew even more technically challenging, Bernini was likely to have been even less involved.

Casting the *Cathedra's* four church doctors was a feat of technology and artisanship. The pouring of the molten metals – the actual casting portion of the casting process – is described by Victoria Avery as "the most precarious, expensive, and essential step in the making of bronze statuary."[75] Each doctor – except for S. Agostino – was cast in one piece, making them some of the largest single-pour sculptures of their time. This process required the expertise of a master founder and the skilled work of knowledgeable assistants.

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[72] In the documents, Giovanni Rinaldi is referred to as "*Monsu. Gio*". The assessment that "*Monsu. Gio*" is Giovanni Rinaldi comes from Battaglia, *La Cattedra Berniniana*, 37. See also Laura Falaschi, "Il Ciborio Santissimo Sacramento in San Pietro in Vaticano," in *L'Ultimo Bernini (1665-1680): nuovi argomenti, documenti e immagini,* ed. Valentino Martinelli (Rome: Edizioni Quasar, 1996), 85.
[73] Battaglia, *La Cattedra Berniniana,* 220, doc. #429. 100 baiocchi made 1 scudo.
[74] It is difficult to make a precise assessment of the total prices of any phase of work because some documents pay one worker for their work on different phases. For example, in Battaglia, *La Cattedra Berniniana di San Pietro,* 231-31, document #506 details the total expenses for the entire project, the waxes are grouped with cleaning, polishing, and chiselling of the metals.
[75] Avery, *Michelangelo,* 172.

Giovanni Artusi da Piscina, titled *fonditore* in the documents, was the main founder of the *Cathedra Petri*, and responsible for casting and other foundry duties. His work included casting the four church doctors, the reliquary seat, two putti above the seat, two angels flanking the seat, and the four coats of arms beneath the monument.[76] As the principal founder, Artusi would have participated in each phase of work, supervised the entire team, and taken control of the most technical aspects of casting. Such technical details include the composition of the bronze alloy, maintenance of furnace temperatures, construction of molds, and the actual pour of the metals. Although he is credited as the sole founder in many sources, Artusi could not have been expected to work alone; he was aided by over fifty-six foundry workers, some of whom were founders themselves.[77]

The majority of the *Cathedra's* bronzes were cast in the Santa Marta foundry, located behind the Basilica's apse.[78] The precise location of this foundry has been lost, and few maps reference its locus.[79] The second foundry used to cast the *Cathedra*'s bronzes was the Belvedere foundry, located near the Belvedere court.[80] The diary of Pope Alexander VII reveals that the second church doctor was cast in the Belvedere foundry.[81] On May 25, 1662, he writes, "*questa mattina si è gettata felicemente la seconda statua di bronzo della cattedra verso Belvedere*" (this morning, the second statue of bronze of the *Cathedra* was easily cast near Belvedere).[82] Later, on January 20, 1663, Alexander VII writes that the fourth statue was cast in the foundry near the

[76] Battaglia, *La Cattedra Berniniana,* 188-189, doc. #211.
[77] Earlier counts of the foundry workers have excluded the founder Artusi. Although he is performing tasks, such as wax making, cleaning, and bronze cleaning, before and after the bronze pour, he represents the master founder and leader of the foundry team, rather than a foundry worker in terms of social hierarchies.
[78] Lamouche, "Fondeurs, artistes et artisans du bronze à Rome: 1585-1625," 163.
[79] Lamouche, "Fondeurs, artistes et artisans du bronze à Rome: 1585-1625," 163.
[80] Lamouche, "Fondeurs, artistes et artisans du bronze à Rome: 1585-1625," 139-40.
[81] Richard Krautheimer and Roger B. S. Jones, "The Diary of Alexander VII: Notes on Art, Artists and Buildings," *Römisches Jahrbuch der Bibliotheca Hertziana* 15 (1975): 216, doc. #558.
[82] Krautheimer and Jones, "The Diary of Alexander VII," 216, doc. #558. Translated by Jennifer Liu.

Porta Angelica, which is near the Belvedere Courts, and that this statue was of a Greek doctor.[83] From this, we know that the second and fourth casts were made in the Belvedere, and the first and third in Santa Marta. Battaglia has attempted to solve the chronology of the four doctors' casts but has admitted that it is difficult to know for sure, as there may be inaccuracies in the documents.[84] His proposed order is S. Agostino, S. Ambrogio, S. Giovanni Crisostomo, and finally, S. Atanasio.[85]

The doctors are each cast in one piece, except for S. Agostino (fig. 11). The figure of S. Agostino was the first doctor to be cast in 1661 in the Santa Marta foundry.[86] This cast, however, revealed major and irreparable flaws and had to be recast in 1662. In general, some flaws of bronze casting can be repaired through the use of patches, plugs, or recast portions. However, the issues with the first S. Agostino were evidently too large, and warranted a complete recast. The second cast again had a flaw and required that the head be cast a third time.[87] Possible issues contributing to a flawed first cast include poor metal composition or metal temperature, or an improperly designed mold. This sequence of events reveals that the entire foundry was challenged by the size of these casts and had to adapt their processes to this challenge. After remedying their mistakes, Artusi and his team cast each subsequent sculpture without significant flaws. As each component was being cast, they were also being cleaned and finished.

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[83] Krautheimer and Jones, "The Diary of Alexander VII," 219, doc. #655. The diary entry reads: "*a 18 hore si e gettata la 4.a statua Greca della Cattedra nella fonderia verso la porta Angelica*."
[84] Battaglia, *La Cattedra Berniniana,* 32-33.
[85] Battaglia, *La Cattedra Berniniana,* 32-33.
[86] Krautheimer and Jones, "The Diary of Alexander VII," 215; Document #509, dated September 21, 1661, references the "bad" cast of the first doctor: "*Il Cav. Bernino da nuova che la fonditura stamattina e andata a male, e ci era stato il Card. Aggolino*." Document #519, dated September 23, 1661, references the "recasting" of the statue: "*il Cav. Bernino circa il rifondere la statua a 15 ½*". This may be interpreted to mean that the decision to recast the statue was made on September 23, rather than the recasting taking place on this date. The foundry could not have prepared a new wax inter-model and mold between September 21 and 23.
[87] Battaglia, *La Cattedra Berniniana,* 29.

To bring a bronze to completion, a significant amount of post-cast work, or "cold-work" was necessary. Post-cast work for a monument of this size required a very large team, as well as plenty of time and tools. The team of bronze cleaners I have identified from the documents is the largest of the casting phases, with fifteen named men (Artusi and fourteen identifiable foundry workers) and thirty-five unnamed men. The term 'cleaning', in the sense of surface retouching or refining, comes from the terminology of the documents, where '*rinettatura'* is the most common verb used in reference to post-cast work on the bronze. The next most common verb is '*limare'* (polishing/finishing). Other processes listed in the documents include '*cisellatura'* (chiselling), and '*tassellare'* (tessellating). In bronze, tessellating could involve texturizing the surface to create uniform texture and patterns or making patches to repair imperfections.[88] When a worker is paid for general *rinettatura* of the bronze, it is difficult to know exactly what work he is doing and on which components. This term is also used in relation to the wax inter-models. For example, one worker could be paid for the "*rinettatare cere e metalli della cattedra*".[89] In these cases, one man is cleaning both wax and bronze at the same time with no specification about which areas of the sculpture, and no specific allocation of money to either task.

Even the most perfect of casts requires a great deal of repairing and finishing, processes that are encompassed by the terms fettling and chasing.[90] Fettling is a modern term, with no corresponding Italian verb in the *Cathedra* documents, but can be closely related to *rinettatura*. *Limare* is closer to chasing, which describes the polishing or finishing a bronze. I use the terms

[88] For an Italian definition of *tassellatura* see "Tassellatura," *Treccani Vocabulario Online*, accessed September 25, 2022, https://www.treccani.it/vocabolario/tassellatura/.
[89] This example is taken from Battaglia, *La Cattedra Berniniana,* 166, doc. #73, but the verbiage repeats throughout the documents.
[90] Stone, "Italian Renaissance and Baroque Sculptors in Bronze" 39.

fettling and chasing interchangeably with their Italian equivalents, *rinettatura* and *limare,* as well as the English translation of cleaning and polishing respectively.

Andrew Lacey describes fettling as the "first stage of the cold work" of a bronze.[91] This process involves cutting off or removing excess metal and unwanted casting features with tools such as saws and chisels.[92] Sprues were the main features of the cast that needed to be removed. Core pins were also removed, either by being pulled out or, in some cases, pushed into the hollow interior of the cast.[93] The resulting holes were filled with a metal plug or patched over.[94] Chasing would follow the fettling process. Francesca Bewer describes the act of chasing as filing, scraping, and texturizing to sharpen details.[95] If a finished bronze work has a smooth and shiny, almost reflective, surface, one can assume that a significant amount of chasing (cleaning and polishing) has occurred.

Montagu describes fettling and chasing as "extremely important tasks in the creation of the [bronze] work" and its "artistic effect".[96] While cleaning and polishing has been considered menial and without artistic merit by some, it is a vital part of the artistic process. In fact, the surface is the most immediately recognizable aspect of a sculpture in the eyes of the viewer; even at a distance the shining and smooth surfaces of the *Cathedra*'s components are unmistakable. Studying the *Cathedra*'s surface finishes reveals the intense cold-work that occurred across the entire monument. On the surface, the viewer can most clearly see the indices of the foundry workers' labour.

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[91] Andrew Lacey, "The Sculptor at Work: Recreating the Rothschild Bronzes," In *Michelangelo: Sculptor in Bronze*, ed. Victoria Avery (New York: Bloomsbury USA, 2018), 192.
[92] Lacey, "The Sculptor at Work," 192.
[93] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 106
[94] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 106; Jane Bassett, "Visual Evidence: Notes on Four Bronze Portrait Busts by Gian Lorenzo Bernini," *The Sculpture Journal* 20, no. 2 (2011): 133.
[95] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 54.
[96] Montagu, *Roman Baroque Sculpture,* 72. Here, Monatgu uses the terms 'cleaning' and 'chasing'.

In Antonio Pinelli's comprehensive publication on the Basilica of St. Peter's, we find excellent images of the heads of all four doctors (figs. 12-15). Those working on this section of the bronze must have dedicated a significant amount of time filing and polishing to remove any textural irregularities from the bronze's surfaces. The team of fettlers and chasers were also attentive to the different types of surfaces represented in bronze; the finish of a doctor's skin should have some contrast against his beard, hat, or robes. In a detail of S. Agostino's drapery (fig. 16), the work and skill of the finishers are evident in the evenness and shine of the drapery and the particular attention paid to the textures of the decorative motifs of the stole, where fettling and chasing would have been especially challenging. Overall, the *Cattedra*'s surfaces are highly smooth, polished, and often reflective, pointing to a significant amount of care and labour dedicated to these processes of post-cast work.

We must also be aware, however, that later restorations may have changed the surfaces of the bronzes. For example, in Battaglia's 1943 publication, S. Atanasio's face and beard (fig. 14) appear much duller than in the images from Pinelli's 2000 book (fig. 17).[97] It is difficult to know how the surface of the bronzes looked immediately upon completion, but we may assume that a work of this importance warranted a highly finished surface appearance.

Some artists did not prefer the appearance of a highly polished bronze. Avery suggests Michelangelo preferred "more matte and 'painterly' surfaces", and that rougher surfaces were more legible to the eye.[98] Even Bernini sometimes allowed his bronzes to look 'rough' and remain faithful to their 'as-cast' appearances.[99] Factors that contributed to different finishes

[97] For a discussion of the *Baldacchino*'s restoration efforts and gilding, see Maria Grazia D'Amelio, "Gian Lorenzo Bernini e gli ori del Baldacchino di San Pietro in Vaticano: la doratura secentesca e il suo restaurom" *Annali di architettura* (2009), 137–50.
[98] Victoria Avery, "Brazen Defiance," in *Michelangelo: Sculptor in Bronze,* ed. Victoria Avery (New York: Bloomsbury USA, 2018), 44.
[99] For an example in a small-scale work, see the different finishes of a series of statuettes of Countess Matilda of Tuscany, reviewed in Andrea Bacchi, *Matilde di Canossa: Un bronzetto di Bernini degli anni Trenta* (Milan: Carlo

include aesthetic desires of the patron and artist, and the skill of the finisher.[100] For the *Cathedra* casts, a faithfulness to the as-cast surface did not appear to be of concern. The subtle differences in finish across the monument reveal that artistic choices continued to be made after casting, and that cold-work was extremely important to the overall effect of the sculpture. The artistic process did not conclude when the models were finalized. The post-cast work greatly contributed to the success of a sculpture and those completing the fettling and chasing were essential to the process of creation. Their labour is both hidden and revealed by the surfaces of these massive bronze sculptures.

According to Richard Stone, chasing tools include files, burnishers, abrasives punches, chisels, and tracers.[101] Archival documents also describe workers making their own tools such as files (*raspini*) or wire brushes. For example, a document found in Battaglia's publication describes a payment for thirty-five *libre* of iron wire to make "*grattabuscie*" for the cleaning of the metal statue of S. Agostino ("*filo di ferro lb. trentacinque per fare gratta buscie per rinettare la statua di S. Agostino di metallo*").[102] "*Grattabuscie*" is defined by Maria Grazia D'Amelio as "*spazzole di ottone",* or brushes made of brass, which were used in the context of bronze gilding.[103] What the documents tell us here, however, is that the brush was made of iron and used for chasing. D'Amelio describes the extensive cleaning process required to prepare a bronze for gilding by quoting Filippo Baldinucci's seventeenth-century dictionary of Tuscan art and design terminology.[104] She summarizes Baldinucci's definition of a process called "*bianchire"* as "*la*

Orsi, 2013) and Francesca Bewer, "Bronze Casts After Bozzetti and Modelli by Bernini," *Harvard University Art Museums Bulletin* 9 (1999): 162–67.
[100] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 54.
[101] Stone, "Italian Renaissance and Baroque Sculptors in Bronze," 40.
[102] Battaglia, *La Cattedra Berniniana,* 198, doc. #228.
[103] Maria Grazia D'Amelio, "Gian Lorenzo Bernini e gli ori del Baldacchino di San Pietro in Vaticano: la doratura secentesca e il suo restaurom," *Annali di architettura* (2009): 144.
[104] D'Amelio, "Gian Lorenzo Bernini e gli ori del Baldacchino di San Pietro in Vaticano," 142.

perfetta pulitura del pezzo" (the perfect cleaning of the piece), involving its rinsing with boiling water, polishing with a wire brush, and wiping with a wet cloth.[105] Given the *Cathedra* was heavily gilded, this multi-step process of "perfect cleaning" would have been extensive and time-consuming.

Wittkower claims that all four church doctors were cast by 1663, and that in April of that year, Carlo Mattei began "cleaning and polishing" the figures.[106] However, the archival documents reveal that cleaning and polishing in fact began as the casts were being produced, as early as January 1662. This shows that bronzes were being brought to completion at different times, rather than simultaneously before their assembly and installation. Wittkower also attributes the important work of "cleaning and polishing" to only one man, Carlo Mattei, which may be misleading. We know, in fact, that a team of fifty people, named and unnamed, performed this task. And yet, Wittkower assigns it to one man. This attribution reveals the bias for art historical narratives that focus on individuals rather than collaborative groups or perhaps Wittkower's lack of technical knowledge in bronze casting. Battaglia also perpetuates this idea, through his interpretation of a single document that summarizes the bronzes that Mattei polished, chiselled, and cleaned. These bronzes included the four church doctors, the seat of the *Cathedra*, including its cushion and palm leaves, parts of the two flanking angels, and more.[107] Battaglia's interpretation of the document suggests that Mattei alone cleaned the two Greek doctors, S. Atanasio and S. Giovanni Crisotomo. In his characterization of the bronze cleaning, Battaglia

[105] D'Amelio, "Gian Lorenzo Bernini e gli ori del Baldacchino di San Pietro in Vaticano," 148, n. 43. D'Amelio cites Baldinucci, *Vocabolario Toscano dell'Arte del Disegno,* 192-196. There is no clear English translation of "*bianchire".* It could translate to 'making white' or perhaps bleaching, indicating its association with cleaning. In the document that summarizes Mattei's cleaning, see Battaglia, *La Cattedra Berniniana,* 193, doc. #217, there is a reference to a process called "*rimbiancati"* which may be a similar procedure, given the similarities in the terminology. No other reference to "*rimbiancati"* is found in the Battaglia documents, or Baldinucci's *Vocabulario.*
[106] Wittkower, *Bernini,* 279.
[107] Battaglia, *La Cattedra Berniniana,* 193, doc. #217.

suggests that the two Greek doctors were easier to clean due to their simpler forms.[108] It was the two Latin doctors, he argues, that necessitated the large team of workers – "*di quella dei latini che aveva impegnato o ancora impegna una così larga schiera di maestranze*."[109] For the two Latin doctors, Battaglia asserts that Mattei was assisted by a team of sixteen men. The organization of this document suggests that the sixteen men helped Mattei clean the bronzes of the Latin church doctors only.[110] Regardless of the differences in their complexity, I contend that the size of the Greek doctors and the time-consuming nature of the cleaning process would have required Mattei to have assistance. All four doctors were brought to the same level of finish, indicated by their surface textures and effects, which suggests that each doctor had the same amount of chasing work done likely by a large team.

The sixteen workers who aided Mattei were given the title "*homini*", a variation of "*uomini"*, meaning men. Without a more specific title, we do not know the types of specialized workers and Battaglia's "Cronista" gives us no more information. Instead of referring to Mattei's assistants as *"homini"* as recorded in the payment documents, Battaglia uses the term "*garzoni",* meaning boys.[111] The term "*garzoni*" appears only once in the documents, and yet Battaglia chose to repeat it as a way to characterize groups of labourers throughout his book.[112] Avery states that in a Venetian setting, *garzoni* was used to refer to young male apprentices of master founders.[113] This is also evidenced by documents described by Boehman that refer to apprentices

[108] Battaglia, *La Cattedra Berniniana,* 36.
[109] Battaglia, *La Cattedra Berniniana,* 36.
[110] Battaglia, *La Cattedra Berniniana,* 193, doc. #217.
[111] Battaglia, *La Cattedra Berniniana,* 36.
[112] This single reference comes from document #212 titled "*Conto dei Muratori e Garzoni".* See Battaglia, *La Cattedra Berniniana,* 189, doc. #212. A literal translation would be "Account of wall-makers and boys", but this does not sound like an accurate interpretation. It is interesting to use *garzoni* in close reference to *muratori,* because Battaglia uses it in reference to various groups, but never the *muratori*.
[113] Victoria Avery, *Vulcan's Forge in Venus's City: The Story of Bronze in Venice 1350-1650.* (Oxford: Oxford University Press, 2012), 60. Avery's list of illustrations remarkably credits different people for their specific contributions, such as wax model and casting, rather than one principal artist. See pages XIII-XIX.

as "*garzone*" to differentiate them from more advanced sculptural assistants who had more status.[114] In this case, however, Battaglia choses to characterize these men as boys, despite the documents' use of men. Uomini and garzoni ultimately could be interchangeable terms, as both refer to a worker without a title and do not elevate his status to that of a specialist.

Battaglia provides a partial list of the named bronze cleaners in addition to Mattei. This list includes Angelo Pellegrini, Bartolommeo Cennini, Bartolomeo Crescenzi, Pietro Curiola, Giovanni Battista Pettignotti, Francesco Masene, and Giovanni Gherardi.[115] Also part of the bronze cleaning team according to payment documents, but not listed by Battaglia, are Lazzaro Morelli, Giuliano Visconti, Simon Corni (spelled various ways), Francesco Passinvolta, Giorgio Tedesco, and Giovanni Rinaldi (*Monsu. Gio*). The *Cathedra's* founder Giovanni Artusi was omitted from Battaglia's list, but was also paid for the cleaning of the bronzes. It is possible that any of these workers could have assisted Mattei in the cleaning of the Greek doctors, as many payment documents only reference the general cleaning of the "*Cathedra"* with no indication of the specific component. Following the extensive cleaning of the bronzes, they were ready for the final phase of the casting process – gilding.

The gilding of the *Cathedra* potentially brings the foundry workers, their knowledge, materials, and tools out of the foundry and into the Basilica. Pinelli argues that the bronze components of the monument were transported to the apse of St Peter's and erected prior to their gilding.[116] The gilding documents are not detailed enough to confidently support this argument

[114] For one example see Boehman, "Maestro Ercole Ferrata," 163, n. 334. Boehman uses the word *garzone* ending with an 'e', while it may also appear as *garzoni,* ending with an 'i' in other sources.
[115] Battaglia, *La Cattedra Berniniana,* 34. Battaglia also lists an individual named Domenico Paradotti whom I have excluded. The documents Battaglia cites in reference to Paradotti describe iron and tools that he supplies to the project. Although his tools are used for the cleaning of the bronze, he himself is not performing any action directly to the bronze and thus he is not counted in my list of foundry workers. Battaglia's "Cronista" directly quotes document #228.
[116] Antonio Pinelli, *The Basilica of St. Peter in the Vatican,* vol. 4 (Mirabilia: F. C. Panini, 2000), 623.

and Pinelli does not cite any sources. Moving the statues before their gilding would reduce the risk of surface damage in transport, making earlier transportation more appealing. Maria Grazia D'Amelio argues that the *Baldacchino'*s crowning components were gilded in the foundry, then transported to the Basilica for installation. This sequence of events indicates that it was not necessary for gilding to take place in situ, although the *Baldacchino* components would have been smaller than those of the *Cathedra*.[117] Still, D'Amelio argues that the dangerous and labourious process of gilding could only be carried out to perfection if performed within the workshop ("*Un laborioso procedimento, peraltro pericoloso viste le misure di sicurezza descritte da Bald, che poteve essere realizzato a regola d'arte solo in laboritorio*").[118] Evidently, gilding the *Cathedra* in the apse of St. Peter's would have added an extra challenge to the process. Out of the foundry and into one of the most holy places in the Basilica, the gilders, and other foundry workers, would have turned the apse into a make-shift workshop with scaffolding, materials, and tools.

Mattei, titled *spadaro* or gilder*,* was the principal gilder of the *Cathedra*'s bronzes. A secondary gilder was hired to gild the stucco portions. Mattei was paid handsomely for his work on the bronze which includes gilding as well as polishing, chiselling, and cleaning ("*limatura, cisellatura, e rinettatura")*.[119] Totalling his individual payment documents reveals that Mattei was paid over 7000 scudi for his bronze cleaning and gilding.[120] To put this amount into perspective, Bernini was paid a total of 8000 scudi for his designing and supervising of the entire

[117] D'Amelio, "Gian Lorenzo Bernini e gli ori del Baldacchino di San Pietro in Vaticano," 142.
[118] D'Amelio, "Gian Lorenzo Bernini e gli ori del Baldacchino di San Pietro in Vaticano," 142.
[119] Battaglia, *La Cattedra Berniniana,* 193, doc. #217. The syntax of "*limatura, cisellatura, e rinettatura"* is interesting because one will usually find that *rinettatura* comes before *limatura* in the sequence of post-cast work.
[120] For payments for the gilding, see Battaglia, *La Cattedra Berniniana,* 193 doc. #217; for payments for the cleaning, see Battaglia, *La Cattedra Berniniana,* 172-174, docs. #131-151.

project,[121] and Artusi, the founder, was paid 25,000 scudi for his casting of the bronzes.[122] Artusi's total earning was significantly higher than Bernini's because the documents specify that the founder was to cast the bronzes at his own expenses ("*deve fare a tutte sue spese*") [123]. Thus, his payments included reimbursements for materials.

No other named foundry workers were paid for gilding. We should not assume that Mattei executed this entire task on his own, though. In fact, an unspecified number of anonymous *spadari* were paid 2.40 scudi as a tip for their gilding of the four doctors in January of 1665.[124] It is difficult to know how many men received this tip, since it was such a small amount. Gilding the monument would be a significant endeavour, given the scale of the operation, and I argue that Mattei must have had assistance in this complex process. The chemical and material complexities of gilding may have meant that only specialists could have assisted him. Gilders hired by Mattei may have been left out of the Fabbrica documents because they were paid at his own expense.

The archival documents reveal that the method of gilding the *Cathedra's* bronzes and stucco differ. The bronzes were gilded *a fuoco,* while the stucco *Glory* was gilded *a mordente.*[125]

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[121] Battaglia, *La Cattedra Berniniana,* 231-232, doc. #506. In this document, Bernini's payment is described as, "*pr la Sopraintend.a per pro.ne di mesi 40 a 200 [scudi] per mese,"* meaning for his supervisory role (*sopraintendenza),* he was paid 200 scudi a month for four months. While "*Sopraintend.a"* is capitalized in the document, Bernini's title at this time was the Architect of St. Peter's (*l'Architetto della Fabbrica di San Pietro).* On page 14, Battaglia compares his *Cathedra* salary to the salary he received for the decoration of the Basilica's portico, a contemporaneous project. For the portico, Bernini was paid only 60 scudi per month for 60 months. Battaglia suggests Bernini was paid less for this project because he only produced a single drawing and left the rest of the project to his assistants.

[122] Battaglia, *La Cattedra Berniniana,* 231-232, doc. #506.

[123] Battaglia, *La Cattedra Berniniana,* 168, doc. #102.

[124] Battaglia, *La Cattedra Berniniana,* 221, doc. #440.

[125] For a document mentioning gilding *a fuoco* see Battaglia, *La Cattedra Berniniana,* 172, doc. #140, Stanislao Fraschetti only mentions gilding *a fuoco* in his description of the *Cathedra.* See Stanislao Fraschetti, *Il Bernini, La Sua Vita, La Sua Opera, Il Suo Tempo*, (Milano: U. Hoepli, 1900), 33. For a document mentioning gilding *a mordente,* see Battaglia, *La Cattedra Berniniana,* 213, doc. #363. The stucco's gilding was led by Vincenzo Corallo, *indoratore* (gilder).

Gilding *a fuoco* can also be called fire gilding, amalgam gilding, or mercury gilding.[126] In this process, gold leaf is dissolved into liquid mercury, and applied onto the bronze surface that has been heated with fire.[127] The heat of the surface evaporated the mercury, leaving behind only the gold, now chemically bonded to the bronze.[128] Bewer states that gilding *a fuoco* has now been banned because of health risks.[129] Exposure to mercury and noxious fumes from its evaporation posed a threat to the health of gilders – Cellini was able to recognize that master gilders working with mercury did not live long.[130] Gilding processes reveal that even after the casting process and the assembly of the monument, when the demanding manual labour has been done, there were still dangers.[131] The second method, gilding *a mordente,* is also known as oil gilding, as oil is used as adhesive to adhere gold leaf to the object's surface – in this case stucco.[132] D'Amelio states that both gilding methods involved mixtures of liquid with urine.[133] According to Pamela Smith, this practice demonstrates how the body of the artisan was literally a part of the production process and a tool in the sculptural workshop.[134]

Since there is a large amount of gilding present on the *Cathedra's* bronze surfaces, the gilding operation was likely a sizeable undertaking. Thus, it is curious that only Mattei is credited for its execution. Given the chemical challenges of gilding *a fuoco,* Mattei's uncredited

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[126] For more detail on gilding bronze, see Maria Grazia D'Amelio, "Gian Lorenzo Bernini e gli ori del Baldacchino di San Pietro in Vaticano: la doratura secentesca e il suo restaurom" *Annali di architettura* (2009) 137–50; and Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 55-56.
[127] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 56.
[128] D'Amelio, "Gian Lorenzo Bernini e gli ori del Baldacchino di San Pietro in Vaticano," 142.
[129] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 56.
[130] For the dangers of the sculptural workshop see Smith, *The Body of the Artisan,* 113; for Cellini on gilding see Benvenuto Cellini, *The Two Treatises on Goldsmithing and Sculpture*, trans. C. R. Ashbee (New York: Dover, 1967), 95.
[131] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 56.
[132] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 56. Bewer suggests gilding *a fuoco* creates a stronger bond between the gold and surface, while gilding *a mordente* can be damaged with excessive rubbing of the surface.
[133] D'Amelio, "Gian Lorenzo Bernini e gli ori del Baldacchino di San Pietro in Vaticano," 142.
[134] Pamela H. Smith, "Historians in the Laboratory: Reconstruction of Renaissance Art and Technology in the Making and Knowing Project," *Art History* 39, no. 2 (2016): 226.

assistants likely provided knowledge and experience (and maybe other bodily contributions) to the process. Gilding represents the last phase of the *Cathedra'*s manufacturing process and is also the most ambiguous in terms of its labour force.

Attending to the technical processes of the *Cathedra's* manufacture challenges the miraculous conceptualization of the *Cathedra* – one that assigns its making to an unrealistically small group of people.[135] This section has demonstrated the complexities and challenges of making the *Cathedra Petri* with a specific focus on the teams of specialized workers involved. The size of the *Cathedra'*s foundry team is remarkably large, due in part to the scale of the monument, and the fact that only one master founder was hired in Artusi. To compare, the *Baldacchino* was cast by six founders.[136] I argue that each of the *Cathedra's* foundry workers aided their single founder significantly, both with technical knowledge and physical labour.

Working Dynamics and Social Hierarchies of the Foundry

In this section, I examine the hierarchies and social dynamics of the seventeenth-century foundry drawing especially from biographies of notable foundry workers. The *Cathedra*'s foundry team was employed by the Fabbrica and was managed by three main leaders: the Architect, the Superintendent, and the Factor, or *Architetto, Sopraintendente,* and *Fattore*. The Fabbrica granted Bernini, the *Architetto di San Pietro,* access to their two foundries and pool of labourers who operated these facilities. As such, Bernini did not have to seek out his own foundry and

[135] On the miracle or enchantment of technological marvels, see Alfred Gell, "The Technology of Enchantment and the Enchantment of Technology," in *Anthropology and Aesthetics* (Oxford: Oxford University Press, 1992), 43-44 and 49-56.

[136] For more details on the creation and casting of the *Baldacchino,* see the documents published in Oskar Pollak, Ernst Trenkler, and Dagobert Frey, *Die Kunsttätigkeit Unter Urban VIII: Die Peterskirche in Rom* (Hildesheim: G. Olms, 1981), 306-426. Notably, no founders are credited for the *Baldacchino*'s casting in Wittkower's catalogue entry for the *Baldacchino.* See Wittkower, *Bernini*, 244-245.

foundry team, and many of these workers were also employed on other Papal commissions, as evidenced by archival documents.

As the Architect of St. Peter's, Bernini occupied one of the highest positions achievable by an artist in the seventeenth century. This was an esteemed role held previously by Michelangelo and Carlo Moderno.[137] Rice reveals that Bernini's role was relatively distanced from the workers and materials of the Fabbrica.[138] While some documents reference Bernini's *sopraintendenza* (superintendence or supervision) of the *Cathedra*, he was not the Fabbrica's *Sopraintendente.* Benedetto Drei is named under documents, like a signature, with the title "*Sop.te"* which may represent a short-form version of the word *Sopraintendente* or *Soprasante,* a title that was also used in reference to this position.[139] The *Fattore,* Giacomo Balsimelli, was mainly in charge of materials acquisition and labour organization.[140] Rice describes the *Sopraintendente* and *Fattore* as those "who oversaw the workers, recorded their hours, ordered and inspected building materials, and kept accounts of the cost of those materials."[141] She provides a further, detailed breakdown of labour and hierarchies within the Fabbrica. She states:

> Under [the Architect, Superintendent, and Factor] worked teams of skilled craftsmen, including masons, stonecarvers, stuccoists, gilders, carpenters, and metal workers. These teams were paid on the basis of piecework. They presented their accounts to the Architect who, together with the superintendent and the factor, carefully measured and appraised all work before approving payment. In addition, there were scores of unskilled laborers in the employ of the Fabbrica, paid according to the number of *giornate* [days] they worked. Finally, a small

[137] Louise Rice, *The Altars and Altarpieces of New St. Peter's: Outfitting the Basilica, 1621-1666* (Cambridge: Cambridge University Press, 1998), 12 and 320. See Rice's excellent breakdown of "The Salaried Staff of the Reverenda Fabbrica di S. Pietro c.1620- c.1650" on page 320.
[138] Rice, *The Altars and Altarpieces*, 11.
[139] Rice's "The Salaried Staff of the Reverenda Fabbrica di S. Pietro C. 1620-C. 1650" tells us that Drei's father, Pietro Paolo Drei, also held the role of *Soprasante*. See Rice, *The Altars and Altarpieces*, 320.
[140] Rice, *The Altars and Altarpieces*, 11. Rice's list on page 320 tells us that Balsimelli held the position from 1650-1684.
[141] Rice, *The Altars and Altarpieces*, 11.

> number of convicts were sentenced to hard labor in the service of the Fabbrica, and were paid nothing at all.[142]

We may compare this list of "skilled craftsmen" to the titles of those found in the *Cathedra* documents, which include *ferraro* (iron worker), *scarpellino* (carver), *falegname* (carpenter, woodworker), *calderaro* (coppersmith, metallurgist), *argentiero* (silversmith), *spadaro* (gilder), *ottonaro* (brassworker), *scultore* (sculptor), *fonditore* (founder), and *limatore* (polisher, filer).[143] Some of these titles are not necessarily connected to the realm of bronze casting, but their presence in the foundry indicates that the foundry was a place of diverse specializations, and that foundry workers may have had multiple areas of expertise.

Beneath the *Architetto, Sopraintendente,* and *Fattore,* the payment documents provide a sense of how certain foundry workers occupied a higher status than others. The highest paid workers likely had the most advanced skills and contributed the most significant work. They may have been leaders of smaller groups of workers, like Mattei and the sixteen *uomini*. Three men can be identified as the middle-men of the foundry. Below the Bernini, Artusi, and Mattei these men were paid well and contributed significant work: Lazzaro Morelli, Angelo Pellegrini, and Bartolommeo Cennini.[144] I will examine each man and his roles in turn.

As an example of a multifaceted worker with diverse talents, I begin with Lazzaro Morelli, titled *scultore*. Despite being one of the main four model-makers, Morelli was significantly involved in the *Cathedra*'s bronze casting.[145] In fact, Morelli was one of the most

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[142] Rice, *The Altars and Altarpieces*, 11.
[143] Translations by Jennifer Liu. See Table 1 for the named workers and their titles.
[144] There are, of course, more men who are part of this 'middle-men' strata of the social hierarchy of the foundry. Morelli, Pellegrini, and Cennini, however, represent the middle-men of the foundry in their clear expertise and skills. They are also excellent examples of foundrymen because they have relatively full biographies that point to their trainings, careers, and experiences.
[145] Battaglia, *La Cattedra Berniniana,* 163-64, docs. #47-61. At first, I dismissed Morelli's relevancy for this thesis because of his role as a model-maker. A further reading of the archival documents revealed his contributions to the foundry work after the model-making phase.

ubiquitous members of the team, with payments relating to work in almost all areas of the *Cathedra'*s production. His work on the terracotta models began as early as 1657,[146] and Wittkower suggests that after the 1660-1661 enlarging of the *Cathedra,* Morelli became Bernini's principal assistant.[147] After the terracotta models, Morelli's work included making and cleaning wax models, cleaning bronzes, and helping to erect and assemble the final monument. Beyond bronze, Morelli also helped arrange and mount the stucco *Glory* above the *Cathedra.* In total, Morelli was paid 1,760 scudi, more than all other foundry workers, but less than Bernini, Artusi, and Mattei.

We have a substantial amount of information on Morelli, thanks to contemporary sources like the *Dizionario*'s biography, and primary sources such as *Vite de' pittori, scultori, ed architetti moderni* by Lione Pascoli, first published in the 1730s.[148] Like Bernini, Morelli was the son of a sculptor, but began his artistic training under his uncle, because his father died when he was very young.[149] After leaving his birthplace of Ascoli, Morelli began his career in Rome by working first with Francesco Duquesnoy. It was Duquesnoy who introduced him into the workshop of Bernini.[150] Morelli was documented on several Bernini projects in marble and bronze, including marble spandrel figures that decorate St. Peter's nave from the late 1640s and forty-six of the St. Peter's Square Colonnade statues in marble in 1666, not long after his work concluded on the *Cathedra*.[151] Morelli's involvement in the foundry beyond his model-making

[146] Battaglia, *La Cattedra Berniniana,* 160, doc. #19.
[147] Wittkower, *Bernini,* 279.
[148] Cristiano Marchegiani, "MORELLI, Lazzaro,"in *Dizionario Biografico degli Italiani*, Treccani, vol. 76, 2012, https://www.treccani.it/enciclopedia/lazzaro-morelli_%28Dizionario-Biografico%29/; Lione Pascoli *Vite de' Pittori, Scultori, Ed Architetti Moderni,* 2 vols. (Roma: Antonio de' Rossi, 1730-1736).
[149] Marchegiani, "MORELLI, Lazzaro."
[150] Marchegiani, "MORELLI, Lazzaro."
[151] Montagu, *Roman Baroque Sculpture,* 147; Gabriele Barucca, "A Small Bronze After a Model by Lazzaro Morelli and Some Eighteenth-Century Roman Silver in the Church of Santa Maria di Piazza, Ostra Vetere" in *The Eternal Baroque: Studies in Honour of Jennifer Montagu*, ed. Carolyn H. Miner (Milan: Skira Editore S.p.A, 2015), 286.

duties is interesting and relatively unique. Rarely does one see a model-maker become a foundry worker. It may be easier to assume that foundry workers wanted to move from the anonymity of the manual labourer to the esteem of the model-maker, and not vice-versa. Morelli's diverse artistic activities indicate that a foundry worker may be more than a manual laborer. The foundry worker could also be an artist with talent and merit. Despite not being a founder, Morelli established himself as a constant figure in the foundry from beginning to end.

Behind Morelli, the second highest paid foundry worker was Angelo Pellegrini, with a total earning of 534 scudi for work in both wax and bronze.[152] Similar to Morelli, Pellegrini is an example of a foundry worker who worked on multiple phases of the *Cathedra.* His payments began in May 1660, and ended in December 1664. In the *Cathedra* documents, he is titled *scultore* or sculptor, but also referred to as a bronze founder (*fonditore)* in other sources like the Thieme-Becker *Lexicon*.[153] The *Dizionario* reveals that he was the student of Bastiano Torrigiani, a Bolognese artist active in Rome.[154] He worked with another famed Baroque sculptor, Alessandro Algardi, as a founder rather than a student.[155] Filippo De Boni credits Pellegrini with the bronze statues of the Apostles on the column of Trajan, as well as various busts, statues, ornaments, and gates for churches in Rome.[156] Contemporaneous to the making of the *Cathedra,* Alexander VII also commissioned Bernini to design a large set of crosses, crucifixes, and candlesticks with his family crest to adorn each chapel's altar in St. Peter's

[152]Antonino Bertolotti, *Artisti Bolognesi, Ferraresi Ed Alcuni Altri Del Già Stato Pontificio in Roma Nei Secoli XV, XVI e XVII; Studi e Ricerche Tratte Dagli Archivi Romani,* (Bologna: Regia tipografia, 1886), 243.
[153] Ulrich Thieme, et al., *Allgemeines Lexikon Der Bildenden Künstler von Der Antike Bis Zur Gegenwart*, vol. 26, *Olivier-Pieris* (Leipzig: W. Engelmann, 1932), 358.
[154] Emmanual Lamouche, "TORRIGIANI, Bastiano," in *Dizionario Biografico degli Italiani*, Treccani, vol. 96, 2019, https://www.treccani.it/enciclopedia/bastiano-torrigiani_%28Dizionario-Biografico%29/.
[155] Jennifer Montagu, *Alessandro Algardi*, vol. 1 (New Haven and London: Yale University Press in association with the J. Paul Getty Trust, 1985), 24.
[156] Filippo de Boni, *Biografia degli artisti ovvero dizionario della vita e delle opere dei pittori, degli scultori, degli intagliatori, dei tipografi e dei musici di ogni nazione che fiorirono da'tempi più remoti sino á nostri giorni* (A. Santini e figlio, 1852), 761.

Basilica.[157] Pellegrini was one of the founders responsible for the casting and cleaning of a portion of these candlesticks.[158] Pellegrini's experience as a founder made him well-suited to working on different areas of the bronzes casting and finishing. While he was not the principal founder of the *Cathedra*, he likely assisted Artusi closely, as one of the most skilled and experienced foundry workers.

The third highest paid foundry worker was Bartolommeo Cennini, having been paid 410 scudi for work in both wax and bronze. From Florence, Cennini was the son of a founder, and his son too participated in the bronze founding family business.[159] Before entering the studio of Pietro Tacca, Cennini likely apprenticed with his father at a young age.[160] He moved to Rome in the 1640s after Tacca's death and joined Bernini's studio.[161] Like Morelli, Cennini worked in both marble and bronze. In his discussion of Cennini's marble spandrel figures in St. Peter's Basilica, Robert Enggass says, "Despite his relative obscurity, Cennini seems to have been a sculptor of merit".[162] Enggass highlights Cennini's compositional problem-solving abilities in the carving of the allegory for *Obedience,* dated to 1647, writing, "Given a difficult problem…he arrived at a solution that required significant skill."[163] With this, we have an example of a foundry worker exercising his inventive skills and earning the praise of an art historian. In this

[157] Roberto Battaglia, *Crocifissi Del Bernini in S. Pietro in Vaticano* (Rome: Reale Istituto di Studi Romani, 1942), 3-21.
[158] See documents in Roberto Battaglia, *Crocifissi Del Bernini in S. Pietro in Vaticano* (Rome: Reale Istituto di Studi Romani, 1942), 22-23. Bartolomeo Cennini was also involved in the candelabras project, having fettled two small Christ casts that would be attached to crucifixes corresponding to the candelabras. For Cennini's documents see page 24. Giovanni Artusi was also part of the candle stick casting; see Battaglia, *Crocifissi Del Bernini in S. Pietro in Vaticano,* 23-25.
[159] Bruno Santi, "CENNINI, Bartolommeo," in *Dizionario Biografico degli Italiani*, vol. 23, 1979, https://www.treccani.it/enciclopedia/bartolommeo-cennini_%28Dizionario-Biografico%29/.
[160] Santi, "CENNINI, Bartolommeo."
[161] There is confusion surrounding Cennini's arrival in Rome. Some suggest he was active in Rome in the 1620s and argue that he was present for the *Baldacchino's* making.
[162] Robert Enggass, "New Attributions in St. Peter's: The Spandrel Figures in the Nave." *The Art Bulletin* 60, no. 1 (1978): 103.
[163] Enggass, "New Attributions in St. Peter's," 103.

short discussion, Enggass provides a value judgement on Cennini's sculpting skills, while also acknowledging his bronze casting skills. Cennini and Pellegrini have similar profiles, having worked on the making and cleaning of waxes, and the cleaning of bronzes for the *Cathedra*. Both are *scultore* and *fonditore* and blur the line between sculptor, founder, and foundry worker.

Montagu claims that in all of seventeenth-century Rome, there were only two sculptor-founders with the skills to cast their own bronzes: Domenico Guidi and Francesco Mochi.[164] Despite documentary and biographical evidence revealing Pellegrini and Cennini too were sculptor-founders, their status and the value of their independent projects appear to have situated them below the status of Guidi and Mochi, two esteemed model-makers who were also the designers of many independent projects. The fact that Montagu claims there were only two sculptor-founders suggests that she recognizes only the most prolific sculptors. The description of Pellegrini and Cennini as both *scultore* and *fonditore* points to the eclipsing of the foundry workers by model-makers of more fame and status.

Moving down the hierarchy of the bronze foundry, the least recognized group of workers are those who were left anonymous in payment documents. This group of forty-one unnamed workers has rarely been mentioned by scholars. Despite Mattei receiving the credit for cleaning the majority of the *Cathedra,* as we saw above, there is evidence of a group of thirty-five unnamed workers who were paid to clean the *Cathedra*'s bronzes. This is the largest anonymous group of the project's different phases. This mass of anonymous cleaners has two peculiarities to

[164] Montagu, *Roman Baroque Sculpture,* 62. For more on Mochi's bronzes see Jennifer Montagu, "A Model by Francesco Mochi for the 'Saint Veronica,'" *The Burlington Magazine* 124, no. 952 (1982): 430–37; For more on Domenico Guidi see Cristiano Giometti, *Domenico Guidi 1625-1701: Uno Scultore Barocco Di Fama Europea*, (Rome: L'Erma di Bretschneider, 2010), and David L. Bershad, "A Series of Papal Busts by Domenico Guidi." *The Burlington Magazine* 112, no. 813 (1970): 805–11. Despite also being founders, there is no documentary evidence that suggests Bernini hired either Guidi or Mochi to cast his bronzes.

parse out: the repetition of three anonymous polishers, and the team of twelve who were only paid five scudi for an essential job that is only documented once.

First, let us turn our attention to a group of three unnamed polishers (*tre limatori*) of the second S. Agostino cast. On the cleaning of S. Agostino, Battaglia describes a complex operation of cleaning "with various assignments of artists and workers".[165] The three *limatori* are a particularly interesting group because they appear in six separate payment documents, across the span of nine months.[166] This polishing took place from June 1662 to February 1663. The *limatori* are never named, always appear as a trio, and are always cleaning or polishing the cast of S. Agostino. Their title, *limatori,* provides a sense of their niche specialization, as the verb *limare* can be related to polishing. For my tally of unnamed workers, I have counted each of these six references to *tre limatori* only once, with the assumption that they are the same three men each time. If this is incorrect, my estimated number of forty-one unnamed workers employed across the entire project increases by eighteen. To make this assessment, I question if these three men repeatedly came to Santa Marta on these specific days to perform the polishing of S. Agostino because that was their explicit job, or if on these six occasions, the Fabbrica needed S. Agostino to be polished, and called upon any three men in the foundry to execute the task. Battaglia's inclusion of "*I tre anonimi limatori"* only once in his "Cronista", suggests to me that it was the same three men cleaning S. Agostino each time. This group was paid a total of 184.20 scudi for their cleaning. To compare, a trio consisting of Bartolommeo Crescenzi, Pietro Curiola, and Giovanni Battista Pettignotti were paid 266.68 scudi as a group, for polishing and tessellating S.

[165] Battaglia, *La Cattedra Berniniana,* 34. In Italian, the full quotation reads: "*vediamo svolgersi intorno al Sant'Agostino una complessa opera di rinettatura alla quale partecipano successivamente e con diversi incarichi numerosi artisti e maestranze*."
[166] Battaglia, *La Cattedra Berniniana,* 217-18, docs. #393, #395, #397, #398, #399, #400.

Agostino over seven months, from May 1662 to January 1663.[167] The titles of these men reveal different specializations; Crescenzi was titled *spadaro,* while Curiola and Pettignotti were titled *ottonari*, meaning brass-worker. The named and unnamed trios share similar timelines and areas of work, but Crescenzi, Curiola, and Pettignotti were paid significantly more. This wage discrepancy suggests that the anonymous workers were at the bottom of the social hierarchy of the foundry and paid the least.

The second interesting group of anonymous workers, also in relation to bronze cleaning, is a group of eleven unnamed men, led by Giovanni Gherardi. Gherardi, titled *scalpellino* meaning stonemason or stone carver, was not paid explicitly for cleaning bronzes, but for a task essential to the making of any bronze cast.[168] Assisted by eleven workers called *"homini"* or men, Gherardi cut the cast of S. Agostino out of its mold ("*taglia il metallo uscito dalla forma*").[169] The verb *tagliare,* meaning to cut, might inspire images of cutting sprues and such off of the bronze surface, but instead Gherardi and his team are cutting the cast of S. Agostino out of its mold to free it ("*uscito della forma*"). Gherardi is an interesting but ambiguous character, because he appears only once in the documents, in this payment from March 1662.[170] Unlike Morelli or Pellegrini, he was not an active participant in numerous areas of the foundry work. Instead, his job was quite specific. No other references to the cutting or *tagliare* of metals can be found in the *Cathedra* documents despite it being a necessary step to remove the cast from the mold. Gherardi was only paid two scudi, and his eleven assistants only three scudi to share between them. From the monetary valuing of the 'cutting' of metals, we can see that this

[167] Battaglia, *La Cattedra Berniniana,* 185, doc #206. This is our only example of *tassellatura* in the entire project. This could be because of the casting trouble the foundry team was experiencing with S. Agostino.
[168] "Scalpellino," Treccani Vocabolario Online, Accessed July 10, 2022. https://www.treccani.it/vocabolario/scalpellino/.
[169] Battaglia, *La Cattedra Berniniana,* 226, doc. #491-92.
[170] Battaglia, *La Cattedra Berniniana,* 226, doc. #491-92.

aspect of the casting process was not seen as very important, despite the fact that it is necessary for every cast and a physically demanding job. It is important to note that it was Gherardi who was hired to complete this task, not any of the other foundry workers that were part of the cleaning team. Gherardi, as a stonemason, did not have any other duties in the foundry beyond this *tagliare,* which likely could have been performed by any other foundry worker or able-bodied man. Little biographic information is available on Gherardi and his indistinct team of uomini.

Hindering the count of the anonymous foundry workers are four payment documents that refer to an unspecified number of men working in the foundry on the bronzes.[171] There are four cases in which documents provide a date, a description of the work, and an amount paid to the group, but no number of men to which these scudi were paid. Each group of men is described differently – *muratori* (construction or masonry workers)*, uomini* (men)*, lavoranti* (workers)*,* and *spadari* (gilders). The payment for the *muratori* is the largest, at 60 scudi, for their "*rompere il metallo alla fonderia*" (breaking of the metal in the foundry).[172] 'Breaking' the metals involved reducing large chunks of hard metal into smaller pieces that could be more easily melted down to produce the molten bronze alloy. This document provides a clear instance of the *muratori's* involvement in the casting process by getting their hands on the metals for the casts. For this, they may be considered foundry workers, but one document does not inform the status of the entire group. Further, it is not possible to know how many men were involved in this breaking of the metals, and thus they cannot be added to the list of unnamed foundry workers. In Battaglia's "Cronista", he makes only two mentions of the *muratori*.[173] Their work does not

[171] See Battaglia documents #386, #396, #401, and #440.
[172] Battaglia, *La Cattedra Berniniana,* 216, doc. #386.
[173] Battaglia, *La Cattedra Berniniana,* 17, 36. One mention references their building of the *ponte* and the other their guarding of the foundry at night.

appear to be central to his interests, which affirms my judgement that this type of worker was, in general, distanced from the sculptural realm. In this way, there are many more workers involved in the making of a monument like the *Cathedra,* but this thesis focuses on those who directly involved with the making and casting of the bronze components.

Interestingly, there are no examples of named *muratori*. That is to say, no named individual is given the title *muratori.* Instead, they consistently appear as anonymous groups and in large numbers, with the largest group of *muratori* indicated in the documents being fourteen.[174] Their title suggests that they are wall-makers, but they are more specifically defined by the Treccani's online *Vocabulario* as masons, or a group of workers constructing masonry works ("*Operaio addetto alla costruzione di opere murarie*").[175] Their payments in the *Cathedra* documents suggest they are a multifaceted group of workers involved in various construction projects that contributed to the success of the foundry. In general, the *muratori* are a large group of labourers, found throughout the *Cathedra* documents, but I have excluded them from my total count of the unnamed workers due to the nature of their work. Their contributions appear to be removed from the casting process, in terms of both the pre- and post-cast work. Some of the documents describe the *mutarori's* generic work in the foundry, including guarding statues overnight, or the building of infrastructure in the foundry called *ponte* or bridges, but it is rare to find payments for *muratori* who were directly involved in the making of the *Cathedra's* bronze components.[176]

The *muratori* documents are found in the section "*Spese Varie"* (Various Expenses), and under the subtitle "*Spese di Giacomo Balsimelli Fattore della Fabbrica*" (Expenses of Giacomo

[174] Battaglia, *La Cattedra Berniniana,* 221, doc. #445.
[175] "Muratóre," Treccani Vocabulario Online. Accessed July 2, 2022. https://www.treccani.it/vocabolario/muratore/.
[176] See Battaglia documents #367, #378, #381, #384, #386, #390.

Balsimelli *Fattore della Fabbrica*).[177] Evidenced by his role as *Fattore,* Balsimelli was in charge of the foundry workers, but the documents reveal that he was not performing any significant foundry work.[178]

Beyond the *muratori,* there are three other groups of anonymous and uncounted workers. A group of *diversi uomini* were paid 6.80 scudi as a tip for their casting of three doctors in October 1662.[179] A group of *lavoranti* were paid 6.20 for their casting of the "last" doctor in February of 1663.[180] Lastly, a group of *spadari,* mentioned above in relation to Mattei, were paid 2.40 scudi for their gilding of the four doctors in January of 1665.[181] It is nearly impossible to estimate how many people were part of these teams. These cases reveal that the labour force employed by the Vatican to produce the *Cathedra Petri* was certainly larger than previously described. My tally of forty-one unnamed workers would, in reality, be much higher if it was possible to count these *muratori, uomini, lavoranti, and spadari.*

This section has provided a top-down analysis of the Vatican's foundries to investigate the administrative role of Bernini, the men who were the most knowledgeable in the foundry (middle-men), and finally, the complexities of the anonymous workers. Through these social hierarchies, we can see the varying degrees of anonymity and erasure experienced within the foundry.

[177] The entirety of Giacomo Balsimelli's documents span pages 215-225, docs. #365-479 of Battaglia, *La Cattedra Berniniana.*
[178] He was paid for the 'cooking' of the terracotta models in the summer of 1659, but nothing involving the waxes or bronzes is suggested in the sources. Battaglia, *La Cattedra Berniniana,* 215, doc. #365, and 217, doc. #389.
[179] Battaglia, *La Cattedra Berniniana,* 217, doc. #396.
[180] Battaglia, *La Cattedra Berniniana,* 218, doc. #401.
[181] Battaglia, *La Cattedra Berniniana,* 221, doc. #440.

Embodied Knowledge, Experience, and Training

By looking at their training and methods of knowledge generation, we may uncover how foundry workers obtained the knowledge that made them invaluable to major sculptural projects. I aim to redefine the importance of foundry workers: instead of characterizing them as anonymous physical labourers who have been erased from narratives about artistic production, I posit that these artisans and craftsmen were knowledgeable and skilled contributors to bronze casting.

The tradition of family businesses and sons apprenticing their fathers contributed to the generation and acquisition of embodied knowledge for specialized artisans and craftsmen starting at a young age. Giovanni Baglione, a seventeenth-century biographer of artists, asserts that the prolific founders of Baroque Rome were "united by blood ties, and under a variety of surnames they have demonstrated an inseparable union of artistic skill, and have perpetuated their names in metal" ("*onde tutti fra loro di sangue congiunti, hanno sotto varietà di cognome mostrato una inseparabile unione con la virtù, e ne' metalli hanno perpetuato il lor nome.*")[182]

Several examples of family legacies can be found among the founders and foundry workers employed by the Fabbrica. Angelo Pellegrini was part of a large web of foundry families in seventeenth-century Rome. His wife was the daughter of Orazio Censore, the founder to Pope Clement VIII at the end of the sixteenth century.[183] Pellegrini was the nephew of Domenico

[182] English translation from Montagu, *Roman Baroque Sculpture,* 49. In Italian, see the biography of Bastiano Torrigiani in Giovanni Baglione, and Giovanni Battista Passari, *Le vite de' pittori, scultori, architetti, ed intagliatori: dal pontificato di Gregorio XIII. del 1572. fino a' tempi di papa Urbano VIII. nel 1642*. 2nd ed. (Roma: A spese di Nicolò, e Vincenzo Rispoli, 1733), 213.
[183] Bertolotti, *Artisti Bolognesi,* 190; Lamouche, "TORRIGIANI, Bastiano."; on Orazio Censore and the Censore family see Emmanuel Lamouche, « Les Censore: De Bologne à Rome, Une Dynastie de Fondeurs Aux 16e et 17e Siècles," In *Cuivres, bronzes et laitons médiévaux : histoire, archéologie et archéométrie des productions en laiton, bronze et autres alliages à base de cuivre dans l'Europe médiévale (12e-16e siècles) = Medieval copper, bronze and brass : history, archaeology and archaeometry of the production of brass, bronze and other copper alloy objects in medieval Europe (12th-16th centuries),* ed. Thomas N. Dandridge (Namur: Agence wallonne du Patrimoine AWaP, 2018), 191–202.

Ferreri, another Roman founder and a collaborator of Censore.[184] Ferreri was the student of Bastiano Torrigiani, who was also distantly related to Censore through marriage.[185] These intertwined relationships show that bronze founding was often a family affair. For an example of the families of more specialized workers, we may look to the *Cathedra*'s gilder, Carlo Mattei. The *Dizionario's* biography of Mattei's son, Tomasso Mattei, reveals that Carlo Mattei's family home in Rome was also his workshop.[186] References to Tomasso Mattei as "*spadarino*", meaning little gilder, have been interpreted to suggest that he was trained by his father.[187] The family history of Giovanni Artusi, the *Cathedra*'s master founder, is vague. His *Dizionario* biography does not mention any family members, and the Thieme-Becker only mentions his wife, Caterina and the fact that he had three children, none of whom are named.[188] Niccolò Artusi is a named foundry worker on the *Cathedra* bronze team, but there are no explicit connections between the two other than one footnote in a chapter of *L'Ultimo Bernini* by Laura Falaschi from 1996.[189] Here, she claims that Niccolò Artusi, whom she titles *scultore,* is the brother of Domenico Artusi, titled *capofonditore della Camera Apistolica* (Master Founder of the Apostolic Chamber).[190] Both men, she claims, are the sons of Giovanni Artusi.[191] The connection between Niccolò and the other two Artusi's is debatable as Falaschi provides no

[184] Maria Celeste Cola, "FERRERIO, Domenico," in *Dizionario Biografico degli Italiani*, Treccani, vol. 46, 1996. https://www.treccani.it/enciclopedia/domenico-ferrerio_(Dizionario-Biografico).
[185] Lamouche, "TORRIGIANI, Bastiano."; Montagu, *Roman Baroque Sculpture,* 49.
[186] Dimitri Ticconi, "MATTEI, Tomasso," in *Dizionario Biografico degli Italiani*, Treccani, vol. 72, 2006. https://www.treccani.it/enciclopedia/tommaso-mattei_%28Dizionario-Biografico%29/
[187] Ticconi, "MATTEI, Tomasso."
[188] Marco Chiarini, "ARTUSI, Giovanni detto il Piscina," in *Dizionario Biografico degli Italiani*, Treccani, vol. 4 1962. https://www.treccani.it/enciclopedia/artusi-giovanni-detto-il-piscina_%28Dizionario-Biografico%29/;.Ulrich Thieme, Hans Vollmer, Fred C. Willis, and Felix Becker, *Allgemeines Lexikon Der Bildenden Künstler von Der Antike Bis Zur Gegenwart,* vol. 2, *Antonio da Monza-Bassan* (Leipzig: W. Engelmann, 1908), 166.
[189] Falaschi, "Il Ciborio Santissimo Sacramento in San Pietro in Vaticano," 99, n. 110.
[190] This is an esteemed position for Roman founders, held also by Orazio Censore, mentioned above. There is no documentation provided regarding Domenico's acquisition of this position.
[191] Falaschi, "Il Ciborio Santissimo Sacramento in San Pietro in Vaticano," 99, n. 110.

documentary evidence.[192] The relationship between Domenico and Giovanni, however, is more clear. In two letters written by Domenico, previously unpublished but transcribed in this chapter by Falaschi, the founder described himself to be the son of Giovanni Artusi.[193] Domenico used his family ties for the purposes of self-promotion. In one letter, he promised to punctually serve Bernini on his Sacrament Chapel Ciborium of bronze, just like his father did, and reminded his reader that it was his father who made the sumptuous 'machine' of the *Cathedra* of St. Peter's ("*il quale promette servire puntualissimanente sichome à fatto Gio: Artusi, suo Padre, infare la sontuosa machina della Catreda di S. Pietro*…").[194] This quotation illustrates the importance of family ties in the industry of bronze production. Domenico uses the legacy of his hardworking father to bolster his own skills and character. Even without documentary evidence, we may assume that Giovanni trained his two sons in goldsmithing or bronze casting from a young age.

Montagu argues that these family relationships may have been "specific to Rome"[195]; however, Avery reveals that Venetian foundry work was also largely "a family affair", with groups of important founders producing 'heirs' to take-over a family's foundry and metal-work business.[196] The first master that a young, aspiring founder observed and apprenticed with would likely have been his father. Avery's account of Venetian foundries, their division of labour, and educational practices provides an excellent comparison to that of Rome. We cannot assume the same practices were occurring in the city centre as on the island, but within the Vatican's foundries, and Roman foundries in general, we may find that the same familial practices occurred.

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[192] In this footnote Falaschi cites the *Dizionario*'s biography of Giovanni, but the only mention of his children is a single daughter.
[193] Falaschi, "Il Ciborio Santissimo Sacramento in San Pietro in Vaticano," 106. See documents 38 and 39.
[194] Falaschi, "Il Ciborio Santissimo Sacramento in San Pietro in Vaticano," 109-110.
[195] Montagu, *Roman Baroque Sculpture,* 49.
[196] Avery, *Vulcan's Forge in Venus' City,* 55.

On the training of foundry workers and founders, Bewer argues, "Technical knowledge was generally passed down as trade secrets from one generation of practicing craftsman to the next."[197] Similarly, Smith describes the apprenticeship process in relation to its mode of knowledge generation. She writes, "these processes of apprenticeship, in which examples were worked through, skills were modelled, and techniques and knowledge were passed on, resulted in an ability to generalize more broadly on the basis of practice and experience in a variety of circumstances."[198] Smith's "Making and Knowing" project develops a theory of embodied knowledge, which reinstates the value of technical knowledge in the context of sculpture and making.[199] Embodied knowledge represents a method of knowledge acquisition that is based upon observation, experience, and, often, trial-and-error processes of working with technically demanding materials.[200] This method of teaching and learning prioritizes experience and observation over contemplation and textual study. The seventeenth-century foundry represents a place of both making and knowing, in that the foundry worker was both making sculptural projects and generating knowledge through first-hand experience. We may see in the Fabbrica's foundry, generations of men from the same family entering and evolving within the opportunities afforded by large-scale papal sculptural commissions, and instances where founders and foundry workers were exercising their intellectual capacities and continuously learning through their experiences. The scale of the *Cathedra* commission allowed for each man to exercise their skillset. The case of the failed cast of S. Agostino in 1661 reveals a moment of growth and

[197] Bewer, "A Study of the Technology of Renaissance Bronze Statuettes," 7.
[198] Smith, *From Lived Experience to the Written Word,* 36.
[199] "The Making and Knowing Project: Intersections of Craft Making and Scientific Knowing," The Making and Knowing Project. Accessed January 15, 2023. https://www.makingandknowing.org/.
[200] In her study of a well-studied anonymous French manuscript on casting small bronzes from live animals as models, Pamela Smith argues that artisan-founders valued experience over textual learning, evidenced by the writer of the manuscript self-referentially urging his reader to not look for all the answers in his text, but through experience. See https://edition640.makingandknowing.org/ for more on the manuscript.

learning for the foundrymen who were challenged by the size of the casts. We also know that the scale of the *Baldacchino* invited the collaboration of bronze experts across sculpture and artillery, in its size and complexity.[201] In this way, bronze casting was not monotonous labour but intellectually challenging, and the foundry was a space that welcomed technical collaboration, innovation, and experimentation.

Intellectual and Manual Labour

The unequal value given to intellectual and manual work has been a longstanding debate in early modern art and art history. The devaluation of embodied knowledge has directly contributed to the erasure of the foundry worker. For example, Suzanne Butters recalls that Michelangelo Buonarotti did not want to be called 'Michelangelo the Sculptor', a title which tied him to "the heavy physical labour of carving stone", because this physical or manual aspect "compromised the intellectual merits of sculpture compared to those of painting."[202] Butters' account of Michelangelo's sentiments towards sculpture illustrates the ideological differences between painting and sculpture through their relationship to the artist's body. Butter's chapter engages with the theory of *paragone*, meaning a comparison and competition between sculpture and painting to debate about which medium was inherently better. However, her examples of sculpture are exclusively marbles. It is well-known that Michelangelo also designed sculptures in bronze.[203] For his bronze sculptures, Arie Pappot and Robert van Langh reveal that Michelangelo hired master founders because likely "lacked a thorough metallurgical

[201] Kirwin, *Powers Matchless,* 117 and 129.
[202] Susan B. Butters, "From Skills to Wisdom: Making, Knowing, and the Arts," in *Ways of Making and Knowing: The Material Culture of Empirical Knowledge*, ed. Pamela H Smith, Amy RW Meyers, and Harold J. Cook (New York: Bard Graduate Centre, 2017), 50.
[203] For more on Michelangelo and bronze, see Avery, Victoria, ed. *Michelangelo: Sculptor in Bronze*, (New York: Bloomsbury USA, 2019).

understanding" and he did not apprentice as a goldsmith.[204] However, they argue that Michelangelo took on the extensive cold-work for some of his bronze casts.[205] In this way, Michelangelo did not perform the most intellectually-demanding and technical portion of the casting process, but the perceived-to-be 'menial' and physically laborious jobs of fettling and chasing. As discussed above, the fettling and chasing of a bronze were some of the most important phases of the casting process to ensure the ideal or intended aesthetic effect of the piece. Michelangelo's aesthetic preference for rougher casts did not mean a lack of cold-work. In fact, the Rothschild bronzes examined in *Michelangelo: Sculptor in Bronze,* appear to have required significant fettling and chasing to finish them to an acceptable degree.[206] Still, Avery argues that Michelangelo also "no doubt also hired labourers to do menial and physically exhausting tasks."[207] Chasing, therefore, was one of the tasks Michelangelo did not perceive to be 'menial', and warranted his own hand. In contrast to Michelangelo, Cellini wanted to fashion himself as a founder as much as a sculptor or modeller.[208] His autobiography clearly describes his hands-on experiences in the foundry as more than a distant supervisor and highlights his technical mastery. It was this mastery that made him the superior founder and artist in his workshop.

While there may have been more "heavy physical labour" involved in bronze casting, I argue that founders and foundry workers were more intellectually stimulated in their bronze making than those working in marble. Due to the material complexities of bronze casting, it is a more technology- or science-based process that demanded substantial training and knowledge

[204] Aire Pappot and Robert van Langh, "Technical Considerations of the Rothschild Bronzes," in *Michelangelo: Sculptor in Bronze,* ed. Victoria Avery (New York: Bloomsbury USA, 2019), 172.
[205] Pappot and van Langh, "Technical Considerations of the Rothschild Bronzes," 173.
[206] Cyril Humphries, "Secular Popes, Pagan Times," *Michelangelo: Sculptor in Bronze,* ed. Victoria Avery (New York: Bloomsbury USA, 2019), 142.
[207] Avery, "Brazen Defiance," 41.
[208] Cole, *Cellini and the Principles of Sculpture*, 46.

from its makers. “Hard physical labour” is therefore met or matched with intellectual stimulation through an understanding of the material properties of the medium. The labour-centric debate on the merits of sculpture has coloured the lens through which scholars have viewed the contributions of founders and foundry workers. By the seventeenth century, prolific artists enjoyed a particular esteem and celebrity – given the association of artistic invention and originality with intellectual pursuits – however, other workers were still subjected to a lower status.[209]

Bernini’s model-makers, and their models, have amassed a substantial body of scholarship, in large part due to the perceived close proximity of model-making to the genius and invention of Bernini.[210] In the study of terracotta models after Bernini’s designs, the models have been intensely examined and surveyed, as scholars have attempted to discern the specific hands of their makers.[211] Cole claims that some scholars have attempted a similar study on small bronzes to determine “who chased this or that small bronze.”[212] However, he does not provide citations for such studies, or clarify if these scholars were using physical evidence from the sculptures or archival evidence that would name chasers in payments. A physical study in search of indices of an individual chaser or foundry worker would be difficult to perform on the large monuments designed by Bernini given their scale. Further, it would be very challenging to distinguish the physical markers of individual foundry workers from a large group because their work, as described above, was intended to be invisible, seamless, and uniform. Despite their work being more permanent and visible than that of the model-makers, the foundry workers’

[209] Butters, “From Skills to Wisdom,” 58.
[210] Here, ‘model-makers’ could be interpreted also as sculptural assistant, or marble carver.
[211] For publications on terracotta models, see: C.D. Dickerson, Anthony Sigel, and Ian Wardropper, *Bernini: Sculpting in Clay* (New York: Metropolitan Museum of Art, 2012); Ivan Gaskell, Henry Lie, *Sketches in Clay for Projects by Gian Lorenzo Bernini: Theoretical, Technical, and Case Studies* (Cambridge: Harvard University Art Museums, 1999); Evonne Levy and Carolina Mangone, *Material Bernini* (Milton Park: Routledge, 2016).
[212] Cole, *Ambitious Form,* 22.

contributions were perceived to be removed from the artist's inventive genius and thus assigned a lower status.

Sculpture was once regarded as a less intellectual sect of visual arts, behind painting, evidenced by the opinions of Renaissance masters such as Michelangelo and Leonardo da Vinci. Despite this separation between painting and sculpture, Renaissance artists and writers were fighting to elevate the status of visual arts from its status as a mechanical art to a liberal art.[213] Wittkower, in *Born Under Saturn: The Character and Conduct of Artists,* writes, "By the admission of the visual arts into the circle of the liberal arts, for which artists of the fifteenth and sixteenth centuries pleaded in word and picture, the artist rose from a manual to an intellectual worker."[214] I argue that the foundry worker occupied an undertheorized zone between manual and intellectual work. They were manual labourers, in the sense that they performed extensive manual work to bring a bronze to completion; however, they also were intellectual workers in that they possessed the necessary embodied knowledge (technical and theoretical) to perform their duties. This embodied knowledge is an indicator of the convergence of the manual and intellectual aspects of artistic production.

Further, in some contexts, experiential knowledge may have been valued over artistic ingenuity. Aristotle states:

> Nevertheless we consider that knowledge and proficiency belong to art rather than to experience, and we assume that artists are wiser than men of mere experience (which implies that in all cases wisdom depends rather upon knowledge); and this is because the former know the cause, whereas the latter do not. For the experienced know the fact, but not the wherefore; but the artists know the wherefore and the cause. For the same reason we consider that the master craftsmen in every profession are more estimable and know more and are wiser

[213] Claire Farago, *Leonardo Da Vinci's Paragone: A Critical Interpretation with a New Edition of the Text in the Codex Urbinas* (Leiden: BRILL, 1992), 25.
[214] Rudolf Wittkower Margaret Wittkower, *Born Under Saturn: The Character and Conduct of Artist* (New York: Random House, 1963), 16.

> than the artisans, because they know the reasons of the things which are done; but we think that the artisans, like certain inanimate objects, do things, but without knowing what they are doing… Thus the master craftsmen are superior in wisdom, not because they can do things but because they possess a theory and know the causes.[215]

Aristotle's theory valorizes artists and craftsmen. The quoted passage brings the titles of 'artisan' and 'artist' into conflict. For Aristotle, 'artists' and 'master craftsmen' were awarded the same status based on their knowledge. He values 'artists' and 'craftsmen' over 'artisans' by judging who understood creative processes and had technical know-how. The craftsman, however, has often be considered lesser than the artist because he practiced craft, rather than art. Aristotle instead recognizes the wisdom and knowledge possessed by the craftsman, and promotes his ability to create while "posess[ing] a theory and know[ing] the causes."[216]

Relating Aristotle to the early modern period, in the sculptural realm, there were many types of artists, craftsmen and artisans – those who only designed works, executed their own designs, or produced the designs of others – and not one simple definition of these groups.[217] Understanding the differences between artist and artisan involves a nuanced understanding of creative processes that often differed across workshops. Artists and artisans could perform many of the same duties. For example, this essay has demonstrated how Lazzaro Morelli occupied many roles in the *Cathedra*'s processes of production, thus confusing the binary of artist and artisan. Smith's body of work on artisans and sculptors in the early modern period foregrounds the artisan as an expert in creation, thus challenging Aristotle's value judgement of artist over

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[215] Aristotle, *Metaphysics,* Trans. Hugh Tredennick, vols. 17-18 (Cambridge, MA: Harvard University Press, 1933), 1.980a-1.981b.
[216] Aristotle, *Metaphysics,* 1.981b.
[217] On the diverse relationships between artists as designers, executants, and members of workshops, see chapters 3-5 in Jenifer Montagu, *Roman Baroque Sculpture.*

artisan.[218] Smith argues that artisans also possessed the material knowledge, technical skill, and know-how that made artists and craftsmen praiseworthy in the eyes of Aristotle. The distinction between artist and artisan grows more complicated when we recognize that, in the world of bronze casting, artists sometimes did not have the material or procedural understanding that Aristotle praised. In the specific case of the foundry and bronze casting, the foundry workers and craftsmen were often more knowledgeable about the processes and reasoning behind casting than the artist. For this reason, I argue that the status of foundry workers should be raised based on their possession of specialized knowledge.

In his doctoral dissertation from 2013, titled "Fondeurs, artistes et artisans du bronze à Rome: 1585-1625," Emmanuel Lamouche uses the theories of Vincenzo Giustiniani, a seventeenth-century art theorist, to demonstrate how the hierarchy of the foundry could be considered fluid, and how the artist could potentially occupy a lower status than the founder. Lamouche cites Giustiniani's *Discorso sopra la scultura* (*Discourse on Sculpture)*, written in 1610 to make the assessment that the sculptor may be considered subordinate to the founder – Giustiniani uses the term "*molto subordinato*" – because of the knowledge that the latter possessed.[219] In the foundry environment, Giustiniani valued the technical knowledge, or know-how, over artistic ingenuity, which is a reversal of traditional hierarchies of knowledge in the seventeenth-century art world. If we apply Giustiniani's model of reversal to the seventeenth-century foundry, we would likely find that not only the founders but also the foundry workers

[218] On artisans see Pamela H. Smith, *From Lived Experience to the Written Word: Reconstructing Practical Knowledge in the Early Modern World* (Chicago: University of Chicago Press, 2022); Pamela H. Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago: University of Chicago Press, 2018); Pamela H. Smith, Amy RW Meyers, and Harold J. Cook, eds. *Ways of Making and Knowing: The Material Culture of Empirical Knowledge* (New York: Bard Graduate Centre, 2017).
[219] Lamouche, "Fondeurs, artistes et artisans du bronze à Rome," 291.

could be attributed a higher status than Bernini. In this reversal of hierarchies, knowledge was moving upwards from the founder or foundry worker to the sculptor.

Lamouche demonstrates that this is only one mode of social organization in the context of the foundry, and that the *molto subordinato* sculptor is rarely realized in the seventeenth-century workshop.[220] He describes the different kinds of relationships between sculptors and founders to emphasize the variety in circumstances that can surround bronze casting.[221] Factors such as the size of the project, size of the foundry, and specialized knowledge (or lack thereof) of the principal artist all contribute to how the sculptor and founder interact, and determines who received the highest status in the foundry. In the case of the *Cathedra*, he could not necessarily be considered the *molto subordinato* sculptor because he simply was not present in the workshop. Since Bernini was most often absent from the foundry, and occupied the esteemed role of *Architetto di San Pietro*, he was slightly removed from these hierarchies but always assumed to be at their top.

Giustiniani's and Lamouche's theories on hierarchy reversal could be seen in Bernini's first monumental bronze project, the *Baldacchino* (fig. 18). Kirwin demonstrates that there was a reversal of status between Bernini and the Fabbrica's founders, where the former was learning from the latter.[222] This case reveals that Bernini's much-lauded natural talents were not enough to produce such a marvel of metal. Kirwin clearly lays out all that Bernini did not know or could not do, to illustrate just how much he had to rely on founders, architects, and engineers. Kirwin supports his arguments by claiming that that Bernini was observing the master founders in their casting of the *Baldacchino*. Despite a document that suggests that Bernini was involved in

[220] Lamouche, "Fondeurs, artistes et artisans du bronze à Rome," 295.
[221] See Lamouche, Fondeurs, artistes et artisans du bronze à Rome," 302-315.
[222] Kirwin, *Powers Matchless,* 128-129.

multiple stages of the casting process, Kirwin doubts the authenticity of these self-stated contributions. Montagu translates and summarizes the 1627 document which details the work provided by Bernini for the casting of the columns of the *Baldacchino*. She states:

> A statement presented on Bernini's behalf, outlining his work on the columns, claims that he had made the designs and the small and large models, that he had made the plaster moulds and cast the wax, that he had cleaned the wax casts and fitted them together to cast the metal, that he had attached the tubes for the metal to enter and the air to escape, that he had worked with the foreman to cover the wax into its final mould, to bind the moulds with metal, heat out the wax, bury the moulds in the ground for greater strength, melt the metal, and cast the twenty pieces.[223]

This description of Bernini's work, and the degree of his involvement in the *Baldacchino* in general should be met with some skepticism. This document is, arguably, an exaggeration of Bernini's contribution and perhaps an effort to attribute most of the work to the artist. The sizeable team of founders and foundry workers made available by the Fabbrica ensured that Bernini would not have to do all of this work himself. One interesting phrase used by Montagu is that "he had worked with the foreman."[224] The word foreman is relatively vague and does not give a sense of who helped Bernini with these steps after the model-making. This is the only point at which the document acknowledges that Bernini had help in the foundry.

Kirwin reminds his reader that Bernini simply did not have the skills required to do all of the procedures cited this document – he was a sculptor and not a foundryman.[225] He argues that for the *Baldacchino* project, Bernini entered into a kind of "apprenticeship at the foundry", where he received "on-the-job training" and observed the founders perform the casting

[223] Montagu, *Roman Baroque Sculpture,* 70.
[224] Montagu, *Roman Baroque Sculpture,* 70.
[225] Kirwin, *Powers Matchless,* 128.

process.[226] At this point, he was not yet *Architetto di San Pietro,* and did not have a great deal of experience with bronze, but was still a well-regarded and successful sculptor who had a strong relationship with many popes. His informal apprenticeship and training were rooted in observation. Kirwin argues that Bernini observed the "the master professionals" in the Vatican's foundries starting from their preparation of the clay for molds, and moving on to the polishing, finishing, and gilding of the final cast.[227] This represents the kind of reversal of the hierarchies of workshop contributions asserted by Giustiniani. We may compare this to the case of Cellini, who, when in France from 1540-45, "diligently" observed French founders and their techniques.[228] According to Cole, it was only after this trip, where Cellini learned from "the expert *lavoranti*" of the French foundry, that he was able to conceptualize and cast the *Medusa* group.[229] At this point, however, Cellini was in his forties, and was already an established goldsmith. For Bernini, the young sculptor entered the foundry as an observer to learn as much as possible in this short time from the master founders, like an apprentice. Thus, in the arena of the bronze foundry, Bernini found himself to be intellectually inferior to the founder, and relied heavily on the technical experience of specialized experts, both for the *Baldacchino* and subsequent bronze projects.

Despite his informal and short apprenticeship, it appears that Bernini did not continue to develop his foundry skills through continued observation, and he continued to rely on bronze experts. Wittkower boldly claims that after the *Baldacchino*, Bernini "hardly touched a tool himself".[230] For the *Cathedra*, there is no document that outlines Bernini's self-stated

[226] Kirwin, *Powers Matchless,* 128-129. Unfortunately, Kirwin's arguments on Bernini's apprenticeship are not well-supported with documentary evidence.
[227] Kirwin, *Powers Matchless,* 128.
[228] Cole, *Cellini and the Principles of Sculpture,* 46
[229] Cole, *Cellini and the Principles of Sculpture,* 46.
[230] Wittkower, *Bernini,* 39.

contributions to the casting and foundry work. Therefore, I conclude that Bernini was not in the foundry performing the duties of a foundry worker. He likely did not come into close contact with the wax models nor was he involved in the bronzes' casting, cleaning, or gilding. After the success of his first large-scale bronze monument, Bernini's confidence was bolstered, contributing to his conviction in his *Cathedra* design, but he did not demonstrate an interest in continuing or improving his bronze casting skills.

The *Baldacchino* and the *Cathedra* both required enormous amounts of money, materials, and labour. While the Papacy's extravagant expenditures on spectacular materials was widely recognized, the hiring of legions of labourers has been less remarked upon. It is as though the work of these labourers had been rendered invisible, obscured by the status of Bernini as the principal artist. My review of the *Baldacchino*'s documents has produced a list of thirty-one named and over seventeen unnamed workers.[231] The ratio of named to unnamed workers is remarkably different than that of the *Cathedra'*s team. This could be partially due to an increased number of masters who collaborated to the "collaborative venture" of the project, to use Kirwin's words. Some payment documents for named individuals include the collaboration of an unspecified number of men, indicated by the words "*e compagni*" which translates to "and coworkers".[232] Because of this anonymity, it is difficult to make an assessment on the total number of individuals involved in the casting of the *Baldacchino*. Comparing the *Baldacchino* and *Cathedra* projects is important because it is through the *Baldacchino* that Bernini learned to work with bronze.

[231] Pollak, Trenkler, and Frey, *Die Kunsttätigkeit Unter Urban VIII,* 306-426.
[232] Like Mattei's summary document in which his team of sixteen *limatori* are noted, the "*e compagni"* documents an interesting combination of named and unnamed contributors in one payment.

Tensions in the Workshop of Bernini

Despite designing multiple large-scale bronze monuments for St. Peter's, and many smaller bronze objects, little is known about Bernini's experience in the foundry based on archival documents or his biographies. More specifically, the *Cathedra* documents do not provide a sense of Bernini's relationships to his foundry workers or the social dynamics he entered into in the Fabbrica's foundries. There is more documented evidence on the relationship between Bernini and his sculptural assistants or model-makers. Tensions between Bernini and his sculptural assistants reveal that ideas of credit, celebrity, and authorship were present in the workshop environment in the seventeenth century.

According to biographer Lione Pascoli, Bernini's assistant Morelli once said, "How much better would it have been for me to stay at home, where I did not and could not earn very much, but where, eventually, I would have earned first place among my colleagues."[233] By "home" or "*casa",* Morelli was referring to his hometown of Ascoli. Pascoli does not provide a date for this quotation, but we know that Morelli arrived in Rome in 1641, and he was introduced to Bernini in 1643.[234] Regardless of whether Morelli had begun to work with Bernini, this quotation provides us with a perspective on the state of the Roman sculpture industry from a sculptor below Bernini's status. Morelli also represents a foundry worker with diverse skills. His various abilities likely made him an attractive employee, and yet he was lamenting the lack of respect given his expertise. The full quotation is quite emphatic, with multiple exclamation points; Morelli must have been quite frustrated with his circumstances in Rome, where the cost

[233] In English: Rudolf Wittkower, Joseph Connors, and Jennifer Montagu, *Art and Architecture in Italy, 1600–1750: Volume 2: The High Baroque, 1625–1675* (Yale University Press, 1999), 318. Wittkower translates a quotation said by Morelli to Pascoli. In Italian the quotation reads: "*Quanto avrei fatto meglio di starmene in patria, dove è vero che non guadagnava, e guadagnar non poteva molto, ma alla fine v'evrei fatta sempra tra i miei contemprofessori la prima figura*". For the full quotation see Lione Pascoli, *Vite,* 446.
[234] Marchegiani, "MORELLI, Lazzaro."

of living was high, and he appears not to have been earning enough money to support himself comfortably. Moreover, he was unhappy with feeling like he could never earn "first place", calling attention to the hierarchies and celebrity culture of Rome at the time. The sentiments of other foundry workers are more difficult to ascertain given a lack of archived documents or correspondences.

Alice Jarrard states that in the 1660s, Bernini's workshop was a place of "repressive hierarchy" and "outright discord".[235] Her assessment is evidenced by letters from 1667 written by Giovanni Battista Muzzarelli to Rinaldo D'Este, one of Bernini's patrons at this time.[236] She cites an example of a commission where Bernini presented models made by his assistant, Mattia De' Rossi to the Pope, claiming that he had made them himself.[237] Jarrard suggests that in claiming the models were his own ("*opera sua*") Bernini meant that they were of his creative invention and design. Still, Muzzarelli's letters provided evidence of De' Rossi's dissatisfaction with this characterization of his work and the general tensions between master and assistant. From this example, we see how Bernini took credit for models made by other artists.

Another example of tension within Bernini's workshop comes from the beginning of his career. Giuliano Finelli was one of Bernini's earliest assistants and joined his workshop after working with his father Pietro Bernini.[238] The working relationship between Bernini and Finelli, however, was short lived and ended when Finelli became dissatisfied with the credit for his sculptures being attributed to Bernini. According to Franco Mormondo, "Finelli had no longer

[235] Alice Jarrard, "Inventing in Bernini's Shop in the Late 1660s: Projects for Cardinal Rinaldo d'Este." *The Burlington Magazine* 144, no. 1192 (2002): 411. http://www.jstor.org/stable/889610.
[236] Jarrard, "Inventing in Bernini's Shop in the Late 1660s," 411.
[237] Jarrard, "Inventing in Bernini's Shop in the Late 1660s," 411.
[238] Paola Santa Maria, "FINELLI, Giuliano," in *Dizionario Biografico degli Italiani*, Treccani, vol. 48, 1997. https://www.treccani.it/enciclopedia/giuliano-finelli_%28Dizionario-Biografico%29/; Finelli is also the nephew of Domenico Guidi, one of the two sculptor-founders recognized by Montagu.

wished to work within the darkness of Bernini's shadow."[239] Similarly, Montagu says, "Finelli was not merely a craftsman, but a young man with the makings of a very considerable sculptor in his own right, with an ego to match, and he could not bear to remain in this subordinate position, nor tolerate this anonymity while Bernini received the fame and glory for his work."[240] After leaving Bernini's studio, Finelli established himself as an independent sculptor, free from the "repressive" workshop environment and constraints of being an assistant.[241] While Baldinucci's biography lists some examples of Bernini's rivals, Finelli is not mentioned. His is an example of one of the tensest working relationships with Bernini.

While none of these examples directly relate to bronze founding, the stories of Morelli, De' Rossi, and Finelli demonstrate the conflicts that arose in seventeenth-century sculptural workshops. In these situations, even Bernini's model-makers were left dissatisfied with their position in the hierarchy of his studio. In truth, however, model-makers and sculptural assistants like Morelli, De' Rossi, and Finelli enjoyed significantly more status than founders and foundry workers. Morelli was the only model-maker of this group who worked closely with bronze as well. My reading of archival and biographical sources suggests that that Morelli's strong reputation was derived from his model-making, his skills in marble, as well as his close proximity to Bernini, but not on his bronze foundry work. If he was not also a model-maker and independent marble sculptor, Morelli too would have been left unrecognized, like the vast majority of other foundry workers.

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[239] Franco Mormando, *Bernini: His Life and his Rome* (Chicago: University of Chicago Press, 2011), 79.
[240] Montagu, *Roman Baroque Sculpture,* 106.
[241] For more on Finelli's career, see Damian Dombrowski, *Giuliano Finelli: Bildhauer zwischen Neapel und Rom* (Frankfurt am Main: P. Lang, 1997); Damian Dombrowski, "Addenda to the Work of Giuliano Finelli," *The Burlington Magazine* 140, no. 1149 (1998): 824–28.

Conclusion

In the diary of Paul Freart de Chantelou, the Frenchman quoted a letter from January 1666 in which Bernini wrote, "*Io per la gratita di Dio ho finite l'opera della catedra…*" (By the Grace of God, I have finished the work of the Cathedra).[242] By attributing the Cathedra to the 'Grace of God', Bernini obfuscates the technical knowledge, physical labour, and time dedicated to the project by over fifty-seven skilled individuals, while also bolstering his own work on the *Cathedra.* In truth, Bernini's work essentially ended after he made the designs for the monument.

Bernini had a primary role in the Fabbrica's artistic program while in the role of *Architetto*; however, he was not directly involved with the workers who executed his massive sculptural projects. As Rice asserts, the *Architetto* "provided designs when necessary and maintained artistic control over the building as a whole".[243] She further assesses that it was his *sopraintendente* and *fattore* who worked closely with both the labour force and the materials of the *Cathedra Petri*.[244] From this division of power and responsibility, we can see how far-removed Bernini was from the foundry. Further, Bernini had numerous contemporaneous projects to the *Cathedra* which pulled him away from the work. First instance, he left Rome in 1665, travelling to Paris, and spent five months in France before returning to his papal work.[245]

The *Cathedra Petri's* bronze surfaces both hide and reveal the presence of a large group of artists, craftsmen, and workers, who created and constructed the monument. These invisible workers contributed knowledge, skill, time, and labour to bring one of Bernini's most visible bronze design into reality. Bernini's ambitious design for the *Cathedra* was bolstered by the

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[242] Paul Fréart de Chantelou and Ludovic Lalanne, *Journal du voyage du Cavalier Bernin en France* (Paris: Gazette de Beaux-Arts, 1885), 261.
[243] Rice, *Altars and Altarpieces of New St. Peter's,* 11.
[244] Rice, *Altars and Altarpieces of New St. Peter's,* 11.
[245] Wittkower, *Bernini,* 279. The experiences of Bernini in Paris are documented in the diary of Paul Fréart de Chantelou and published in various editions. See, for example, Paul Fréart de Chantelou, and Ludovic Lalanne, *Journal du voyage du Cavalier Bernin en France* (Paris: Gazette de Beaux-Arts, 1885).

success of the *Baldacchino,* his first bronze monument. The *Baldacchino's* success, however, was in no small part due to the expertise of founders, engineers, and architects who compensated for Bernini's inexperience in both bronze and large-scale monuments. The *Cathedra* pushed the limits of bronze and challenged the capabilities of seventeenth-century bronze founders in its complexity and scale. The largest casts of the *Cathedra*, the four doctors, stand at five feet tall, making them taller than each individual cast of the *Baldacchino*.[246] They are some of the largest single-pour bronze casts of the early modern period. Thus, Bernini demanded even more from his foundry team as he aimed to match and surpass his previous bronze designs. In relation to casting single-pour monumental sculptures, Cole claims that Cellini argued that "founding, no less than modelling, must be *ingenious*."[247] For Cellini, technical difficulty was just as important as artistic invention. The mastery of bronze casting, and more specifically single-pour casting, was an achievement of and testament to Cellini's own knowledge and skill. For the *Cathedra Petri,* however, the *ingenious* founding, was put into the hands of Artusi and the fifty-seven foundry workers.

In the seventeenth century, it would have been very difficult to award credit to this group of foundry workers. My goal of bringing their identities and experiences out of Bernini's shadow is indebted to the Fabbrica's archival documents. Since documents only reference physical work performed in the foundry, we are left to imagine the scope of the intellectual contributions the foundry worker brought into this space dominated by both making and knowing. Archival documents provide a different view than other period sources such as Titi's guidebook, Chantelou's diary, and Baldinucci's biography where the foundry worker is absent from descriptions of the labour and manufacture of a finished monument. Each of these sources inflate

[246] The largest components of the *Baldacchino* are the four angels atop the columns, at four feet tall.
[247] Cole, *Cellini and the Principles of Sculpture,* 48

Bernini to the status of the artist-genius and minimize or erase the intellectual and physical contributions of any other figures.

Similarly, when modern art historians focus a spotlight on only the most major characters and leave out the rest of the supporting cast, it can be very misleading to a reader who is not familiar with the scale and scope of bronze production. Despite foundry workers occupying a lower position in the hierarchy of a foundry or founder's workshop, we must not assume that they were not knowledgeable; technical knowledge generated from their first-hand experiences in the foundry and observations of master founders developed these men into specialized artisans, craftsmen, and workers. The recurring presence of individuals in the Fabbrica's documents indicates they were repeatedly employed and suggests they had successful careers. Suzanne Butters argues, "In the sense that wisdom is born of experience, that philosophy is a love of wisdom, and that philosophy begins in wonder and puzzlement (as Plato and Aristotle claimed), the delight experienced by artisans when they produced new things, extending nature's range, exercising their skills and bringing into play their inborn talent, made them wise."[248] In this way, the *Cathedra* may be regarded as the manifestation of the collaborative wisdom and knowledge of over fifty-seven skilled workers, rather than one artist-genius. Both physically and intellectually, foundry workers were more involved in bronze sculptures than they have received credit for.

[248] Butters, "From Skills to Wisdom," 60.

Appendix:

Table 1: Named workers, their titles, and contributions to *Cathedra Petri* (including the principal founder)

Name	**Title**	**Contributions**
Angelo Pellegrini	*Scultore, fonditore*	Wax making, wax cleaning, bronze cleaning
Bartolommeo Crescenzi	*Spadaro*	Bronze cleaning
Bartolommeo Cennini	*Scultore, fonditore*	Wax making, wax cleaning, bronze cleaning
Carlo Mattei	*Spadaro*	Bronze cleaning, bronze gilding
Francesco Masene	No title	Bronze cleaning
Francesco Passinvolta	No title	Bronze cleaning
Giorgio Tedesco	No title	Bronze cleaning
Giovanni Artusi	*Fonditore*	Wax making, wax cleaning, bronze casting, bronze cleaning
Giovanni Battista Pettignotti	*Ottonaro*	Bronze cleaning
Giovanni Gherardi	*Scalpellino*	Cutting bronze out of molds
Giovanni Rinaldi	*Scultore*	Wax making, wax cleaning, bronze cleaning
Giuliano Visconti	*Limatore*	Bronze cleaning
Lazzaro Morelli	*Scultore*	Model making, wax making, wax cleaning, bronze cleaning, stucco
Niccolò Artusi	*Scultore*	Wax making, wax cleaning, bronze cleaning
Pietro Curiola	*Ottonaro*	Bronze cleaning
Simon Corni	*Limatore*	Bronze cleaning

Table 2: Groups of unnamed workers, with contributions, payments, dates, and document numbers.

Titles	**# Of men**	**Amount paid in scudi**	**Contribution**	**Date(s)**	**Battaglia Document number(s)**
Uomini	11	3.00	Cutting cast out of mold	March 1662	#492
Limatori	3	184.20	Bronze cleaning	June, July, October, November, December 1662, February 1663	#393, #395, #397, #398, #399, #400
Uomini	6	9.70	Wax cleaning	June 1664	#429
Uomini	16	Unknown	Bronze cleaning	November 1665	#217
Uomini	5	4.00	Bronze cleaning	December 1665	#459

Figures:

Figure 1: Gian Lorenzo Bernini, Giovanni Artusi, and foundry team. *Cathedra Petri.* Gilt bronze and stucco, marble, glass. 1656-1666. St. Peter's Basilica, Vatican City, Italy. Photo via WikiMedia (Dnalor_01). Note that the table and candles obscure the four bronze Chigi coats of arms attached to the marble pedestal.

Figure 2: Gian Lorenzo Bernini, Giovanni Artusi, and foundry team. Detail of *Cathedra Petri:* S. Ambrogio (left) and S. Atanasio (right). Gilt bronze and stucco, marble, glass. 1656-1666. St. Peter's Basilica, Vatican City, Italy. Image via Flickr (Steven Zucker). Edited by Jennifer Liu.

Figure 3: Gian Lorenzo Bernini, Giovanni Artusi, and foundry team. Detail of *Cathedra Petri:* S. Giovanni Crisostomo (left) and S. Agostino (right). Gilt bronze and stucco, marble, glass. 1656-1666. St. Peter's Basilica, Vatican City, Italy. Image via Flickr (Steven Zucker). Edited by Jennifer Liu.

Figure 4: Benvenuto Cellini. *Perseus Holding the Head of Medusa.* Bronze. 1545-54. Piazza Della Signoria, Florence, Italy. Image via Flickr (Steven Zucker).

Figure 5: Unknown woodcut printer. *Goldbeaters at Work on a Duplex Plate of Gold and Silver*. Woodcut on paper. 1540. Image via Biringuccio Vannoccio. *The Pirotechnia of Vannoccio Biringuccio: The Classic Sixteenth-Century Treatise on Metals and Metallurgy*. Translated by Cyril Stanley Smith and Martha Teach Gnudi (Mineola: Dover Publications, 2005).

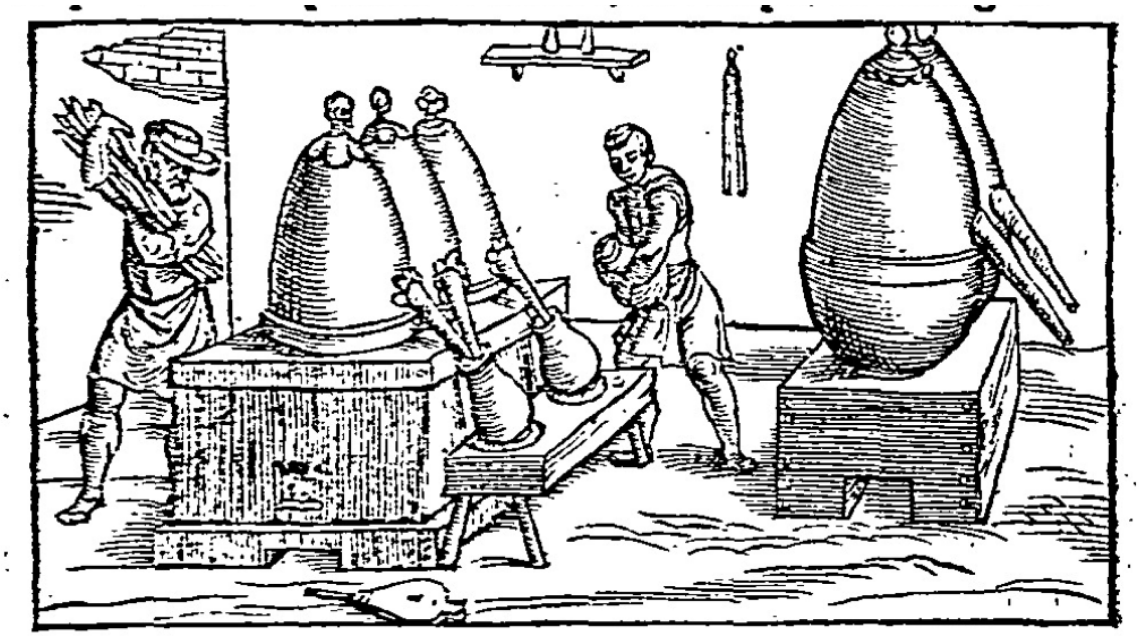

Figure 6: Unknown woodcut printer. *Recovery of Mercury with a Distilling Bell*. Woodcut on paper. 1540. Image via Biringuccio Vannoccio. *The Pirotechnia of Vannoccio Biringuccio: The Classic Sixteenth-Century Treatise on Metals and Metallurgy*. Translated by Cyril Stanley Smith and Martha Teach Gnudi. (Mineola: Dover Publications, 2005).

Figure 7: Workshop of Gian Lorenzo Bernini, likely Ercole Ferrata, Antonio Raggi, Lazzaro Morelli, and Pietro Verpooten. Model for seat for *Cathedra Petri.* Terracotta. Late 1650s. 23 × 11.5 × 11 inches. Detroit Institute of Arts Museum, Detroit, MI. Image via Detroit Institute of Arts Museum.

Figure 8: Workshop of Gian Lorenzo Bernini, likely Ercole Ferrata, Antonio Raggi, Lazzaro Morelli, and Pietro Verpooten. Model of S. Ambrogio for the *Cathedra Petri.* Terracotta. 1660. 14.25 x 10.43 x 7.5 inches. Harvard Art Museums, Cambridge, MA. Image via Harvard Art Museums.

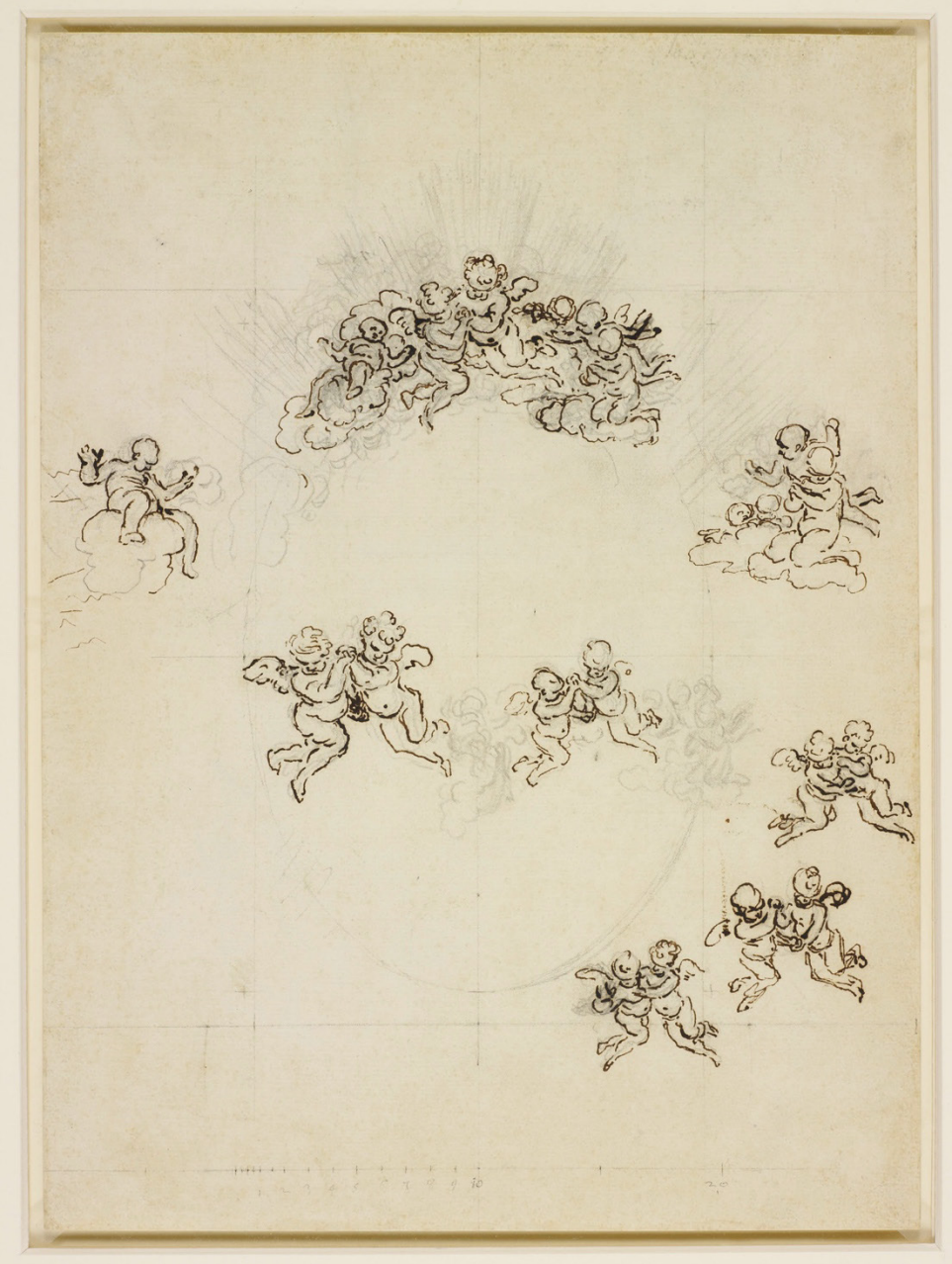

Figure 9: Attributed to Bernini. Verso of study of Glory for *Cathedra Petri.* Ink and chalk on paper. 1656-57. 37.3 x 27.3 cm. The Royal Collection Trust, Windsor, England. Image via The Royal Collection Trust.

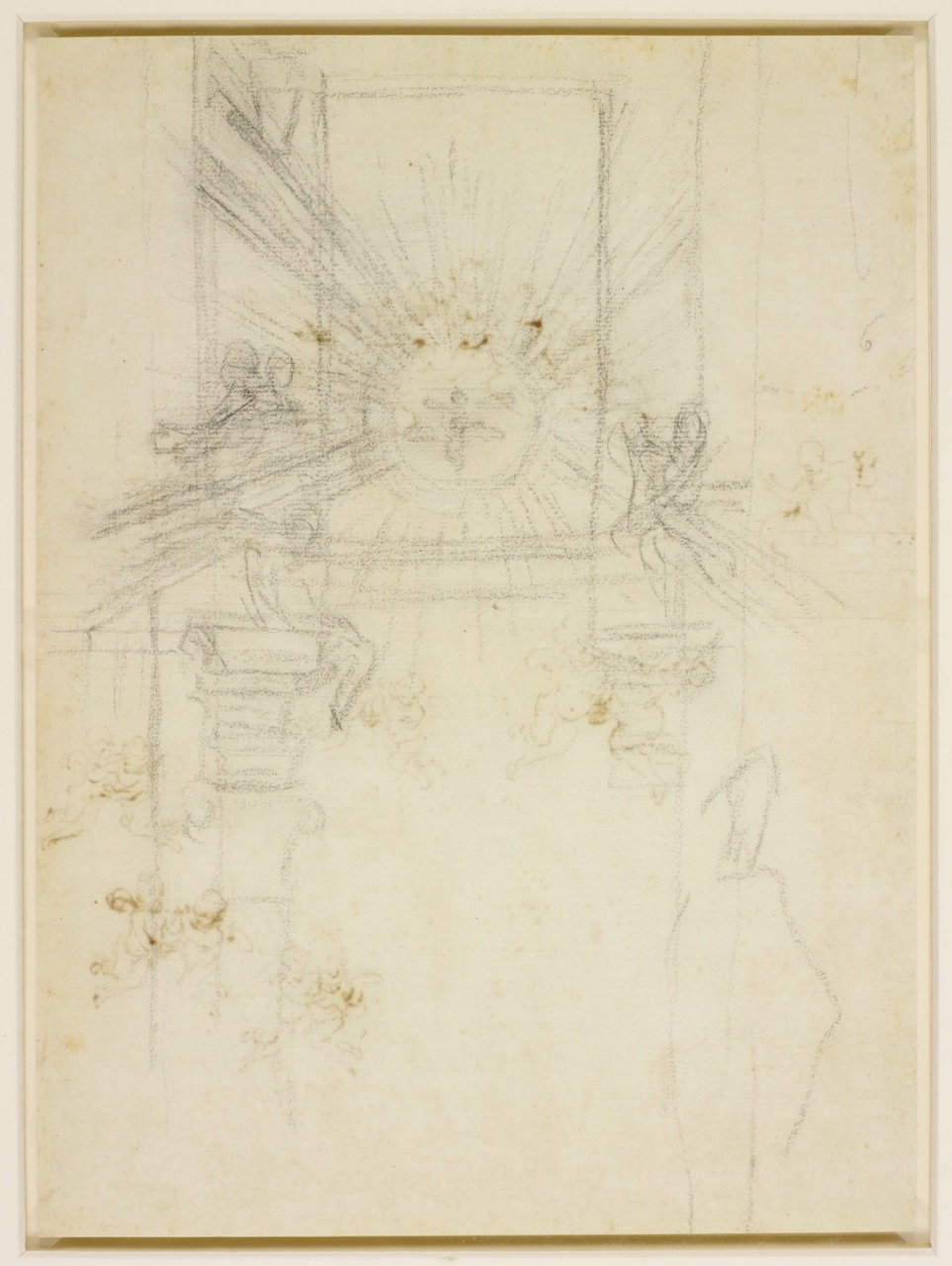

Figure 10: Attributed to Bernini. Recto of study of Glory for *Cathedra Petri.* Ink and chalk on paper. 1656-57. 37.3 x 27.3 cm. The Royal Collection Trust, Windsor, England. Image via The Royal Collection Trust.

Figure 11: Gian Lorenzo Bernini, Giovanni Artusi, and foundry team. Detail of *Cathedra Petri:* S. Agostino. Gilt bronze and stucco, marble, glass. 1656-1666. St. Peter's Basilica, Vatican City, Italy. Image via Flickr (Steven Zucker). Edited by Jennifer Liu.

Figure 12: Gian Lorenzo Bernini, Giovanni Artusi, and foundry team. Face of S. Agostino of the *Cathedra Petri:* S. Agostino. Gilt bronze and stucco, marble, glass. 1656-1666. St. Peter's Basilica, Vatican City, Italy. Image via Antonio Pinelli, *The Basilica of St. Peter in the Vatican,* vol. 1 (Mirabilia: F. C. Panini, 2000).

Figure 13: Gian Lorenzo Bernini, Giovanni Artusi, and foundry team. Face of S. Ambrogio of the *Cathedra Petri:* S. Agostino. Gilt bronze and stucco, marble, glass. 1656-1666. St. Peter's Basilica, Vatican City, Italy. Image via Antonio Pinelli, *The Basilica of St. Peter in the Vatican,* vol. 1 (Mirabilia: F. C. Panini, 2000).

Figure 14: Gian Lorenzo Bernini, Giovanni Artusi, and foundry team. Face of S. Atanasio of the *Cathedra Petri:* S. Agostino. Gilt bronze and stucco, marble, glass. 1656-1666. St. Peter's Basilica, Vatican City, Italy. Image via Antonio Pinelli, *The Basilica of St. Peter in the Vatican,* vol. 1 (Mirabilia: F. C. Panini, 2000).

Figure 15: Gian Lorenzo Bernini, Giovanni Artusi, and foundry team. Face of S. Giovanni Crisostomo of the *Cathedra Petri:* S. Agostino. Gilt bronze and stucco, marble, glass. 1656-1666. St. Peter's Basilica, Vatican City, Italy. Image via Antonio Pinelli, *The Basilica of St. Peter in the Vatican,* vol. 1 (Mirabilia: F. C. Panini, 2000).

Figure 16: Gian Lorenzo Bernini, Giovanni Artusi, and foundry team. Detail of S. Ambrogio (drapery) of the *Cathedra Petri:* S. Agostino. Gilt bronze and stucco, marble, glass. 1656-1666. St. Peter's Basilica, Vatican City, Italy. Image via Antonio Pinelli, *The Basilica of St. Peter in the Vatican,* vol. 1 (Mirabilia: F. C. Panini, 2000).

Figure 17: Gian Lorenzo Bernini, Giovanni Artusi, and foundry team. Detail of S. Atanasio of the *Cathedra Petri:* S. Agostino. Gilt bronze and stucco, marble, glass. 1656-1666. St. Peter's Basilica, Vatican City, Italy. Image via Roberto Battaglia, *La Cattedra Berniniana di San Pietro* (Rome: Reale Istituto di Studi Romani, 1943).

Figure 18: Gian Lorenzo Bernini, Giacomo Laurentiani, Orazio Albrizi, Gregorio de'Rossi, Antonio Beltramelli, Ambrogio Lucenti, Innocenzio Albertini, and foundry team. *Baldacchino*. Gilt bronze, copper, wood, marble. 1623-34. St. Peter's Basilica, Vatican City, Italy. Image via WikiMedia (Dennis Jarvis).

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