

Imitation and emulation in Rembrandt's neighborhood– deciphering transmission of ideas among artists living around the corner

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Abstract

Historical and cadastral maps can enrich art historical research by allowing to pinpoint the artist's workshop to a specific location in the city. Cadastral resources, together with historical maps and archival sources, enable us to virtually reconstruct the spatial networks in neighborhoods where artists lived, worked, and socialized. However, the dissemination of artistic innovation through physical contact within the same community has long escaped the art historian's attention. This research intends to fill this gap through deep-mapping the production and consumption of painting in seventeenth-century Amsterdam, with a focus on Rembrandt's neighborhood, Sint Antoniesbreestraat. Information extracted from archival documents are layered on top of the historical maps of 1625 and 1724 by georeferencing the descriptions of locations from the original sources. Wealth distribution in the city based on the 1631 tax registration are visualized which refutes the commonly-held belief that Sint Antoniesbreestraat was crowded with wealthy patrons of arts, who attracted artists to this neighborhood. This research further links the biographical databases of agents in the creative industries in Amsterdam and analyzes the composition of the neighborhood of Sint Antoniesbreestraat, which illustrates that this area continued to flourish throughout Rembrandt's lifetime. A closer observation of the functioning and evolution of creative industries in a spatial cluster reveals that, as the art market matured, Rembrandt's neighborhood experienced a 'reverse gentrification' -- artistic painters were replaced by the 'industrial' painters who painted *on spec* or participated in mass production. Lastly, by layering paintings created in Sint Antoniesbreestraat onto the map, it shows that, for the transmission of artistic knowledge, physical proximity worked in a similar way as social relation because both provided access to each other's work and collections for inspiration. Therefore, spatial clustering and the social network of artists will need to be translated into measures of accessibility to reveal the transmission of artistic innovation.

Keywords: spatial clustering; knowledge transmission; tax registers; Amsterdam; Rembrandt

Introduction

In recent years, increasing awareness of the importance of place and space in humanities and social sciences has reinforced a shift of interests from temporal subjects matters to themes relevant to space and place for a deeper analysis of human behavior.² The phenomenon of spatial concentration of artists and artistic activities, so-called 'spatial clustering,' has attracted scholars to probe into the cause and the dynamics of the artistic clusters. The research using contemporary examples emphasizes the importance of face-to-face relations in conveying new and tacit knowledge (such as painting techniques) which drives up the need for physical proximity.³ Economic geographers confirmed that accessibility

¹ We thank Claartje Rasterhof, Harm Nijboer, and Gabri van Tussenbroek for their advice. Special thanks go to Clé Lesger, who generously shared his list of the 250 wealthiest Amsterdamers in the 1631 kohier, and Marleen Puyenbroek, who allowed us to use the data she collected for her BA thesis: M. Puyenbroek, *Kunstenaars van de Breestraat*, BA thesis, University of Amsterdam, 2016.

² D.J. Bodenhamer, J. Corrigan J, T.M. Harris. *The spatial humanities. GIS and the Future of Humanities Scholarship*, Bloomington, IN. 2010.

³ A.Rallet, A. Torre, *On geography and technology: Proximity relations in localised innovation networks*. In Michael Steiner (Ed.) *Clusters and regional specialisation: On geography, technology and networks*. London: Pion, 2008.

to other artists ranks as the top factor when contemporary artists make their choice of location.⁴ However, studies looking into historical evidence of spatial clustering of painters only focused on the most prominent painters across history.⁵ Due to the difficulty in collecting location-related information from historical sources, existing studies of the spatial clusters in the early modern time are scarce and often restricted to describing the clustering phenomenon at the city level.⁶

Amsterdam, during its golden age, was known for the size and scale of its creative industries, especially for paintings. At its peak, there were more than 300 painters working in the city, who accounted for the unprecedented painting production in various genres and style.⁷ Thanks to the 150 years of art historical research on artists and artworks of the Dutch Golden Age, a significant number of artists who lived in Amsterdam are well-researched. The existing knowledge concerning these artists goes beyond the works of art they created and expands to various aspects of their lives, in particular, their residence and social relations. Traditional art historical scholarship has not yet gone into greater detail than using street and/or place names to describe the exact spot where artists lived, worked and socialized.⁸

Historical and cadastral maps, in this case, can help to contextualize the geographical information that art historians have identified, translating the vague descriptions of location into a more exact geo-referenced representation. This research, as a pilot of the Amsterdam Time Machine project, thus tries to take advantage of the geo-referenced cadastral sources to pinpoint the artist's workshop to a specific location in the city, to probe into the mechanics of dissemination of artistic innovation within Amsterdam, and to understand to dynamics of artist's intra-city location choice. In this paper, we focus on Rembrandt's neighbors and his artistic rivals living in Amsterdam to unfold the patterns of socio-spatial aspects of production, consumption, and innovation of the painting industries of the Golden Age Amsterdam. Therefore, the research question of this project has two objectives: 1) methodological: how can 19th-century cadastral maps assist historical and art historical research of the previous centuries? and 2) art historical: how did geographic proximity within a city facilitate the transmission of artistic innovation?

(Deep) Mapping painting production and consumption of Amsterdam

Detailed property maps for the entire city of Amsterdam were available for the first time in 1832. This cadastral map, which has recently been digitized and transformed into georeferenced vectors by the HisGIS project, divided Amsterdam into 28,365 lots on which 30,047 individual buildings had been built before 1832.⁹ Fortunately, as architectural historians have shown, the center of Amsterdam had not changed much since the 16th and 17th century as most existing buildings date from these two

⁴ Å.E. Andersson, D.E. Andersson, Z. Daghbashyan, B. Hårsman. *Location and spatial clustering of artists*. "Regional Science and Urban Economics", 2014 Jul 1;47:128-37.

⁵ J. O'Hagan, C. Hellmanzik, *Clustering and Migration of Important Visual Artists: Broad Historical Evidence*, "Historical Methods", 2010, 121-136.

⁶ C. Rasterhoff, *The fabric of creativity in the Dutch Republic. Painting and publishing as cultural industries, 1580-1800*. Amsterdam University Press, Amsterdam. 2017.

⁷ ECARTICO database: <http://www.vondel.humanities.uva.nl/ecartico/analysis/>

⁸ A notable exception: Dudok van Heel, SAC. *De jonge Rembrandt onder tijdgenoten. Godsdienst en schilderkunst in Leiden en Amsterdam*. PhD diss., Radboud University Nijmegen, 2006.

⁹ Fryske Akademy. (2014). HISGIS-project Amsterdam. Retrieved from <http://www.hisgis.nl/hisgis/gewesten/amsterdam/>

centuries.¹⁰ It thus allows us to employ the 1832 cadastral map as a geographical anchor to realign other historical information extracted from various archival sources.

Information about locations in the pre-cadastral sources is often scattered in the marriage registration (*ondertrouwregisters*), tax registrations (*kobieren* and *verpondingsregisters*), court registrations of real estate transactions (*transportakten*), notarial deeds, and in all kinds of other archival documents, all of which have not yet been systematically linked. Fortunately, these sources have been well researched by art historians and linked to individual artists. The existing biographies of artists are compiled in the *ECARTICO* database – a comprehensive collection of structured biographical data concerning painters and other agents in the culture industries of the Low Countries during the 16th and 17th century – including over 6,000 descriptions of locations.¹¹ On the consumption side, numerous probate inventories have described not only the collections of the owners but sometimes, also the location of their property, which enables us to map the consumer's location in conjunction to the information on artistic production.

Within the framework of the Amsterdam Time Machine, this research project aims to systematically link datasets from the aforementioned heterogeneous sources and extracts the descriptions of locations associated with the agents in the art market. Nevertheless, the 17th-century locations identified in the sources cannot be directly plotted on the nineteenth-century cadastral map, as the streets and canals might have been altered or renamed. For instance, the marriage registration of Rembrandt indicated his residence as '*opdt Breestraet*' ('on broad street'), which was called 'Joden Breestraat' in the 1832 cadaster as it is known today.¹² To reconstruct the 17th-century concepts of location, we project the very detailed 1625 panoramic map of Amsterdam by Balthasar Florisz. van Berckenrode to the 1832 cadastral map, georeferencing the streets and houses with the 17th-century street names or other notion of locations, such as '*opdt de hoek van Breestraet*' (on the corner of Breestreet). Besides, Amsterdam went through a large expansion in the 1660s during Rembrandt's lifetime, and the new area was not reflected in Van Berckenrode's map of 1625. Therefore, we further layer Gerrit de Broen's map of Amsterdam (1724) to account for the city's expansion. With the multi-layered geo-coded maps, the Amsterdam Time Machine team is developing a database of historical street names to transform locational indications into geo-coded geometries across time.¹³ In addition, in order to study how proximity facilitated the transmission of artistic knowledge and innovation, we connected the collection of images and catalogues on Netherlandish art from the 17th century from the Netherlands Institute for Art History (*RKDImages*), assigning the dated paintings to the locations where individual artists lived when they painted the paintings.¹⁴ Methodologically, this research added to the Amsterdam Time Machine a mechanism of translating the location-related description in historical sources into georeferenced physical space and creating a spatial network in conjunction with a social network. This geo-translation and spatial network construction will consider the uncertainty and ambiguity rooted in the sources. The first cadastral map of Amsterdam serves as the anchor and basis in this geo-translation process (Fig. 1).

¹⁰ R. Glaudemans, *Een bouwhistorische waardenkaart voor de stadskern van Amsterdam*, Stadsarchief Amsterdam, 2008. pp.17-24.

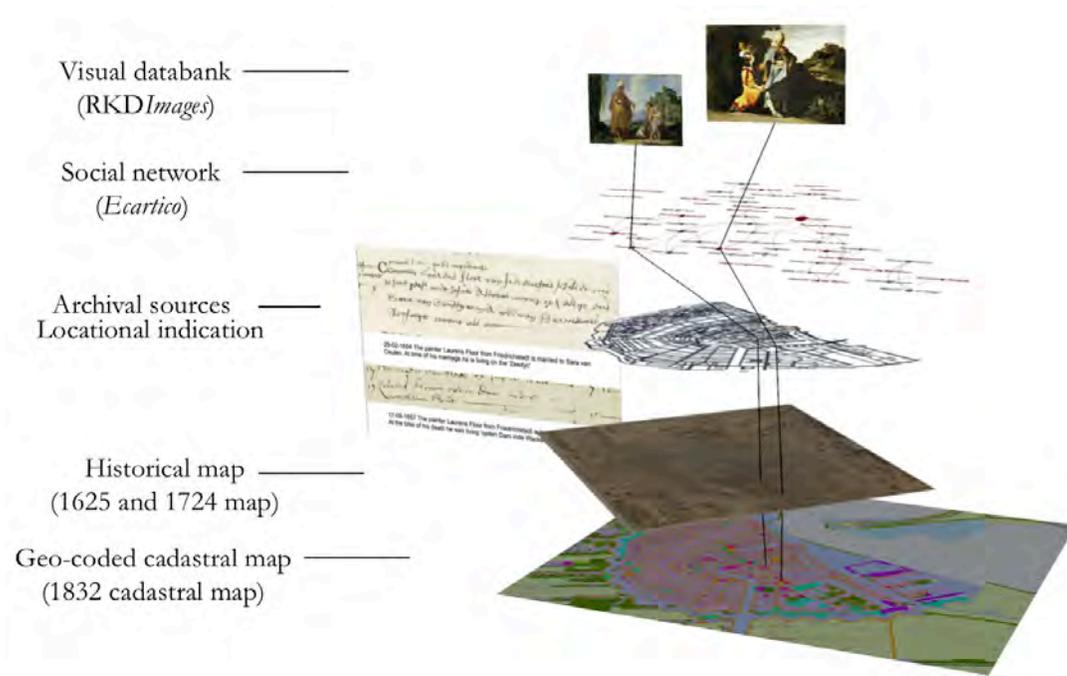
¹¹ See note 6 for the link to ECARTICO database

¹² Stadsarchief Amsterdam DTB 765, p.50 https://archieff.amsterdam/indexen/ondertrouwregisters_1565-1811/zoek/query.nl?i1=1&a1=rijn&x=20&z=b&s=5#SK200004000027

¹³ M. Den Engelse, <http://adamlink.nl>

¹⁴ *RKDImages*: <https://rkd.nl/nl/explore/images>

Fig. 1 – Multi-layered historical maps on the vectorized cadastral map.



On the basis of these multi-layered maps linked to various historical sources, this research tries to virtually reconstruct the spatial networks in neighborhoods where artists lived, worked, and socialized through ‘deep mapping’ of artists and their collectors during Rembrandt’s lifetime. The concept of deep mapping, which results from the convergence of the multi-layered model of Geographical Information System (GIS), allows the cartographic representation “to be visual and experiential, immersing users in a virtual world in which uncertainty, ambiguity, and contingency are ever-present” and can work with such “imprecision and fluidity as the nature of humanities questions and evidence demands.”¹⁵ As mentioned earlier, the descriptions of locations in the pre-cadastral sources are often imprecise and fluid. Deep mapping painting production and consumption in Amsterdam will embrace these uncertainties to see, experience, and understand space in all its complexity. Nevertheless, we are convinced that multilayered deep maps of linked data on cultural markets enable historians and art historians to develop a better understanding of the remarkable flourishing of creative industries during the Dutch Golden Age. In this essay, we mainly focus on one neighborhood, the Sint Antoniesbreestraat in Amsterdam, where, in the age of Rembrandt, the most prominent and sought-after artists clustered, including Rembrandt himself.

The composition of Rembrandt’s neighborhood

The neighborhood Rembrandt chose to settle in was around Sint Antoniesbreestraat (*St. Anthony broad street*). This was the main street of the newly expanded neighborhood to the east of medieval Amsterdam and it was the principal thoroughfare in the new quarter. After Antwerp fell to the Spaniards in 1585, immigrants from the southern Netherlands fled north and affluent merchants, as

¹⁵ D.J. Bodenhamer, J. Corrigan, T.M. Harris (Eds.), *Deep Maps and Spatial Narratives*, Indiana University Press, Bloomington & Indianapolis (2015), p.28.

well as artists and artisans, came to settle down in this new quarter of Amsterdam to continue their trade.¹⁶ Art historians have stressed that for the first four decades of the 17th century, this area was close to where many wealthy patricians lived at the time. However, by 1639, when Rembrandt bought his costly house in this neighborhood (which now stands as the Rembrandthuis Museum), many of the affluent and rich had moved to houses on the new canals in the west of the city, and, in the 1640s, the artists would have moved with them to the middle-class part of Jordaan neighborhood, near the grand canals.¹⁷

Here, we test our observations, which were derived from the study of a limited sample of people within the artistic circle, by plotting city-level wealth distribution, created through deep mapping of the top 250 wealthy people in the 1631 tax registers, on the geo-referenced 1625 map (Fig. 2). Although it is true that several affluent burghers did not live far from Rembrandt's neighborhood, Figure 2 clearly demonstrates that, by 1631, when Rembrandt still lived in Leiden, the new canals, especially Herengracht, Keizersgracht, and Singel (marked dark red and red in Fig. 2), already housed the most affluent and wealthy of Amsterdam. A total of 101 out of the 250 wealthiest people resided along these three canals, further away from Rembrandt's neighborhood. Therefore, being close to the wealthy patricians could not have been the main motivation for Rembrandt and other artists to settle in this area. Still, the area around Sint Antoniesbreestraat (from Nieuwmarkt to the St. Antonispoort) (Fig. 2) itself was still relatively well-off, compared to most areas of the city in 1631. 96 of the residents owned assets valued at more than 1000 guilders (which was the threshold for taxations), and four of them had assets valued over 100,000 guilders. Notably, few artists were mentioned in the 1631 tax registration, indicating that most artists who lived in this neighborhood rented their houses.

Table 1 – *Distribution of wealth in the streets of the 1631 Amsterdam*

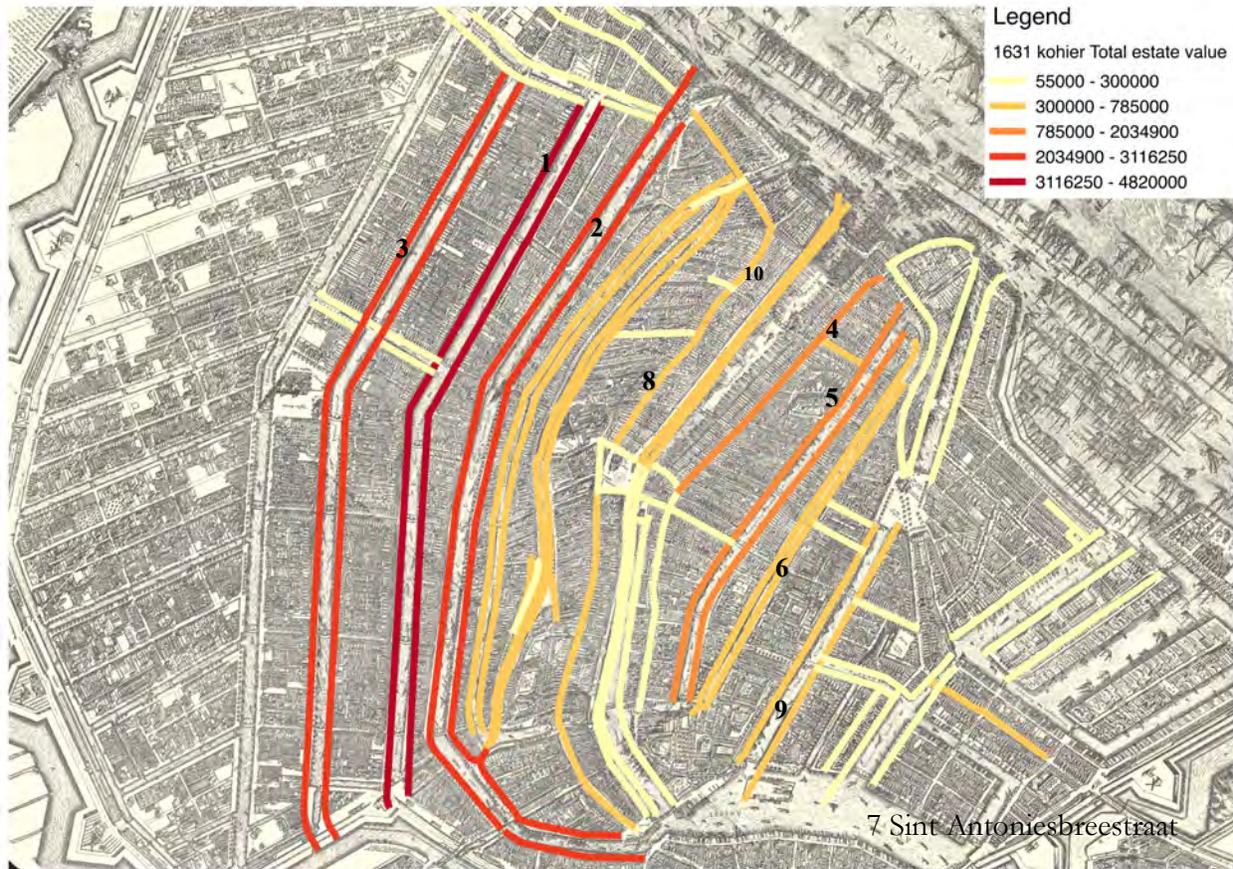
Rank	Street name	Number of top 250 wealthy people	Total estate value	%
1	Herengracht	43	4,820,000	20.6%
2	Singel	34	3,116,250	13.3%
3	Keizersgracht	24	2,466,000	10.5%
4	Warmoesstraat	14	2,034,900	8.7%
5	Oudezijds Voorburgwal	16	1,833,000	7.8%
6	Oudezijds Achterburgwal	7	785,000	3.4%
7	Sint Anthonisbreestraat	7	728,000	3.1%
8	Nieuwendijk	8	720,000	3.1%
9	Kloveniersburgwal	8	700,000	3.0%
10	Damrak	6	604,000	2.6%

Source: Frederiks, J.G., Frederiks, P.J. *Kobier van den tweehonderdsten penning voor Amsterdam en onderhoorige plaatsen over 1631*. Amsterdam: Ten Brink & De Vries, 1890. The wealthiest Amsterdamers are summarized by Clé Lesger.

¹⁶ For the new city plan in 1586 and the expansion around St. Anthonisbreestraat, see Dudok van Heel, SAC. *De jonge Rembrandt onder tijdenoten. Godsdienst en schilderkunst in Leiden en Amsterdam*. PhD diss., Radboud University Nijmegen, 2006. pp.115-6, note 182.

¹⁷ E. J. Sluijter. *Rembrandt's Rivals: History Painting in Amsterdam, 1630-1650*. Amsterdam: John Benjamin's Publishing Company, 2015. p.16.

Fig. 2 – Street-level locations of the top 250 wealthy people in the 1631 tax register



Source: Source: Frederiks, J.G., Frederiks, P.J. 1890; Base map: Balthasar Florisz. van Berckenrode, *Map of Amsterdam*, 1625, print, Amsterdam, Rijksmuseum. (See table 1 for the number of streets)

The shifting fabric of the spatial cluster for cultural industries

The neighborhood of Sint Antoniesbreestraat is often regarded as ‘the artist quarter’ and a spatial clustering of creative individuals in the beginning of the 17th century.¹⁸ Art historians have claimed that from the 1640s onwards, this neighborhood started to decline as an artistic center since painters moved to the western part of the city.¹⁹

Looking into the fabric of the creative industries in this neighborhood, we geo-referenced the location descriptions in the *ECARTICO* database, which contains around 130 people connected to Sint Antoniesbreestraat during the 17th century. Around 40 of them were active during Rembrandt’s presence (1633 to 1654) in this neighborhood. The comprehensive biographical data collected in

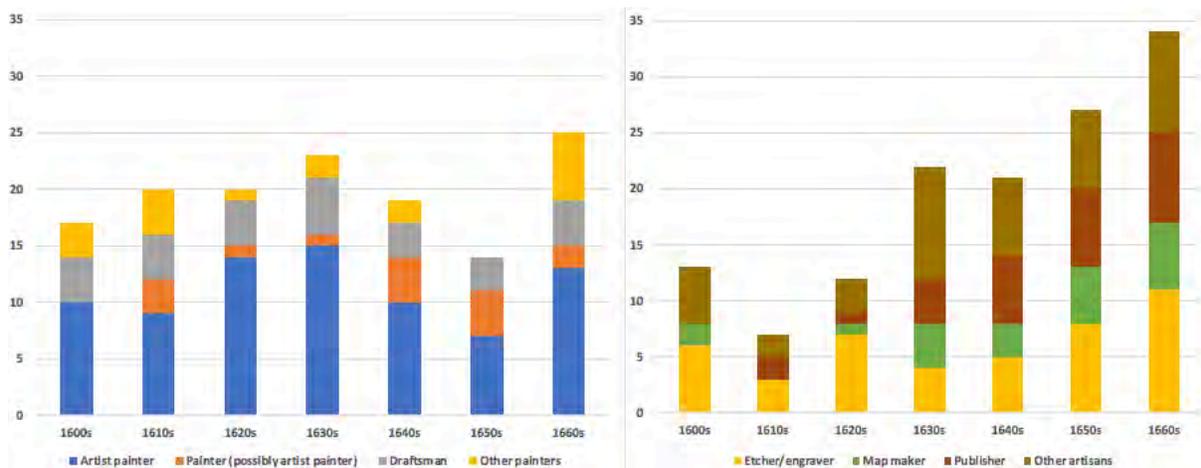
¹⁸ S.A.C. Dudok van Heel, *The Birth of an Artists' Quarter - Pieter Isaacs's Amsterdam Years*, In B. Noldus and J. Roding (ed.) *Pieter Isaacs (1568-1625): Court Painter, Art Dealer and Spy*, Frederiksborg Castle, The Museum of National History, Hillerød. Turnhout: Brepols, 2007, 74-91.

¹⁹ Sluijter 2015, pp.15-19. Dudok van Heel 2006, p.115-6.

ECARTICO paints a more complete picture of the creative industries around Sint Antoniesbreestraat, which allow us to complement and assess art historical observations based on individual cases.

Graph 1 shows the evolution of the population of creative individuals who had lived in this neighborhood by profession during Rembrandt's lifetime. *ECARTICO* allows us to extend our scope beyond the immediate decline of the painter's population in the 1640s that art historians observed.²⁰ Looking at the creative industries as a whole, we find that the population of other agents in the creative industries like print-making and publishing kept expanding over time, making the decline in the painter's population look like a temporary recession. In other words, Sint Antoniesbreestraat continued to flourish as a creative cluster throughout Rembrandt's lifetime.

Graph. 1 – Artists and artisans living in Rembrandt's neighborhood



Source: ECARTICO (Accessed July 11, 2018)

Nevertheless, the temporary recession of the painters' population in the Sint Antoniesbreestraat in the 1640s and 1650s was not incidental. The immediate cause of the decline was the death of the members of the older generations of painters in the 1630s, most notably Rembrandt's master Pieter Lastman (1583-1633), François Venant (1591-1636), David Vinckboons (1576-1633), Jeronimus Sweerts (1603-1636) and Jacques van der Wyhen (1586-1638). More importantly, the pupils who finished their training in the 1630s were no longer willing to or able to settle down in the neighborhood of their masters, and this resulted in the decline of painters' population, especially in the field of history painters. This was different from settlement patterns of earlier generations. François Venant and Adriaen van Nieulandt came to where their master, Pieter Isaacsz. lived at the beginning of the 17th century, and Rembrandt, Bartholomeus Breenbergh, and Jan Lievens all went back to the neighborhood of their master Pieter Lastman – the Sint Antoniesbreestraat.²¹ In contrast, none of the numerous pupils of Rembrandt settled down in this neighborhood, and many of them returned to their native cities or countries.²² The different location choices of pupils after training marked a critical transition of the art market into its mature stage in which a clearer market segmentation brought in new mechanisms of spatial agglomeration.

²⁰ See Puyenbroek 2016 for a summary of such observations

²¹ Puyenbroek 2016, pp. 51-60.

²² Only Dirck van Santvoort, who was believed to be a pupil of Rembrandt in the 1630s, moved back to this neighborhood in 1657.

In the first three decades of the 17th century, when the art market just took off, the relative importance of geographic and social proximity appears to have kept painters, especially high-end history painters, in the same location. It indicates that in the early stage of the market development the benefits of agglomeration as identified by economic geographers, like the shared “linkages, complementarities, the “spillover” of techniques, skills, information, marketing and customer needs,” were a pull factor for painters to move into the same neighborhood.²³ Between 1630 and 1650, however, as Eric Jan Sluijter elucidated in his *Rembrandt’s rivals*, the art market in Amsterdam had undergone a rapid development and became more competitive, diverse, and segmented. The best of Rembrandt’s pupils, namely Govert Flinck and Ferdinand Bol, managed to penetrate into the elite network of Amsterdam, moving into the elite neighborhood to be part of that social circle.²⁴ Before Flinck and Bol, the same strategy had been applied by the celebrated painter Joachim von Sandrart during his stay in Amsterdam between 1637 and 1645, who moved to the highest circles and lived in a grand house along Keizersgracht. For artists who competed at the highest level, working almost exclusively for the elite patrons, the benefits of economic efficiency and innovation offered by a spatial cluster of the painting ‘industry’ were no longer appealing. Rather, as they portrayed themselves as erudite, intellectual artists, like Flinck, Bol, and Sandrart,²⁵ they opted for another type of spatial clustering – a cluster for the intellectuals, composed of poets, scholars, and social, economic and political elites. The changes in the choices of location as one transformed from an agent in the painting industry to a celebrated intellectual is epitomized by Sandrart’s cousin, Michel le Blon. When he moved to Amsterdam in the 1610s as an engraver and goldsmith, he settled in the Verwerdwarssgracht, a block away from Sint Antoniesbreestraat. As his business as an art dealer advanced, he first moved to Singel, a wealthy neighborhood and then, as a ‘beloved and esteemed’ dealer of Italian arts, an art broker for the high and mighty, he moved to a grand house on Keizersgracht, exactly where almost all famous collectors of Italian art in Amsterdam had settled.²⁶ Hendrick Uylenburgh, another successful art dealer in Amsterdam, who was Rembrandt’s former employer and next-door neighbor for many years, moved out of Sint Antoniesbreestraat in the 1640s, first to the Dam and then to the Prinsengracht, closer to his clients.

As the art market developed into a mature stage and the high-end painters were leaving the neighborhood, Sint Antoniesbreestraat, starting from the 1640s, seemed to have undergone a “reverse gentrification” of its painters. The temporary recession of the painters’ population signified a shift in the fabric of the neighborhood from a creative and artistic center to a mere production center. In the 1640s, only three artists moved to this neighborhood, low-end history painter Guiliam du Gardijn (1596-1647), marine painter Hendrick van Anthonissen (1605-1656), and landscape painter and copyist Cornelis de Bie (1622-1664), all of whom mostly worked *on spec*, of which the last also collaborated with other minor masters who did the staffage of his landscape. Those painters, like publishers, engravers, and other agents in the creative industries, needed the advantages offered by being close to the other agents in the production process and also benefited the most from such proximity regarding productivity and innovation, such as sharing a pool of specialized labor.²⁷ When the market became more mature and segmented, the ‘industrial’ painters replaced the earlier generations of ‘artistic’ painters in the spatial cluster of Sint Antoniesbreestraat.²⁸ In the 1660s, eight out of the eleven painters

²³ M.E. Porter, *On competition. Updated and Expanded Edition*, Harvard Business Press, 2008 (first edition 1998). p.221.

²⁴ E. Kok, *Culturele ondernemers in de gouden eeuw: de artistieke en sociaal-economische strategieën van Jacob Backer, Govert Flinck, Ferdinand Bol en Joachim von Sandrart*. PhD diss., Universiteit van Amsterdam. Amsterdam, 2013.

²⁵ Ibid.

²⁶ Sluijter, *Rembrandt’s rivals*, p.73.

²⁷ Rasterhoff, *Painting and publishing as cultural industries*. p.23.

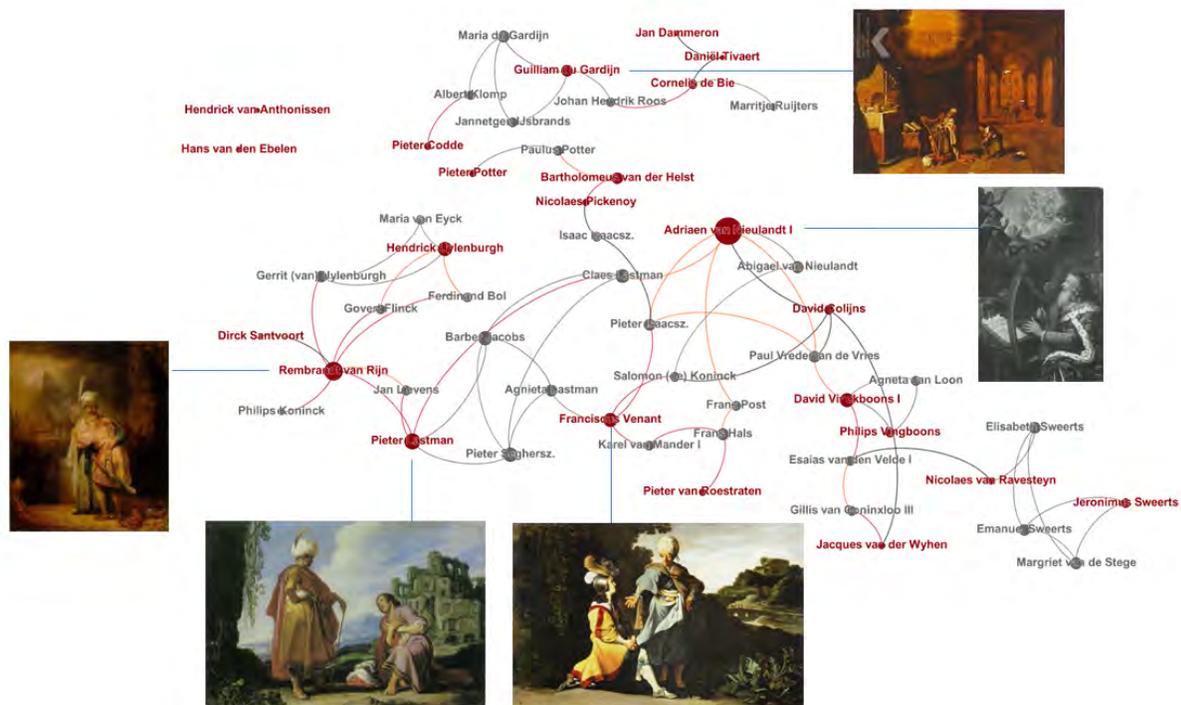
²⁸ A. Jager. ‘Galey-schilders’ en ‘dosijnwerck’. *De productie, distributie en consumptie van goedkope historiestukken in zeventiende-eeuwse Amsterdam*. PhD diss., Universiteit van Amsterdam. Amsterdam, 2016. pp.16-17.

who lived in this neighborhood were ‘industrial’ painters and the other three artists, such as the prominent Gerard de Lairese, were known to have large workshops.

Imitation and emulation among artists living around the corner

Geographically concentrated clustering of painters is believed to have facilitated, even triggered the transmission of knowledge and innovations through informal exchange of specialized information through inter-personal contact.²⁹ While talking with each other in the street, in the pub, or at the kitchen table, Sluijter argued, painters would also be able to pick up successful innovations in style or iconography and perceive more clearly and rapidly new buyer needs or gaps in the market. In order to examine if and how proximity facilitated transmission of artistic knowledge and innovations, we connected the *RKDI* database with the *ECARTICO* database and selected the artworks that were dated to the period when the artist lived in or near Sint Antoniesbreestraat when Rembrandt was present (1633-1654). We also reconstructed the documented social relations among neighbors to see if they had channels (such as master-pupil relations) of knowledge transmission other than informal contact assumed by proximity (Fig. 3).

Fig. 3 – Social network of Rembrandt’s neighbors with examples of paintings of the same subject matter



Source: ECARTICO (Accessed July 11, 2018), RKD.

There are numerous examples of neighbors who painted their own work in direct dialogue with each other. From the early generation, Pieter Lastman’s *David and Jonathan* (painted around 1620) was immediately being imitated by François Venant, who took up the same subject matter around the same time. Venant’s painting has a striking visual similarity with Lastman’s invention – the oriental costume of David, the posture of Jonathan, the plants populating the foreground, and even the position of the

²⁹ Ibid., p.17.

ruin in the background (see paintings in Fig. 3). The same subject matter was emulated by Rembrandt in 1642, when he transformed Lastman and Venant's invention into a narrative that suggests inner movement. However, he left the costume from his master's and Venant's painting intact. For Rembrandt and his rival, Bartholomeus Breenbergh, they started painting *The Preaching of St. John the Baptist* around the same time (1634), resembling each other's composition, derived from Pieter Lastman's early work.³⁰

In the 1640s, minor artist Guilliam du Gardijn painted a relatively rare subject – *David playing the Harp*, which reminds of his neighbor Adriaen van Nieulandt's work of around 1645, even though the two painters were not connected through formal social ties (Fig.3). Sometimes, painters re-visited their neighbor's earlier works, imitating and emulating the work seen before. Adriaen van Nieulandt, for instance, often went back to Pieter Lastman's paintings of the 1620s, ten years after the latter passed away.³¹ However, such acts of imitation and emulation were not exclusive among neighbors. Bartholomeus Breenbergh not only populated his Italian landscape with designs by his neighbors, Lastman or Rembrandt, but also with designs by Adam Elsheimer, whose work he had seen during his residence in Rome.³² Pieter Potter, in his painting of *Jacob shown Joseph's blood-stained coat* in 1630, referred to works of Jan Pynas and Claes Moyaert who lived on the other side of the city.

Therefore, the main artistic benefit of proximity for an early modern artist seems to have been the easy access to a large number of images passing around and through the neighborhood to build his own collection of visual examples in his memory or sketchbooks. As Eric Jan Sluiter put it, "[...] the painters responded to traditions and developments in his art, choosing elements from the 'database' of images stored in his memory and on paper to fit his aspirations".³³ This was particularly true for those 'industrial' painters, who borrowed from various sources to compose their own work. In addition, imitation and emulation more often occurred among painters who were socially connected, meaning they could access each other's work easily. In this way, proximity functions in the same way as a social network in granting access to a collection of images, motifs, and other visual stimuli for painters to draw upon when creating their own work. In other words, it was the accessibility to 'image banks' that mattered to artistic painters which was not exclusively offered by the spatial clustering of artists. More celebrated artists like Flink, Bol, and Von Sandrart who positioned themselves among the internationally known artists, also built or updated their visual 'databases' by, for instance, visiting the collections of famous connoisseurs. We should not ignore the collections of art lovers and connoisseurs which may have been the hub transmitting artistic innovation, especially for the high-end painters. Therefore, regarding transmission of knowledge, both physical proximity/spatial network and social network need to be translated into measures of accessibility to visual resources. Combining the social and spatial network and pinpointing the location of both artists and collectors in the city will be the next step for this project to virtually reconstruct a map of accessibility to art collections in Amsterdam.

Conclusion

In this essay, we showcased how historical and cadastral maps can enrich art historical research by pinpointing the artist's workshop to a specific location in the city. Deep-mapping the production and consumption of painting in the 17th-century Amsterdam, we layered information extracted from

³⁰ Ibid., pp.137-138.

³¹ Ibid., p.186.

³² Ibid., p.142.

³³ Ibid., p.3.

various sources on top of the historical maps of 1625 and 1724, geo-referencing the descriptions of locations from the original sources and plotting them. By doing so, we visualized part of the wealth distribution in the city based on the 1631 tax registration and refuted the commonly-held belief that Sint Antoniesbreestraat was crowded with wealthy patrons of arts, who attracted artists to this neighborhood. Therefore, around 1631, close proximity to affluent clients was not the main attraction of Rembrandt's neighborhood. We then linked *ECARTICO*, the biographical database of agents in the creative industries, to the map and analyzed the composition of the neighborhood. Extending the time span to Rembrandt's lifetime (1609-1669) and extending the scope to all agents in the creative industries, we illustrated that the Sint Antoniesbreestraat continued to flourish throughout Rembrandt's lifetime, hereby challenging the hypothesis that this neighborhood declined as an artistic center. This research added to the historical scholarship a closer observation of the functioning and evolution of creative industries in a spatial cluster, revealing a reverse gentrification process with the development of the art market as the artistic painters were replaced by the 'industrial' painters who painted *on spec* or participated in the mass production. By the end of Rembrandt's lifetime, this area became more of a production center for creative industries including paintings. Lastly, probing into the spatial cluster of Sint Antoniesbreestraat, we layered *RKDImages*, a visual data bank of Netherlandish art, onto the map to observe how imitation and emulation occurred among artists living around the corner from each other. It seems as if physical proximity worked in a similar way as a social relation regarding the transmission of knowledge because both provided access to each other's work and collections for their inspirations. Therefore, spatial clustering and the popular social network analysis of artists should be translated into the analysis of accessibility in order to allow us to study the transmission of knowledge. The art collections within Amsterdam are important sources that warrant in-depth research for future scholars.