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Examining Museum Collections Through a Network Lens. A Case Study of the Metropolitan Museum of Art and the Victoria and Albert Museum

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Examining Museum Collections Through a Network Lens. A Case Study of the Metropolitan Museum of Art and the Victoria and Albert Museum

Abstract

Museums shape our perception of history and culture. In order to understand object accessions and the composition of museum collections, it is necessary to analyse the collectors from whom the objects were acquired. What were their interests and motivations? What understanding of art and collectable objects still shapes our understanding of culture today? Two influential museums, the Metropolitan Museum of Art in New York (Met) and the Victoria and Albert Museum in London (V&A), were selected as examples from the large number of museums and museum objects. We were able to determine donation trends and structures as well as donors central to the network. We also identified gaps for further research, especially in the field of biographical and provenance research.

Museen prägen unsere Wahrnehmung von Geschichte und Kultur. Um den Zuwachs an Objekten und die Zusammensetzung von Museumssammlungen zu verstehen, ist der Blick auf Sammler*innen, von denen die Objekte ans Museum gelangt sind, nötig. Was waren ihre Interessen und Beweggründe? Welches Verständnis von Kunst und sammlungswürdigen Objekten prägt noch heute unser Verständnis von Kultur? Mit dem Metropolitan Museum of Art in New York (Met) und dem Victoria and Albert Museum in London (V&A) wurden zwei einflussreiche Museen als Beispiele für die Untersuchung ausgewählt. Wir konnten Tendenzen und Strukturen der Schenkungen sowie die für das Netzwerk zentralen Mäzene identifizieren. Außerdem konnten wir Lücken für weitere Forschung, wie insbesondere im Bereich der Provenienzforschung, ermitteln.

1. Introduction

Museums shape our perceptions of history and culture. Objects exhibited and collected in museums serve as »documents and representatives of social values«¹ and therefore reflect the culture and ideas of their time.² As »agents and evidence of a certain social reality«³, they act as multipliers of that reality and thus influence our understanding of culture and, ultimately, the production and reproduction of social norms and cultural ideas and objects.⁴ For this very reason, it is important to understand why certain art movements, object genres and countries of origin are particularly well represented in museums and thus have a lasting influence on our understanding of culture. It helps to analyse the reasons and motivations behind the acquisition of objects by museums. The founding phases of the institutions are particularly interesting for such an investigation, as they are a particularly formative time for the respective focus of the collection. The period around the turn of the 19th and 20th centuries is of particular interest because of the passion for collecting and museums at that time, not least because this period is also regarded as the founding phase of modern museums.⁵ As Barbara Black explains in her book *On Exhibit*: »No other age collected with such a vengeance and to such spectacular proportions. No other age treated the museum as an enterprise.«⁶ Many of the objects came to the museums as a result of targeted purchases, but many others through donations. The patrons of the founding years still shape the structures and collections of museums today. Analysing the motivations and networks of these patrons is therefore an essential part of understanding the genesis of museum collections.

[1]

¹ Waidacher 1999, p. 148, translated by the authors.

² Cf. Hooper-Greenhill 1992, p. 3.

³ Waidacher 1999, p. 150, translated by the authors; see also Reilly 2018, p. 14.

⁴ Cf. Hooper-Greenhill 1992, p. 192.

⁵ Cf. Black 2000, p. 9.

⁶ Black 2000, p. 17.

This paper sets out to explore these networks of donors. Additionally, we examine which object types they deemed to be art, or culturally significant, and therefore worthy of collecting by analysing the popularity of the departments those objects were assigned to regarding donations. [2]

It is important to note that our study is explorative, as we only examined the subsets of data currently available online from the respective museum collections. We are aware that a significant proportion of object data from both museums is currently unavailable online, and we cannot assess the extent to which data in our area of investigation is incomplete. Therefore, the results must be critically examined, as we cannot assess the extent to which the data is representative. However, when compared with the biographies of the donors and historical trends, a consistent picture emerges. It can thus be assumed that the results are not entirely distorted. However, deviations are likely. Intensive collaboration with the relevant collections and archival work would be necessary to incorporate and interpret the remaining, undigitised collection data. Nevertheless, trends such as the lack of biographical representation of many major donors, especially women, can be deduced from the study. Ultimately, even if missing data would be added, the major donors already identified would not become minor donors as a result. [3]

2. Subject of the Study

Our research only focused on donations and bequests to the museums. A practical reason is the amount of data, which would otherwise have exceeded our capacities. More importantly, we wanted to analyse donor networks specifically, and therefore collector networks, and not the art market. We focused our study around the turn of the 19th to the 20th century. In Great Britain, this period includes the late Victorian era and the Edwardian era which were dominated by the industrial revolution and the ending reign of Queen Victoria. In the US, it is referred to as the *Gilded Age*, an era characterised by the rise of the *nouveau riche* through shipping, railways and other industries.⁷ Experts debate different approaches to dating this period of upheaval. Its beginning is often equated with the end of Reconstruction in 1877.⁸ Others see the end of the Civil War in 1865 or the Boston Tea Party of 1773 as the start of the Gilded Age. The end of the period is also controversial. For example, the outbreak of the Spanish–American War in 1898 is seen as the end of the Gilded Age, as is the inauguration of Theodore Roosevelt as president in 1901. The start or end of World War I is also cited as a possible end date.⁹ Some authors even consider the stock market crash of 1929 to mark the end of the Gilded Age.¹⁰ Therefore, we opted for a middle ground and examined the data from 1880 to 1910. Two of the most influential museums of that time were the Metropolitan Museum of Art (Met) in New York and the Victoria and Albert Museum (V&A) in London (then under the name South Kensington Museum). The reasoning behind the choice of these two museums can be divided into two aspects: the historical background of the respective museums, and the Open Data policies of these institutions which allowed for easy access to the relevant collection data. [4]

3. Historical Background

The comparison of a European and an American museum is of interest due to the different societal structure of their donors as well as the differences between the art markets and the political ambitions behind museums. Still, nowadays their departments and therefore their collection focus are similar enough to compare these institutions while highlighting the differences in their collection behaviour. [5]

⁷ Cf. Schneirov 2006, p. 194.

⁸ Cf. Edwards 2006, p. 468.

⁹ Cf. Nichols / Unger (eds.) 2017, p. 7.

¹⁰ Cf. Edwards 2006, pp. 463–464.

In Europe, the concept of a public museum was still quite new in the outlined period. The first public museums in Europe were founded in the 18th century, including the British Museum (1759) and the Louvre (1793).¹¹ The South Kensington Museum (now the V&A) was the world's first museum of decorative arts. It was established slightly later in 1852 as a result of the Great Exhibition in 1851.¹² This first Great Exhibition in the purpose-built Crystal Palace in London heralded a new era of public museums in Great Britain.¹³ The new form of exhibition and the sheer size of it, full of the achievements of the new, industrialised society, led to the great success of the event. Taking place in an era where private collecting and public museums started to also be politically desirable, the conditions were right for the foundation of the museum. Queen Victoria and her husband, Prince Albert, were motivated by the goal of educating their population and raising the emerging middle and working classes towards a nationalist understanding of culture, be it through public museums or a private passion for collecting.¹⁴ The first director of the museum, Sir Henry Cole, had similar intentions. His declared aim was to convey a »national culture«¹⁵ to the population. As an arts and crafts museum, the initial focus was also on improving the quality and style of products by English manufacturers through education. By the 1980s, the museum's focus had shifted from education to collecting.¹⁶ Loans and donations by upper-class members and aristocrats dominated the exhibitions. The museum welcomed loans in hope of broadening the collection through long-term loans eventually getting donated to the museum. The effectiveness of this strategy shows in our research results, although, contrary to the museum's hopes, some major lenders like J. Pierpont Morgan did not bequeath their collections to the V&A. Another motivation to attract as many loans as possible was the financial situation of the museum, leaving it dependent on loans and possible donations in order to acquire a substantial and significant collection. This shift in the museum's strategy did invite criticism calling for a return to the educational approach. Britain's imperialism was also reflected in the museum, which can be described as »the epitome of the ›imperial archive«.¹⁷ With the installment of Caspar Purdon Clarke as new director in 1896, five initial departments, called »specialist sections«¹⁸, were introduced, marking the start of a more precise collection focus for the explicit arts and crafts museum: »1. Sculpture, Ivories. 2. Woodwork, Musical Instruments, Leatherwork. 3. Metalwork, Jewellery, Medals. 4. Pottery, Glass, Enamels. 5. Textiles, Lace, &c.«¹⁹

[6]

After the end of the Civil War in 1885, the concept of public museums became popular in the US. In 1870, the Boston Museum of Fine Arts, the Corcoran Gallery of Art and the Metropolitan Museum of Art opened. While the Corcoran Gallery of Art closed down in 2014, the other two museums belong to the country's most important museums of art and cultural history until today. Early US museums were influenced by European approaches to museology. Their concepts were divided after two primary models: the Louvre and the V&A.²⁰ The V&A was regarded as »the most imitated and programmatically influential museum of the late nineteenth century«²¹, signifying its influence on the museum landscape. While the Met initially opted for the conservative, collection-focused model of the Louvre, eventually the educational-driven V&A model was adopted. But quickly afterwards, the Met decided to abandon the educational focus and oriented itself on the Louvre again.

[7]

New York was the economic and cultural epicentre of the US during the Gilded Age. In 1865, the establishment of an art museum in New York was initiated by the affluent lawyer John Jay. The museum's aim was to »encourage[] and develop[] the study of the fine arts, and the application of the arts to manufacture,

[8]

¹¹ Cf. Waidacher 1999, pp. 91–92.

¹² Cf. Bryant 2022, p. 9.

¹³ Cf. Black 2000, p. 10.

¹⁴ Cf. Black 2000, pp. 9, 11, 32.

¹⁵ Black 2000, p. 32.

¹⁶ Cf. Bryant 2022, p. 25.

¹⁷ Kriegel 2007, p. 6.

¹⁸ Bryant 2022, p. 27.

¹⁹ Bryant 2022, p. 27 cites: Forty-fourth Report from the Department of Science and Art..., 1896, para. 49.

²⁰ Cf. Wallach 2010, pp. 253–254.

²¹ Wallach 2010, p. 253.

of advancing the general knowledge of kindred subjects, and to that end, of furnishing popular instruction and recreation.«²² Jay successfully convinced members of the prominent conservative ›Union League Club‹ to support his cause.²³ Subsequent convincing of other »civic leaders, businessmen, artists, art collectors, and philanthropists« resulted in the establishment of the Metropolitan Museum of Art in 1870. Thus, the Met's association with New York's upper class was solidified. This social group was called the ›high society‹. Characterised by competitive dynamics amongst its members, they all sought to secure their position within New York's social elite.²⁴ Inspired by the structure of the British museum, three initial departments were introduced in 1886: »One department comprised paintings, drawings, and prints; a second, sculpture, antiquities and objects d'art; and the third, casts and reproductions.«²⁵ Departments for Classical Art and Egyptian Art followed. With the installation of Caspar Purdon Clarke, the former director of the V&A as new director of the Met, a policy about object standards and quality was introduced to organise and limit the number of objects.²⁶ An important factor in this new strategy of quality over quantity was the monetary bequest of steam locomotive manufacturer Jacob S. Rogers in 1901, which, as the Rogers Fund, was able to finance many of the museum's acquisitions. As a result, the Met was now less dependent on patrons. The museum continued to be restructured, in 1907 the department of Decorative Arts was formed. In the following 10 years after our investigation period, even more new departments were opened.²⁷

The high society's understanding of class went hand in hand with a conscious demarcation from other classes, including the alignment with European aristocracy. Travelling to Europe was an important status symbol and European culture (e.g. clothing, taste in art, architecture and weddings) was influential.²⁸ Private collections of European art also served to raise their owners' status and were the forerunners of museums. In Europe, the increasing presence of wealthy American art collectors on the European art market was viewed with growing concern. The financial resources of wealthy Americans often exceeded the possibilities of European museums. As a result, more and more important works by European artists were exported to the US. This development posed a serious challenge for European institutions.²⁹

[9]

Accordingly, the high society used the Met to enhance their own social status. This can also be seen in their clear choice of a target group: their own peers. Although the museum was officially open to members of the lower classes, this accessibility remained largely theoretical. In practice, the museum was closed on Sundays – the only free day of the week for the working population – until 1891. A supposed lack of etiquette and concerns about how members of the working classes would behave in the museum were often cited as reasons for their exclusion.³⁰ For some members of New York's elite, the Met had other benefits besides enhancing their own status. For example, Luigi di Cesnola, who later became the museum's director, as well as Samuel P. Avery, used the museum for financial enhancement. By selling their own collections to the museum, Avery earned around 175,000 US\$ over the course of the 1870s.³¹ Other members of high society, including John Taylor Johnston, presented their private collections to the public in special exhibitions at the Met. The desired increase in the market value of his art collection led to an income of 328,000 US\$ at its auction. However, such direct ways of profiting from the museum's reputation did not go unnoticed and were heavily criticised by the public. Most members of the Met therefore used more subtle methods to take advantage of the museum. For example, contributing suitable works to the museum's special exhibitions was rewarded with the production of high-quality photographs of the artworks. The Met's special exhibitions were also an opportunity for high society to store their valuable private collections free of charge while

[10]

²² Hibbard 1980, p. 8.

²³ Cf. Wallach 2010, p. 248.

²⁴ Cf. Smith 2016, p. 81.

²⁵ Hibbard 1980, p. 12.

²⁶ Cf. Hibbard 1980, p. 16.

²⁷ Cf. Hibbard 1980, p. 19.

²⁸ Cf. Beckert 2010, pp. 109–111.

²⁹ Cf. Weitzenhoffer 1986, p. 63.

³⁰ Cf. Wallach 2010, p. 252.

³¹ Cf. Ott 2019, p. 122.

on holiday.³² Patrons often demanded special exhibition conditions for their gifts in order to make their collections more visible and thus enhance their own reputation. Catharine Lorillard Wolfe, for example, requested that her bequest be exhibited in a »suitable, well-lighted fire-proof apartment, gallery or separate place«. ³³ Art historian John Ott summarises the tactics employed by members of the Met as follows: »Put simply, the Metropolitan Museum of Art was engineered to display and valorize privately owned collections at public expense«. ³⁴

When the V&A was founded, it was dependent on loans from private patrons, as stated above. The best-known patron was Queen Victoria. Her example was then followed by aristocrats and members of the nouveau riche, who lent their collections to the museum. ³⁵ As at the Met, these lenders did not only pursue altruistic motives; they were also concerned with the »to be seen« and the social status associated with it. Additionally, they used the museum as a free, secure storage for their own objects. ³⁶ Museum donations often resulted from these loans. This is why the loans soon became a »business model« for the V&A. However, the museum still managed to reach a broader target group than the Met. With free admission on Mondays, Tuesdays and Saturdays, the V&A, and particularly its special exhibitions, were also very popular with the middle classes. In contrast, the more conservative British Museum lost a massive number of visitors over the same period. ³⁷

[11]

The personal advantages of the patrons thus played a major role in both selected museums. While the V&A was more regulated by political aspirations for nation-building, the patrons of the Met were even freer in their actions and ambitions. Nevertheless, the interests and reasons for donations are similar enough to be comparable. Another similarity is the respective collection focus. According to the definition of museum types by the German »Institut für Museumsforschung«, both museums are *art museums*. However, based on individual departments, the museums are also *special cultural history museums*, and thus both can also be considered as *collection museums with complex holdings*. ³⁸ A comparison of the two museums' departments reveals a high degree of similarity in their orientation, but the V&A has a stronger focus on decorative arts rather than »classical art«.

[12]

4. Data and Model

The data query on the V&A via API³⁹ proved to be complicated as the amount of data required exceeded the query capabilities of the API. The data query stopped every time after approximately 30 minutes, so that hardly any data could be obtained. Therefore, the data was ultimately acquired through web scraping. The Met has a publicly accessible CSV file containing part of their collection data. The file can be accessed via GitHub,⁴⁰ the CSV file dated May 30, 2022 was used for the following data analyses.

[13]

4.1 Database

We used Neo4j Desktop, version 1.6.0, to store and analyse the data. The database management system (DBMS) had version 5.20.0. In our case, the use of a graph database offers several advantages over relational databases. Since the following data analyses are network analyses, it makes sense to store them as graphs.

[14]

³² Cf. Ott 2019, p. 124.

³³ Ott 2019, pp. 124–125.

³⁴ Ott 2019, p. 124.

³⁵ Cf. Bryant 2022, p. 13.

³⁶ Cf. Bryant 2022, p. 14.

³⁷ Cf. Yallop 2011, p. 67.

³⁸ Cf. Rahemipour / Grotz 2023, p. 162.

³⁹ Cf. Victoria and Albert Museum 2021.

⁴⁰ Cf. The Metropolitan Museum of Art 2023.

Graph algorithms make it easy to explore the relationships in the graph.⁴¹ Because graph databases focus much more on relationships, they can be queried using the Cypher programming language without the need for complicated SQL joins that are required in relational databases. Neo4j also offers good options for data visualisation as graphs with ›Neo4j Bloom‹. The use of graph algorithms in data analysis is also made possible in Neo4j. We used the library ›Graph Data Science Library‹, Version 2.7.0.

4.2 Data Structure and Cleaning

Both museums provide a large amount of metadata about the objects and artists.⁴² Important information included in our study encompasses the categories we named »ObjectID« and »Accession Year«, »Creditline« and »Department«. Entries without a creditline were excluded from the study. Hence, all results mirror the present level of data accuracy within the collections. It is essential for understanding the results to point out that the classification of the objects into departments reflects their current structure. The initial assignment of objects immediately after receipt cannot be traced using the data provided. This would require intensive research in the respective physical archives. Accordingly, more recent departments such as the »Young V&A Collection« are also reflected in our evaluations. In the next step, the data was filtered and sorted according to the period under investigation (1880 to 1910) and the object of investigation (donations). These measures were carried out with a spreadsheet application in Microsoft Excel, as it is easy to filter for entries in table columns. The columns »Creditline«, »Department«, »ObjectID« and »Accession Year« were used. For example, the »Creditline« column was searched for the keywords »Bought«, »Purchase«, »Commissioned« and »Acquired«. These entries were then deleted. First, we checked that only creditlines that clearly denote gifts (keywords: »Bequest«, »Bequeathed from«, »Given by«, »Gift of«, »Received from«) were retained. These words were then removed in order to standardise the data, leaving only the names. [15]

Further data cleansing proved to be difficult. As Neo4j cannot merge data into one node if the spelling differs even slightly (e.g. by spaces), the entries had to be standardised. The names of the patrons were often spelt differently or were abbreviated. For example, the art collector George Salting was entered as »George Salting, Esq.«, »Salting«, »G. Salting«, »Mr George Salting«, »Mr George Salting, Esq.«, »George Salting.« and our preferred spelling »George Salting«. Other persons such as Joseph Henry Fitzhenry are noted in different variations of their first name initials: »J H Fitzhenry«, »J.H. Fitzhenry«, »J, [sic] H Fitzhenry«, »J Fitzhenry«. First names are sometimes abbreviated as initials, other times written out in full: »D. B. Myers« and »Dudley B. Myers«. Although women are usually referred to by their own first names, there are also cases in which they are addressed by their husband's first and last name. Here, only the addition of »Mrs.« indicates that it is the wife: »Mr. and Mrs. Robert de Forest« instead of »Robert and Emily de Forest«. While the addition of »Mr.« could easily be removed, female forms of address had to be retained. All other additions such as military titles, year, place of residence, memorial information (in memory of...) and the honorary title »Esq.« were removed for data unification. Punctuation marks like commas and full stops were also deleted. To avoid differences due to capitalisation, the data was transformed to lower case. The different spelling of names and spelling mistakes were another problem we had to tackle: »Margarette A. Jones« and »Margaretta A. Jones«. Using fuzzy matching in python, different spellings were identified. We used the package FuzzyWuzzy⁴³ with a ratio of > 85. The new list was then reexamined by the authors and the names adjusted. Although isolated errors cannot be ruled out, this data was sufficiently streamlined to proceed with network analysis. [16]

⁴¹ Cf. Cicerone / Di Stefano 2021.

⁴² For detailed information on the Met's collection data, see Arnold / Tilton 2023, pp. 190–192.

⁴³ FuzzyWuzzy 2020.

4.3 Network

The basic structure of the network is identical for both museums. We implemented four different types of nodes: ›Creditline‹ (the donor), ›Department‹ (the museum department to which the object is currently assigned), ›ObjectID‹ (the ID of the individual object) and ›AccessionYear‹ (the year in which the object was inventoried). Each node has a property (›credname‹, ›depname‹, ›ID‹ and ›year‹) in which the name or number is stored. The nodes are connected through various directed, simple edges: (Object → Department), (Object → Creditline), (Creditline → AccessionYear), (Creditline → Department), (Object → AccessionYear). Unsurprisingly, given the outlined data structure, our graphs fulfil the conditions of a *small world network*.⁴⁴ This type of network is characterised by a high clustering coefficient and a low average shortest path length.⁴⁵ The graphs of both museums fulfil these conditions, allowing us to conclude that they form a highly interconnected network with short paths.

[17]

In order to use graph algorithms in Neo4j, the graph was first converted into a bipartite network⁴⁶ with the node types ›Department‹ and ›Creditline‹ in a new DBMS instance. To ensure that the information on the number of objects assigned to a creditline is not lost, this number was added to the respective creditlines as node weight. The newly created network is an *affiliation network*. Sociologist Katherine Faust defines this as follows: »networks of actors tied to each other through their participation in collectivities, and collectivities linked through multiple memberships of actors. [...] Formally, an affiliation network consists of two key elements: a set of actors and a collection of subsets of actors (called events)«. ⁴⁷ In our case, the creditlines are the actors, some of which are assigned to several events, i.e. departments. In order to perform the algorithm calculations, the graph in Neo4j must be projected onto a unimodal network.⁴⁸ To do this, an edge was created between two creditlines whenever both donors donated to the same department and were thus connected. If the two donors have donated to several identical departments, the edge is given a weight that is increased by one per department. The department nodes were then removed from the network.

[18]

5. Questions and Hypotheses

To get an overview of the data structure of the two networks and the general donation behaviour, we first collected some basic metrics:

[19]

- How many objects were donated per department? Which departments (and thus collection focuses) were therefore the most popular?
- How many objects have been donated by individual patrons? Can we identify clusters?
- What is the ratio of major and minor donors in the museums? Are there similar structures in the comparison of the two museums?
- How many objects were donated each year? Are there outliers?
- Which similarities and differences can be found between the Met and the V&A?

Based on previous research about the historical background, we started working with several hypotheses to further be examined in this study. We assumed that paintings and drawings as ›typical‹ types of art were the most popular object donations. However, there could also be an underlying difference in popularity between non-European or American art on the one hand, and European art on the other. It would be plausible to assume that the vast British colonial empire in the 19th century meant that more colonial objects were given

[20]

⁴⁴ Cf. Klampanos / Jose 2012, pp. 163–164.

⁴⁵ Cf. Klampanos / Jose 2012, pp. 163–164.

⁴⁶ Mark Newman defines a bipartite network as »a network with two kinds of nodes, and edges that run only between nodes of different kinds« (Newman 2018, Chapter 6.6).

⁴⁷ Faust 1997, p. 157.

⁴⁸ For more information see Tsoni et al. 2021, p. 306.

to the V&A than to the Met. The world exhibitions as trendsetters and acquisition opportunities could also have an impact on the distribution of departments and the number of objects depending on the year. In view of the social structure of the time with the rich high society and an aspiring upper middle class, it can be expected that patrons from the middle class only owned a few objects they could donate to increase their social status. As the middle class consisted of considerably more people than the wealthy upper class, a large number of small donations can be assumed here. Patrons of the upper class can also be expected to donate larger quantities of objects, but at the same time there will probably be fewer such donors.

We also analysed the departments for differences in the structures of donations. Our hypothesis was that no major differences are recognisable due to similar donor motivations and the same global influences (e.g. world exhibitions). [21]

6. Methodology

The evaluation of the data relating to the base statistics was straightforward. The individual relationships (e.g. number of objects per department) were queried in Neo4j and saved in CSV documents. Similar methods were also used for the comparisons between major and minor donors. [22]

For the more complex queries, graph algorithms were used. These allowed us to also test for the general data structure which was in a form we expected (small world paradigm, see above). This plausible and well-known structure meant that we were working with well-formed data where quantitative methods could be used and produce results. The macro view on the data is particularly useful in verifying or disproving assumptions made in literature which pertain to the entire collection. [23]

The selection of the algorithms to determine the graph's *Betweenness Centrality* and *Degree Centrality* was partly based on the publication *Tudor Networks of Power* by Ruth and Sebastian Ahnert.⁴⁹ We also consulted the recommendations by Katherine Faust in her paper *Centrality in Affiliation Networks*: [24]

- »actors are central if they are active in the network (motivating degree centrality); [...]«
- »actors are central if they have the potential to mediate flows of resources or information between other actors (motivating betweenness centrality)«⁵⁰

Additionally, *Louvain Modularity*⁵¹ was used to identify clusters.

7. Results

The main takeaways will be presented in section 8 (Discussion). [25]

7.1 Objects per Department

Based on our data, which consists only of the objects available online, a total of 21,041 objects were donated to ten departments of the V&A during the period under review. These objects form our data basis. The most objects by far were given to the department »Prints, Drawings and Paintings«, followed by the »Ceramics Collection«. Together, these two departments dominate the donations to the museums with around 65 % of objects. With 2,846 objects, the »East Asia Collection« is in third place. The two departments »East Asia [26]

⁴⁹ Cf. Ahnert / Ahnert 2023, pp. 29, 53-55.

⁵⁰ Faust 1997, p. 160.

⁵¹ For more information see Zhang et al. 2021, pp. 2-3.

Collection« and »South & South East Asia Collection« were viewed together to make them more comparable with the much more general »Asian Art« department in the Met. The joint department has 3,811 objects but remains in third place.

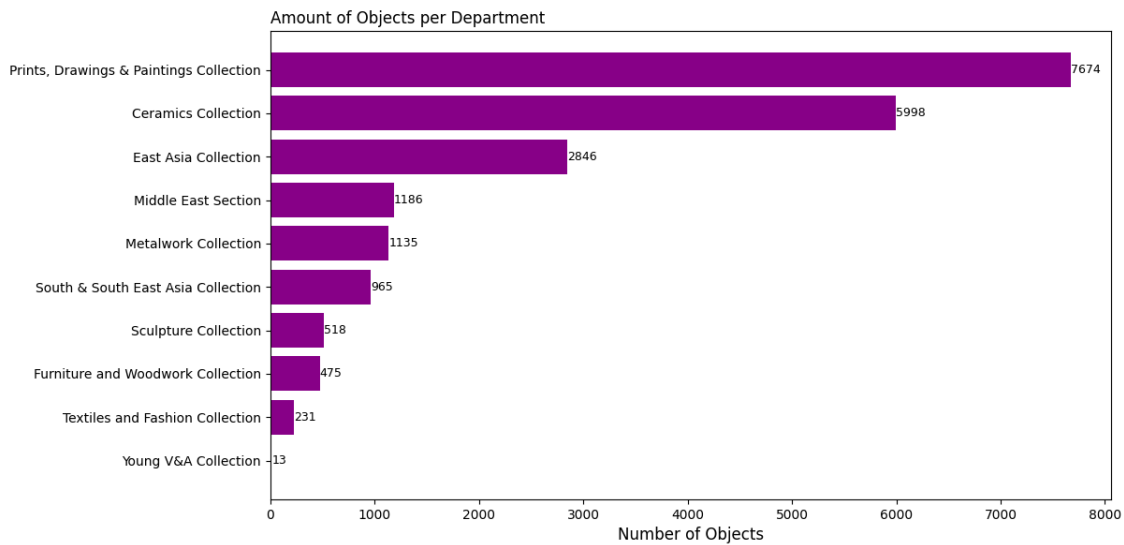


Fig. 1: Amount of objects per V&A department. [Chart: Astrid Brixy 2024]

Based on the equivalent data source at the Met (i.e., the data available online), 11,566 objects were donated to the department »European Sculpture and Decorative Arts«. The two departments »Asian Art« (6,443 objects) and »Egyptian Art« (6,028 objects) follow at considerable distance. The smallest departments were the then still young field of photography (2 objects) and the department showcasing medieval European art »The Cloisters« (17 objects).

[27]

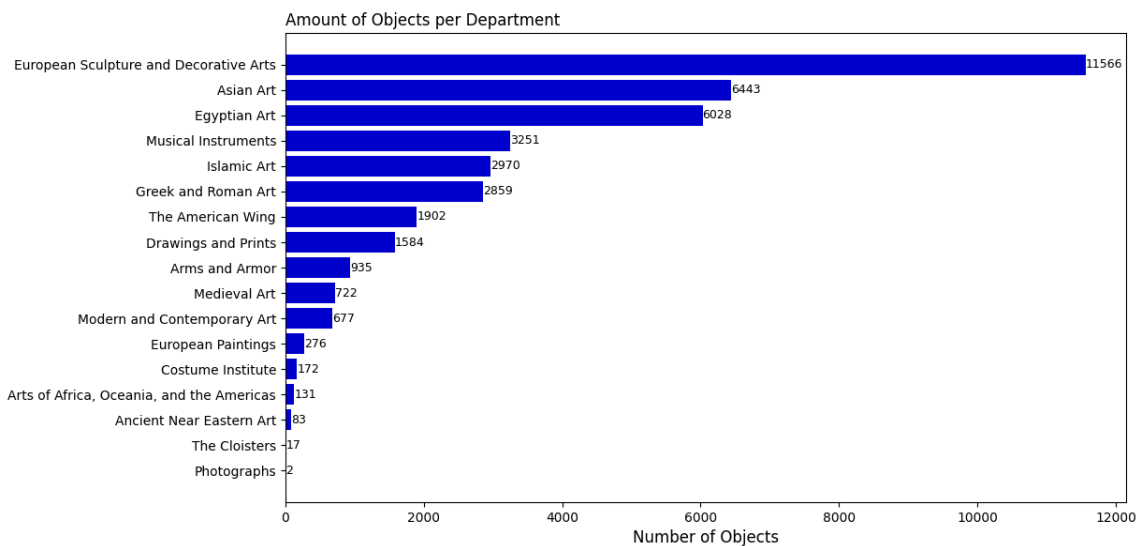


Fig. 2: Amount of objects per Met department. [Chart: Astrid Brixy 2024]

7.2 Creditlines per Department

The »Prints, Drawings and Paintings« and »Ceramics Collection« departments at the V&A also dominate in terms of the number of creditlines per department (267 and 151 creditlines). Other departments have far fewer donors: only 48 creditlines are attested to the »Middle East Section«, which is fourth place in terms of the number of objects. [28]

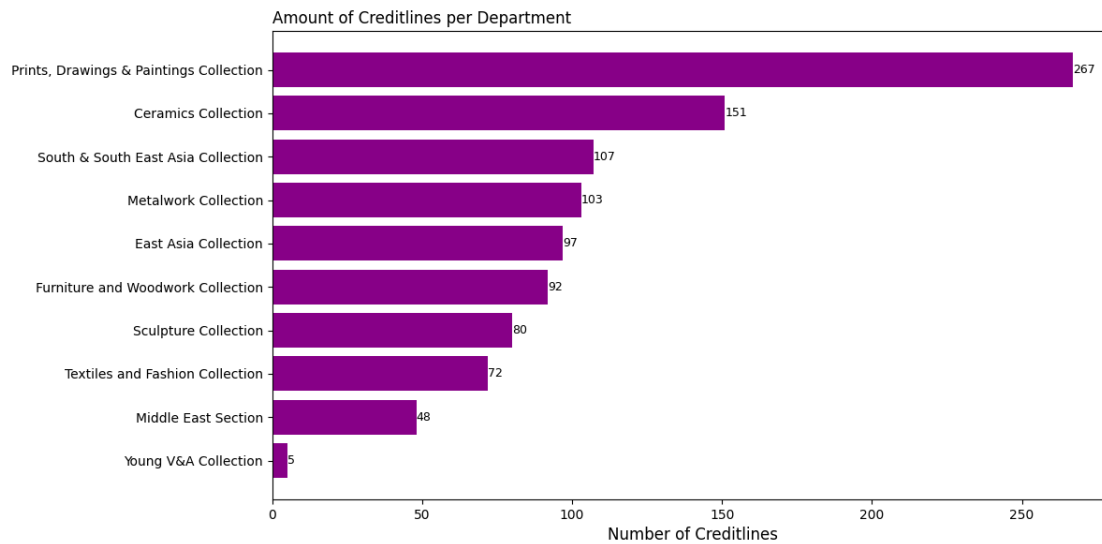


Fig. 3: Amount of creditlines per V&A department. [Chart: Astrid Brixy 2024]

As with the V&A, the department with the most objects at the Met corresponds to the one with the largest number of patrons (»European Sculpture and Decorative Art«, 244 creditlines). »The American Wing«, i.e. American art, especially paintings, is in second place by only a small margin (220 creditlines). As somewhat expected, the smallest departments in terms of object donations are also those with the smallest number of donors. [29]

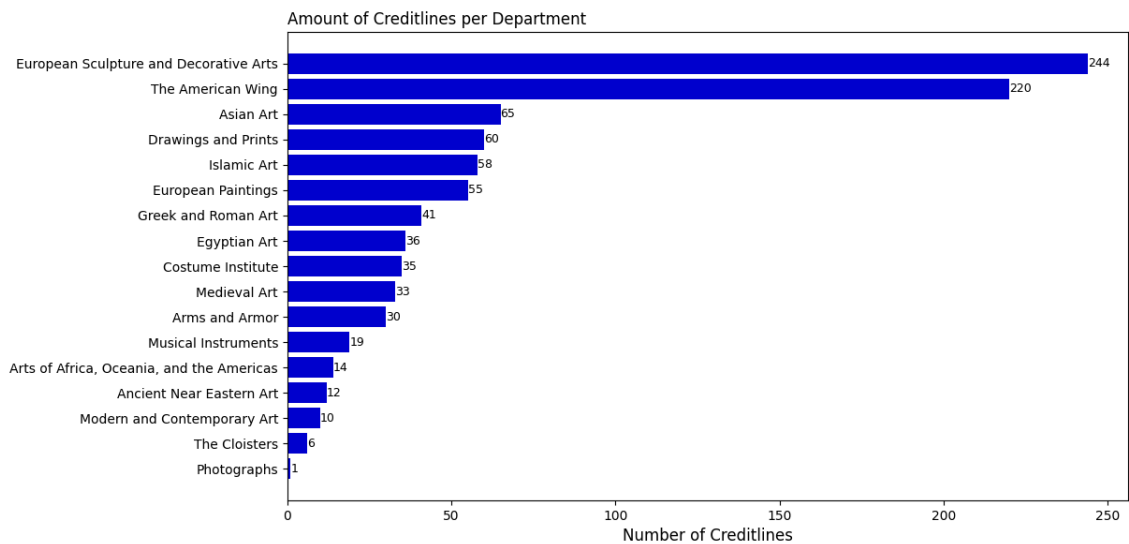


Fig. 4: Amount of creditlines per Met department. [Chart: Astrid Brixy 2024]

7.3 Development of Object Donations over Time

The number of objects donated to the V&A varies considerably over the period analysed. The years 1909 (2,041 objects), 1885 (2,557 objects) and above all 1910 (4,136 objects) stand out with a particularly high number of donations. The fewest objects were donated in 1884 (37 objects), 1892 (25 objects), 1895 (23 objects) and 1883 (11 objects). A comparison of the number of objects donated by decade reveals the dominance of the 1900s: 12,277 objects, i.e. approximately 58 % of the total number of objects were donated then. 25 % (5,329 objects) were donated in the 1880s, while in the 1890s only 3,435, i.e. approximately 16 % of the objects, were donated to the museum.

[30]

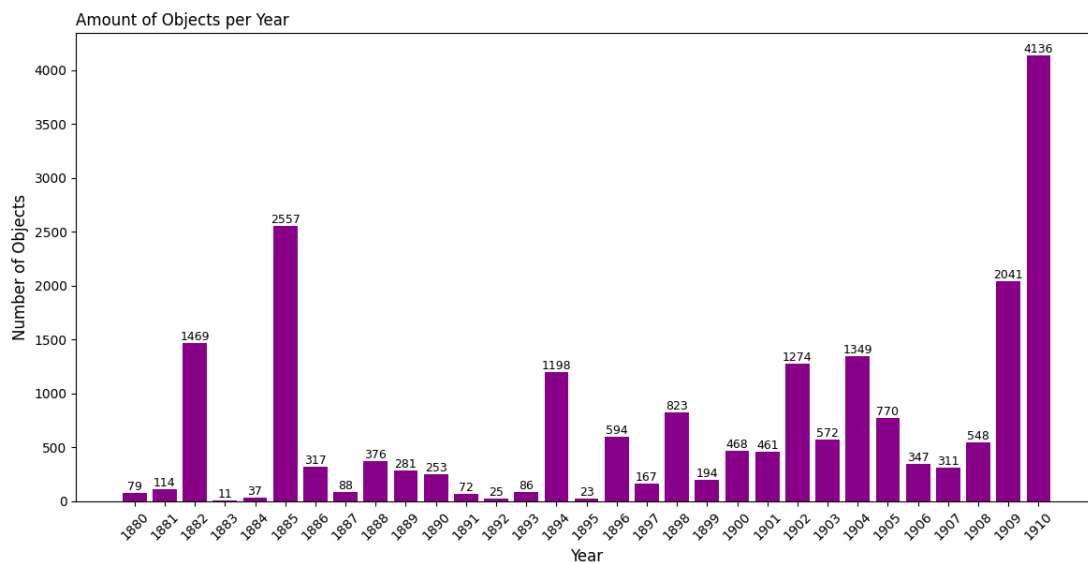


Fig. 5: Amount of objects per year in the V&A. [Chart: Astrid Brixy 2024]

The years 1908 to 1910 are the most popular years in the Met, followed by 1889 and 1907. With only nine objects, hardly any donations were made to the museum in 1884. Overall, approximately 59 % of the objects are from the 1900s, while the 1880s (approximately 19.9 %) and 1890s (approximately 21 %) resemble each other. [31]

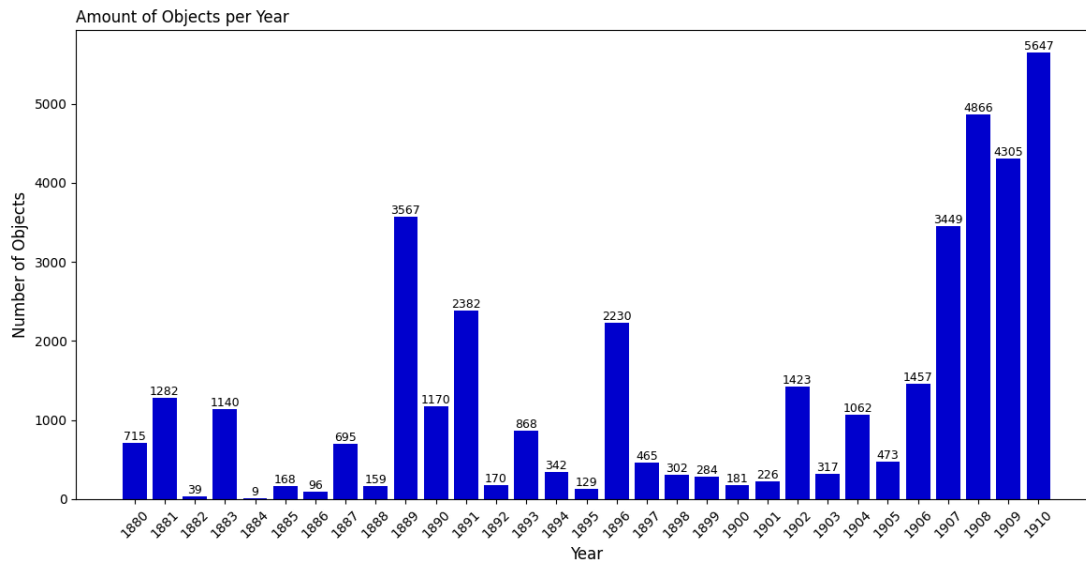


Fig. 6: Amount of objects per year in the Met. [Chart: Astrid Brixy 2024]

7.4 Major and Minor Donors

The structure of major and minor donors in both museums shows striking similarities. We consider people who donated up to ten objects as minor donors and all larger donations as major donors. In total, 630 people donated 21,041 objects to the V&A and 821 people donated 39,450 objects to the Met. [32]

In the V&A, a clear trend can be identified in the distribution of the number of objects per creditline: most donors form a cluster with only few object donations. There are more major donors with donations up to over 3,000 objects in the V&A than in the Met. Interestingly, no donors have given between 1,500 and 2,000 objects to the museum. [33]

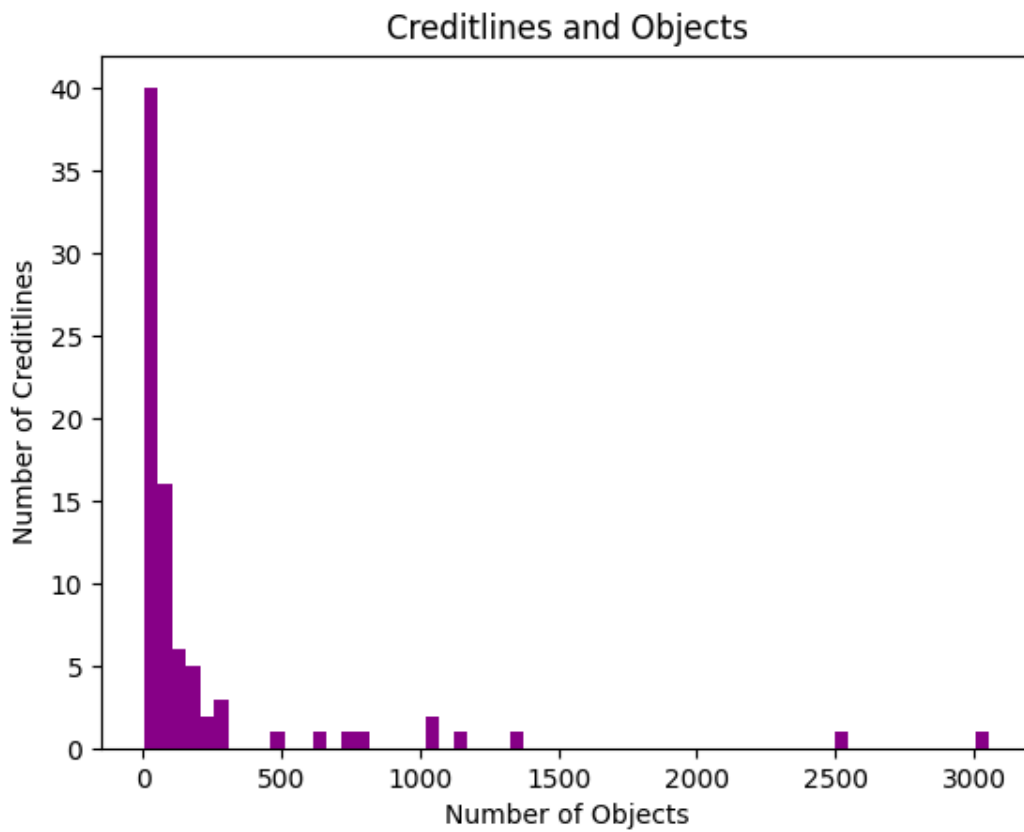


Fig. 7: Amount of objects per amount of creditlines in the V&A. [Chart: Astrid Brixy 2024]

At the Met, too, most people donated only a few objects. The larger the number of objects, the fewer and more isolated are the donors. One conspicuous outlier with 10,168 object donations is the *Rogers Fund*. This monetary fund was donated to the museum in 1903 by railway manufacturer Jacob S. Rogers. In the case of purchases with money from the fund, this was always indicated as a creditline and classified as a donation.

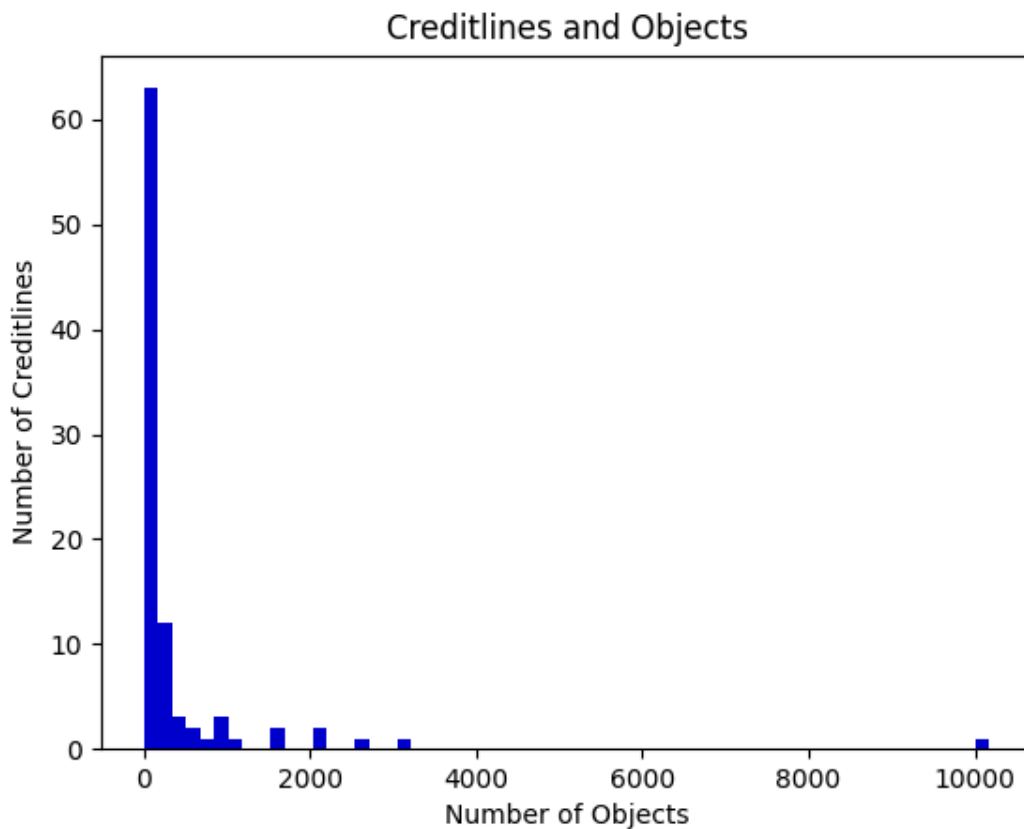


Fig. 8: Amount of objects per amount of creditlines in the Met. [Chart: Astrid Brixy 2024]

A closer look at the results reveals that almost 50 % of donors in both museums gave only one object each to the museum. Almost all patrons donated a maximum of 1,000 objects to the museum, with very few larger donations. [35]

Number of Objects	Met: Amount of Creditlines	V&A: Amount of Creditlines
1	313; ≈ 49,7 %	393; ≈ 48,4 %
2	84; ≈ 13,3 %	114 ≈ 13,9 %
≤ 5	464; ≈ 73,7 %	618; ≈ 75,3 %
≤ 10	502; ≈ 79,7 %	674; ≈ 82,1 %
≤ 50	578; ≈ 91,7 %	773; ≈94,2 %
≤ 100	588; ≈ 93,3 %	793; ≈ 96,6 %
≤ 1000	621; ≈ 98,6 %	815; ≈ 99,3 %
≤ 5000	629; ≈ 99,8 %	821; = 100 %

Tab. 1: Amount of objects per amount of creditlines.

An analysis of the relationship between the number of departments and the size of donations shows that even among major donors, there is a clear trend of donating to just one department. However, the number of people donating to multiple departments is also increasing. [36]

7.5 Degree Centrality and Roles of the Creditlines

To find out which donors are particularly central in the network, i.e. donated a lot and to different departments, is important, as these donors substantially shaped the collections through their donations. Therefore, the degree centrality of the creditlines was calculated, then the number of objects was added. The 50 creditlines with the highest scores (51 in the Met, as there are two creditlines tied for 50th rank) were identified. Then, the associated persons were analysed biographically. The donors were categorised and assigned to at least one of the following classes (the classes were created for this purpose by the authors): middle class, upper class, artist or craftsman, museum employee / professional, military member, church functionary, aristocrat, person only donating the estate of a relative (not a collector themselves), person unknown (no information found) and institution / association / company. Some of the people were also assigned several roles.

[37]

Class	Number of Creditlines
Middle class	1
Artist / craftsman	5
Museum employee or professional	5
Military member	4
Church functionary	2
Aristocrat	6
Estate of a relative	5
Person unknown	14
Institution / association / company	3
Upper class	13

Tab. 2: Creditlines per class in the V&A.

Class	Number of Creditlines
Middle class	4
Artist / craftsman	3
Museum employee or professional	5
Military member	1
Church functionary	0
Aristocrat	1
Estate of a relative	1
Person unknown	7
Institution / association / company	2
Upper class	25

Tab. 3: Creditlines per class in the Met.

The evaluation shows that the hubs in the Met are severely dominated by members of the upper class. In the V&A, upper class members also dominate the hubs. However, it is difficult to make an exact statement, as 14 people, and thus the largest group, could not be identified. In contrast, more people could be identified in the Met, only 7 remain unknown.

[38]

7.6 Betweenness Centrality of the Creditlines

The 50 patrons with the highest betweenness centrality⁵² include many already identified hubs in both museums. The bridges were identified in two complementary ways. First, betweenness centrality was calculated on the unimodal creditline projection. Second, using the original bipartite creditline–department data, creditlines that donated to exactly two departments, each shared by no more than four other creditlines, were identified. This step ensures that bridges not only have a central network position but also connect departments that are otherwise weakly linked. It is noticeable that all the department combinations each contain at least one department that was given few objects. The most noteworthy patrons in the V&A with high betweenness centrality, who also connect otherwise almost disjoint departments, are first and foremost Joshua Dixon, but also George Salting, John Jones, Mrs Amelia Vertue Jodrell, Edmond Dresden, Colonel F. R. Waldo-Sibthorp, Robert Taylor, George Donaldson and Thomas Wardle. In the Met, there is a similar accumulation of creditlines with high degree and betweenness centrality. However, there are considerably more almost disjoint department combinations (156), so that no individual persons will be named.

[39]

7.7 Louvain Modularity Algorithm of the Creditlines

The Louvain algorithm was used to find communities of creditlines. The creditlines can be assigned to only four communities in the Met, but six communities in the V&A. These communities are defined by the departments to which the creditlines have donated, with each community being dominated by specific departments.

[40]

In the Met, cluster 1 consists of donations to a maximum of four departments, always to »The American Wing«. Cluster 2 includes donations to at most six departments, including »Drawings and Prints«, »European Paintings« or »Musical Instruments«. Donations to up to five departments, including »European Sculpture and Decorative Arts« or the »Costume Institute« are collected in Cluster 3. All other departments and all creditlines that have donated to more than six departments form Cluster 4.

[41]

In the V&A, Cluster 1 contains the »Metalwork Collection« (up to 2 departments), Cluster 2 the »South & Southeast Asia Collection« (up to 6 departments) and Cluster 3 the department »Prints, Drawings & Paintings« (up to 3 departments). Cluster 4 either includes the »Sculpture Collection«, the »Textiles and Fashion Collection« or the »East Asia Collection« (up to 9 departments), while Cluster 5 contains the »Middle East Section« and »Ceramics Collection« (up to 7 departments). Cluster 6 includes the departments »Furniture and Woodwork Collection« and »Young V&A Collection« (up to 4 departments).

[42]

7.8 Degree Centrality of the Departments

The degree centrality of the departments, i.e. the number of donors who have donated to this department, was calculated using the algorithms of the Neo4j Graph Data Science Library on a bipartite network without adding the node weights, i.e. the number of objects. Otherwise, the result would not differ from the number of objects per department. The department with the highest degree is »Ceramics Collection«, followed by »Metalwork Collection«. The »Young V&A Collection« has a degree of only 70.

[43]

⁵² Newman explains that betweenness centrality »measures the extent to which a node lies on paths between other nodes« (Newman 2018, Chapter 7.1.7).

Department	Degree
Ceramics Collection	1380
Metalwork Collection	1260
East Asia Collection	1120
Prints, Drawings & Paintings Collection	1020
Sculpture Collection	940
Furniture and Woodwork Collection	810
Middle East Section	770
Textiles and Fashion Collection	740
South & South East Asia Collection	590
Young V&A Collection	70

Tab. 4: Degree centrality per V&A department.

The Met is dominated by the department with the most object donations, »European Sculpture and Decorative Art«. The departments »The American Wing« and »Islamic Art« follow at some distance. With »Photographs«, the department with the fewest objects is also the one with the smallest degree.

[44]

Department	Degree
European Sculpture and Decorative Arts	2110
The American Wing	1370
Islamic Art	1300
Medieval Art	1270
Greek and Roman Art	1120
Asian Art	1050
Egyptian Art	880
European Paintings	850
Drawings and Prints	840
Costume Institute	730
Arms and Armor	650
Arts of Africa, Oceania, and the Americas	530
Ancient Near Eastern Art	500
Musical Instruments	440
The Cloisters	340
Modern and Contemporary Art	160
Photographs	20

Tab. 5: Degree centrality per Met department.

8. Discussion

When interpreting the results, it is important to remember that the database is not complete. It only includes donations recorded in the current object catalogue, not deaccessions. In the case of the V&A as a national museum, possible redistributions of objects to other museums are also not recorded. In addition, many objects are missing creditlines. As a result, the mode of object acquisition cannot be traced easily. Thus,

[45]

we had to disregard these objects in our study. By comparing biographies of individual patrons and the presumed accession year of their bequests, discrepancies arise. Apparently, some donations were not inventoried at the V&A until several years after they were received.

8.1 Objects per Department

The department with the most object donations in the V&A is the »Prints, Drawings and Paintings Collection«. [46] It contains large donations and bequests from a number of artists. In 1887, Isabel Constable, daughter of the painter John Constable, gave the museum »95 paintings, 297 drawings and three sketchbooks«⁵³ of her late father. However, no further information can be found about the artist Louis van Pelégheus, from whom the V&A received 1,129 works. Some collectors such as the Reverend Chauncy Hare Townsend are also among the major donors, although Townsend died in 1869, so a later year was incorrectly given as the »Accession Year«. With the founding of the Tate Gallery in 1908, the V&A no longer collected paintings and drawings.⁵⁴

The Met obtained a large number of donations to the »European Sculpture and Decorative Arts« department. [47] The department can be seen as a mixture of the »Sculpture Collection« and »Furniture and Woodwork« at the V&A. This can be explained by the importance of European art for the status of New York's high society as a distinction from other social classes. Enthusiasm for European culture was rooted in the European travels of the wealthy elite. The significance of art collections and the strong influence of Europe are also reflected in the architecture and interior design of the homes of the high society. Many European furnishings, including furniture, became part of the Met collection as »decorative art« and thus found their place in the »European Sculpture and Decorative Arts« department.⁵⁵

At the V&A, the second most popular department is the »Ceramics Collection«. There are two main reasons [48] for this: Lady Charlotte Schreiber and archaeological excavations in Egypt. Lady Charlotte Schreiber was a highly educated woman. She shared a passion for ceramics with her second husband, Charles Schreiber. They lent the V&A parts of their collection several times and travelled through Europe 24 times in search of new objects.⁵⁶ After the death of her husband in 1884, she donated 1,800 objects to the V&A in 1885. Thus, the museum came into possession of the »world's largest collection of 18th century English porcelain, earthenware, glass and enamels«⁵⁷. It is worth mentioning that this was only a small part of her ceramics collection, totalling around 12,000 objects. Another reason for the department's appeal to donors was excavations in Egypt by the Egypt Exploration Fund (EEF). Founded in 1882, the organisation donated many objects to the V&A. In the absence of a separate department, most of the objects were placed in the »Ceramics Collection«, but some also in »Metalwork« and the »Middle East Section«. ⁵⁸ The Met also received large donations from the EEF, which explains the size of their department of »Egyptian Art«.

The Met's department of »Asian Art« was originally founded in 1915 as »department of Far Eastern Art«. [49] Today, it houses one of the largest and most comprehensive collections of Asian art in the world, with over 35,000 objects.⁵⁹ Even before the department was founded, the Met already owned many Asian artworks. The V&A also obtained a huge amount of Asian artefacts in our survey period. Most Asian artworks are of Japanese or Chinese provenance, between which no distinction was made for a long time. The global political situation explains the phenomenon of an increasing acquisition of Asian objects. From the beginning of the Opium War in 1839, Chinese and Japanese art became a focus of British and American public attention. After

⁵³ Cocks 1980, p. 145.

⁵⁴ Cf. Cocks 1980, p. 145.

⁵⁵ Cf. Montgomery 2010, p. 28.

⁵⁶ Cf. Bryant 2022, p. 70.

⁵⁷ Bryant 2022, p. 69.

⁵⁸ Cf. Artefacts of Excavation.

⁵⁹ Cf. The Metropolitan Museum of Art 2024.

the end of the war in 1841, trade between the countries became much easier.⁶⁰ From the 1860s onwards, supposedly Japanese objects were particularly popular, but above all Chinese blue and white porcelain plates. However, it was not until the 1876 World's Fair in Philadelphia that Asian art achieved a breakthrough in New York high society's passion for collecting.⁶¹ The most important single donor of Asian art to the V&A during the period under study was George Salting. His bequest in 1909 included over 200 of the plates mentioned above.⁶² For the Met, the patrons Stephen Whitney Phoenix, Samuel Colman, Charles Stewart Smith and Edward C. Moore should be mentioned.⁶³ It is striking that there are nine departments of the V&A to which not a single object was donated. The museum's collection focus expanded considerably after the end of the period under review. For some departments, this can be clarified by taking a look at the founding history of the departments. For example, the »Wedgwood Collection«, the collection of the potter and entrepreneur Josiah Wedgwood (1730–1795), was only donated to the museum in 2014. That no patrons contributed photographs to the museum can be attributed to the fact that that technology was still in its infancy at the time. This is also consistent with the result from the Met. Here, the Photography Department also only received 2 objects.

8.2 Development of Object Donations over Time

Surprisingly, the correlation between the number of donations and the respective years in the Met does not show any clear causality between customs duties and object donations. In the years 1883 to 1891, 30 % customs duties had to be paid on the import of European objects to the US in order to promote its own art scene. Despite this, there was no permanent drop in object donations. Even the duty-free years between 1895 and 1897 and the reintroduction of 15–20 % duty in 1897 are not reflected in the donations. Only the large increase in donations in 1910 could be linked to the cancellation of customs duties on works of art older than 20 years in 1909.⁶⁴ One explanation could also be our data foundation, with a possible lack of donated objects in our time frame which might falsify our results. However, the probability that the data from 1883 to 1891 is significantly more complete than that of other years is low. Accordingly, a different reason must be assumed, and further research is needed.

[50]

In the case of the V&A, the year 1910 is particularly noticeable with an accumulation of central patrons. These patrons also stand out due to their high degree centrality which means that they also donated particularly extensively. In 1910, Joseph Henry Fitzhenry donated his »collections of French porcelain and Dutch faience«⁶⁵ to the museum. Sydney Vacher, Robert Forrer and Alan Cole are also listed. The museum came into possession of two large estates as well. George Salting died in December 1909 and left parts of his impressively large collection to the museum. Captain Henry Boyles Murray also bequeathed »his collection including porcelain and metalwork to the Museum together with £50,000 for future acquisitions«⁶⁶ in 1910. In 1885, the large donation of ceramics from Lady Charlotte Schreiber was given to the museum. The Egypt Exploration fund donated many objects in 1909. Overall, an especially large number of different patrons donated objects that year.

[51]

⁶⁰ Cf. Cocks 1980, p. 129.

⁶¹ Cf. Hearn 2015, p. 5.

⁶² Cf. Cocks 1980, p. 131.

⁶³ Cf. Hearn 2015, pp. 5–7.

⁶⁴ Cf. May 2010, pp. 41–43.

⁶⁵ Cf. V&A Archive, Joseph Henry Fitzhenry.

⁶⁶ V&A Archive, Henry Boyles.

8.3 Major and Minor Donors

The large number of minor donors in both museums indicates a similar distribution of patrons from the upper middle class compared to the wealthy members of the upper class. The V&A was founded with a much higher educational goal for the population and, as an arts and crafts museum, focuses on craftsmanship, making the similarities in distribution even more striking. The initial hypothesis derived from the literature that the V&A attracted more minor donors than the Met was not confirmed. [52]

8.4 Degree Centrality and Roles of the Creditlines

Examining the class affiliation of patrons with the highest degree centrality of both museums confirms the hypothesised differences. The assumption that there are more aristocrats among the patrons of the V&A is therefore correct. In addition, the V&A has more bequests that were given to the museum by surviving relatives. This also confirms our hypothesis that the social status of donors at the V&A is much more diverse than at the Met, which is clearly dominated by members of high society (51 % at the Met vs. 22 % at the V&A). We assume a connection with the V&A's focus as an arts and crafts museum. Thus, artisans who wanted to demonstrate their own skills donated individual objects to the museum. In addition, the New York high society purposefully excluded the middle and lower class. Accordingly, they did not donate any objects. However, it must be pointed out that 24 % of the hubs could not be biographically identified in the V&A and therefore could not be effectively included in the analysis. In the Met, this proportion is 10 % lower. The analysis of the social background of the hubs confirms our assumption that the Met was much more strongly dominated by high society than the V&A. This finding is also in line with the historical backgrounds of both museums, as explained at the beginning. [53]

8.5 Betweenness Centrality of the Creditlines

Among the donors with a high betweenness centrality, many hubs can be found. Major donors often had more than one specific field of interest and therefore gave objects to several departments. The fact that significantly more departments are connected by bridges in the Met can be seen as an indication of the less focused interests of patrons there compared to British donors. [54]

8.6 Louvain Modularity Algorithm of the Creditlines

Overall, the V&A has more differentiated department clusters. Interestingly, two clusters show great similarities in both museums. »Prints, Drawings and Paintings« is a cluster at the V&A, and »Drawings and Prints« and »European Paintings« are also a cluster at the Met. Only paintings from »The American Wing« form a separate group. One can speculate that donations to »The American Wing« were also made from a patriotic-nationalist background and that some of these donors may have wanted to criticise the popularity of European art in the US with their donations. Accordingly, this could be a community with different behaviour than the donors of the other departments. It can therefore be assumed that US patrons with an interest in European art and British patrons with the same interest have a more similar pattern than donors who have given American art to the Met. The same applies to patrons of the departments »European Sculpture and Decorative Arts« and »The Costume Institute« at the Met and the departments »Sculpture Collection« and »Textiles and Fashion Collection« at the V&A, which also belong to the same community, respectively. [55]

8.7 Degree Centrality of the Departments

The department with the most objects in the V&A, »Prints, Drawings and Paintings«, only has the fourth highest degree centrality score. This shows that many creditlines donated exclusively to this department. Thus, it has fewer connections to the other departments. At the same time, a particularly large number of people donated to this department, which indicates a large number of people interested exclusively in classical art. In contrast, the department with the second-largest number of objects, the »Ceramics Collection«, is characterised by a higher number of creditlines who were interested in more diverse areas and who also donated to other departments. Interestingly, there is a particularly close connection with the »Metalwork Collection«. Both departments are especially suitable for small donations, as small objects such as cups were easily available. In the Met, on the other hand, patrons of »Asian Art« have a one-sided special interest, while donors of »European Sculpture and Decorative Arts« and »The American Wing« usually also donated to other departments. At the same time, both departments have a particularly high number of creditlines, so it can be assumed that most patrons of the Met also donated to these departments.

[56]

8.8 Graph Distances

Comparison between entire graphs is still at a somewhat experimental stage.⁶⁷ Nevertheless, the distance between two graphs can be used as an indicator of similarity; different distance measures compute different feature distances. As seen above, the general donor structure of the Metropolitan Museum and the Victoria and Albert Museum seems to be rather similar. This should be reflected in similar results for network distances. However, the networks are also quite different in size which can skew outcomes. We used the python library *netrd*⁶⁸ to compute the distances described below. For better comparison, we also created two random *Erdős-Rényi graphs* with NetworkX's *fast_gnp_random_graph()* function.⁶⁹ These were set up to have the same number of nodes and a similar number of edges to the respective real world museum networks and are given as »Random (V&A)« and »Random (Met)«. The probability for edge creation was determined experimentally to match the number of edges in the museum graphs. All results are rounded to three decimal places. The algorithms used were *Laplacian spectral distance* and *NetSimile* as implemented in the *netrd* library. The Laplacian spectral distance takes the Laplacian matrix, consisting of the graph's adjacency matrix and its diagonal matrix of vertex degrees, and computes the matrix spectra or its set of eigenvalues; in the following steps the spectra are converted to be continuous and the resulting distributions can be compared to compute the distance between graphs.⁷⁰ NetSimile takes a larger set of features per node (degree, clustering coefficient, two-hop away neighbours, average clustering coefficient of neighbours, edges in the node's ego-net, outgoing edges from the node's ego-net, number of neighbours of the node's ego-net) and aggregates over the resulting feature-node matrix.⁷¹ The vectors computed in the last step can subsequently also be compared to calculate graph distance. The authors of NetSimile note that one of its advantages is that feature extraction seems to be somewhat independent of network size.⁷²

[57]

Both distance measures indicate a structural similarity between the two museum graphs as well as between the two random graphs conversely. While NetSimile has a longer runtime, it also takes much more features into account. However, the Laplacian spectral distance algorithm yields similar results and might thus be a better choice when first evaluating graph distances.

[58]

⁶⁷ Cf. Wills / Meyer 2020.

⁶⁸ NetSI 2019, [Available Distances](#).

⁶⁹ NetworkX 2025, [fast_gnp_random_graph](#).

⁷⁰ Cf. NetSI 2019, [Available Distances](#); Chung 1997, p. 2.

⁷¹ Cf. Berlingerio et al. 2012.

⁷² Cf. Berlingerio et al. 2012.

By comparing further museum donor networks, network similarity might be computed in a more meaningful way. As these algorithms are based on structural data, additional data might change the general shape of the networks; however, the resulting graph distances with the available data show major structural similarity between the museums. This is unlikely to change, unless a major, significantly differently structured part of the collection data has not been included in the data sets. [59]

	Random (V&A)	Met	Random (Met)
V&A	0.613	0.182	0.6
Random (V&A)	-	0.535	0.071
Met	-	-	0.523

Tab. 6: Laplacian spectral distance.

The Laplacian spectral distance uses the lowest eigenvalue spectra from the algorithm as broadly described above for comparison between two graphs.⁷³ Lower result values indicate a smaller distance, i.e. higher similarity. Notably, the distance between the two random graphs is closer than the two museum graphs. Spectral distances, such as this one, may be used to detect both global and local features and have been reported as a good general distance measure. Our results indicate that the algorithm would be a good fit for finding network similarity. [60]

	Random (V&A)	Met	Random (Met)
V&A	22.333	11.741	22.620
Random (V&A)	-	22.335	12.185
Met	-	-	22.787

Tab. 7: NetSimile.

NetSimile was first proposed by Berlingerio et al. and was designed to work well on graphs of different sizes.⁷⁴ The algorithm uses seven different node features as detailed above which are aggregated into a single value distance afterwards. The lower the computed distance, the closer the graphs are structurally; interestingly the two lowest numbers are the comparisons between the two museums (11.741) and the two random graphs (12.185). Other comparisons yielded higher numbers, all between 22 and 23. Our results indicate that the NetSimile algorithm would also be well suited to the task presented here. A downside to this algorithm is the rather long runtime which has been noted before.⁷⁵ [61]

9. Conclusion

The social structure of the target groups of both museums strongly reflects the structure of their patrons. The biggest difference between the two museums is that the donors at the Met can almost exclusively be categorised as high society compared to the patrons of the V&A. The different orientation of the two museums also plays a role here. The V&A's educational mission is aimed at a significantly different target group than the exclusive Met. The V&A's educational mission appears to have been partially successful, at least if one takes the origin of the objects donated to the V&A as a measure. The network analyses show the most influential patrons. These include people already much discussed in the specialist discourse, such as George Salting at the V&A and J. P. Morgan at the Met. However, it is noticeable in both museums that little to no information can be found about a significant proportion of these donors. This means that their [62]

⁷³ Cf. Wills / Meyer 2020.

⁷⁴ Cf. Berlingerio et al. 2012.

⁷⁵ Cf. Wills / Meyer 2020.

backgrounds and motivations behind the donations cannot be traced. There are slight differences in the departmental structures as well, but the global influence of some trends, such as the fascination with Egypt or the world exhibitions, can be recognised.

Our work also identified aspects in need of further research. For a more complete picture of the donations, the remaining museum objects must be entered into the respective databases. The respective museum archives would have to be consulted as well. If deaccessioned or repositioned objects are found, their information should be added to our database. The movement of objects between departments could be another promising pathway to understanding the development of these collections over time. [63]

Another aspect of further work is provenance research. As many donors could not be sufficiently identified, their motives cannot be analysed. In particular, it should be emphasised that further research into women within the donor networks is necessary, as female patrons can often only be identified indirectly through information about their fathers, brothers or husbands.⁷⁶ Further insight into the provenance of the donated objects would also be of interest in order to create acquisition networks within the data on art markets. In addition, regions of origin of objects could be used as modes of analysis in and of themselves, potentially identifying provenance hubs. This would allow new conclusions to be drawn about the art trade trends at the time. Comparison of these supplementary networks for the V&A and the Met could help answer the question of global art trade networks and their local counterparts. Provenance research could also yield new postcolonial insights by examining questions surrounding the acquisition of objects from other cultures and searching for patterns in terms of location, collection and collectors. By identifying the respective collectors, the background to the acquisition can then also be researched. [64]

Comparing our results with other museums with similar collection focuses would provide a bigger, more cohesive picture of global collection trends and connections at the time. The Louvre, for example, would be of particular interest as an especially influential museum at that time. Using more museums and their collections as data points would also prove an interesting subject to further examine the viability of graph distances for comparing these networks. [65]

In conclusion, our graph-based research approach shows great potential for investigating and comparing the behaviour and patterns of collection formation. It demonstrates that many of our assumptions about collections can be proven or disproven quantitatively, and that this is possible when there is meticulous, data-oriented documentation. However, in some cases the data could not be used to answer central research questions, e.g. the donors' motivations. Making the data openly accessible is the first key step in enabling research, ideally in a machine-readable format. Enriching the data with the necessary metadata is certainly time-consuming and difficult, but it would open up very relevant research opportunities. Our comparative study has shown some of the gaps in understanding and in the recorded datasets – closing the gaps will only be possible with a concerted effort to add those data points. [66]

⁷⁶ These women could not be found in Wikidata either.

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