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The “Who’s Who?”
of Künstlerhaus Exhibitors
A Guide to Analyze Entangled Artists
Biographies Based on Wikidata

From exhibitions catalogs as databases to historical networks research

Exhibition catalogs contain lists of names, artworks, and catalog numbers. They are usually printed to give the audience a quick overview of the exhibited artworks and of the exhibition’s layout. It also became a practical toolkit for collectors, critics, and dealers, because of the additional information such as the current place of residence of an artist or the enumeration of award-winning artists which was printed in addition to the basic information. Taking this into account, it can be said that today exhibition catalogs have rightfully obtained the status of object of art historical studies. They are particularly interesting for questions of social history of art, global art history, and art market.

As an historical source, they are often kept by museum archives or libraries, but a full set of exhibition catalogs is rarely accessible in one place. For that reason, art historians started extensive research endeavors to systematically collect these widely dispersed materials and publish them as reprint editions or excerpted lists of names. These two approaches to documenting the information held in the catalogs continue to exist today and follow separate intentions. The first one is to document the source as exactly as possible and preserve every bit of authenticity. Misspellings of names and erroneous data, which resulted out by chance, lack of time, or unawareness of the organizers, must therefore be preserved this way, because they are part of the production process. The catalog is becoming in its surrogate state the exact copy of the original source and maintains its quality as a consistent work of reference. The other approach tries to overcome the historical bias in these lists of names and produce a dataset for the precise study of research questions from the three art historical fields mentioned before. To achieve that, it is necessary to identify individual artists and classify the multitude of names.

Since the 1990s, the computational turn of the humanities has also had an impact on such undertakings and prolonged the methodological questions to the digital age. At the beginning, digital projects tried to transfer the information contained in exhibition catalogs into databases. The Salons et expositions de groupes (1673-1914) database, maintained by the Musée d’Orsay in France, could be a representative of this approach. Therein, the exhibitors’ names were documented as they were printed in the catalogs of the yearly Salon exhibitions and linked with the artworks exhibited at each venue. The same person can therefore be found under several variations of their name.

In recent years, more advanced databases were developed under the impression of the possibilities of the semantic web in which entities such as persons or places were linked to other web resources. The Database of Modern Exhibitions (DoME) should be mentioned here. The analyzes of exhibition catalogs follow similar motivations when
it comes “to identify a population, to study its opportunities to exhibit abroad, to see what was shown or not, to highlight channels and networks that would be favorable or not for this internalization.” The advantage of such databases lies on hand. Instead of building a single data silo with limited or restricted access, links are set to other web resources in the linked open data cloud. Authority files such as the Integrated Authority File (Gemeinsame Normdatei, GND) for persons, institutions and places provide carefully collected information about entities with their metadata. Second, standards, ontologies and vocabularies were developed for the implementation of the semantic web, which describe relations between data sets and these authority files. As a consequence of that, data is stored as triples consisting of a subject, a predicate with a URI and an object. The URI can be understood as a link pointing to the exact data entry of an external resource. As a result, it is possible to query and process data across different databases.

This development is accompanied by the increasing interest in quantitative studies aiming to uncover hidden patterns in these catalog data with the help of network analyzes. For this approach, it is necessary to translate the exhibitors lists into meaningful data by identifying (or at least defining) every person and formalizing their names. The “unstructured data” must be transformed into structured data first. Then the visualization of catalog data as networks can be performed. This was done in course of the Hagenbund research project in which the association’s internationality was analyzed by evaluating nearly forty years of its exhibition program. The final graph not only reflects the events’ chronological order. It also illustrates how frequently persons or groups were exhibited and to what extent the association’s social structure changed over time. At this point, the data analyzes focused mainly on network statistics. Two questions arise: What would be possible if we could add more details about the exhibitors into such a network? What could be achieved with all the art historical knowledge collected in a biographical encyclopedia? Following this idea, the present article aims to demonstrate the possibilities and to test the limitations of this new approach. But before doing so, it is necessary to explain the sources and datasets used for this study.

Fig. 1. C. Binder (print), after Erwin Pendl, *Gruss aus Wien. Künstlerhaus*, 1899, postcard, Vienna, Wien Museum (17148/13).
The Künstlerhaus Exhibitions during the 19th century

Vienna’s Association of Fine Artists (Genossenschaft der bildenden Künstler Wiens), founded 1861, was the most prominent institution for staging art exhibitions within the Habsburg monarchy (fig. 1). Almost unchallenged in its status during the 19th century, its yearly exhibitions became an important event for artists and their consecration. A change for the Viennese art scene became apparent after the foundation of the Secession in 1897. The trigger for this event was a dispute following the rejection of the artwork *Kirschpflückerin* (Cherry picker) by Josef Engelhart.9 Therefore, Engelhart, Gustav Klimt, and a group of befriended artists left the association. Two years later, another group of artists resigned their membership for similar reasons and founded the Hagenbund. The art historical period succeeding these events gained worldwide fame under the term Viennese modernism.

The primary sources for this study were 29 exhibition catalogs.10 This corpus covered the Ringstraße era, a period of the late 19th century marked by economic and social changes. In comparison to international exhibitions, the yearly exhibitions at the Künstlerhaus showed more Austrian artists. For this group of artists, the success accompanying the public recognition was important for their later career. With the exception of monographs focusing on a single artist’s oeuvre and commemorative publications, little attention has been drawn to the exhibition’s history at a granular level of research.11 As a result, the image of a retrograde association propagated by the Secessionists has held strong in people’s minds. Because of this and the vast exhibitor numbers, the systematic evaluation of these catalogs remained a desideratum and was ideally suitable for quantitative research.12

The evaluation begun within the *Austrian Prosopographical Information System* (APIS), a virtual research environment for the purpose of annotating biographical articles, linking them to LOD-resources such as the GND or GeoNames,13 curating data entries and visual exploration of biographical data.14 This database contained all published biographies from the *Österreichisches Biographisches Lexikon (1815–1950)* (ÖBL), and biographical data which was obtained through the annotation of entities such as person, place or institution names mentioned in its articles.15

Each exhibition was entered as an event into APIS and described through its beginning date, end date, its relation to the place Vienna and Vienna’s Association of Fine Artists. Then the names of exhibitors were cross-checked with existing database entries and linked to these events. 572 persons were identified within the APIS database. From this group, 481 had a biographic article in the ÖBL, which was annotated in course of the research project. The 91 persons not included into the ÖBL were added during the annotation process. Furthermore, the remaining names of the catalogs’ alphabetical lists have been checked against other biographical works of reference and the transcribed exhibitions’ registers provided by the archivist Wladimir Aichelburg to identify individual artists.16 When it was possible to clarify a person’s name, Wikidata was searched for a matching item identifier. As the APIS data provides identifiers from the GND for most persons, it was easy to do this for this group as well. A link to Wikidata was established for 76.22% of all 3,457 exhibitors.

Within the early catalogs, more erroneous information can be found. At this stage of the exhibition’s organization, the personnel may have been less experienced. Some artworks were sent by collectors or dealers from places different from the artist’s current place of residence. This could lead to confusion if the names were written differently or incompletely.

Due to different reasons, there were no annual exhibitions in the years 1873, 1882, and 1894 (fig. 2). In 1873, the Austrian art section of Vienna’s World Fair took place instead of the annual exhibition in the Künstlerhaus. Through generous support and funding, the association expanded its exhibition hall with two side wings. The works
were finished in 1882 and celebrated with the organization of the “First International Art Exhibition.” In 1894, instead of the annual exhibition, the “Third International Art Exhibition” was stated at the Künstlerhaus. The international jubilee exhibitions of 1888 and 1898 showed a broader range of exhibitors than any of the other exhibitions (1888: 872 exhibitors; 1898: 526 exhibitors).

Around 45% of the artists exhibiting in the Künstlerhaus in 1895 and 1896 have biographies in the ÖBL (fig. 3). It can be assumed that this is no coincidence. In the following year, the Vienna Secession was founded. This exhibition was therefore the last occasion where young Austrian artists exhibited next to the “older” generation of the association, before they left and started the promotion of their own artistic style under the label “Secession.” The same decrease in numbers can also be observed in 1900, when the Hagenbund left.
Comparison between APIS data and Wikidata

Which data is crucial for the compilation of a biographical network within Wikidata? What makes the difference to APIS? For answering these two questions, Wikidata and the workflow should be introduced briefly. Wikidata was founded in 2012 by the Wikimedia Foundation as a database containing structured data under public domain for all of the other projects including Wikipedia and Wikimedia Commons. It can be understood as “collaboratively edited multilingual knowledge graph,” which means every item is represented by a unique persistent identifier (QID) and described by a wide range of statements about these items. This data can be accessed through a SPARQL endpoint.

Another way is to enrich existing data sets by using the tool OpenRefine. It has a wide range of functionalities to prepare, clean and reconcile data sets, does not require much programming skills to get started and is well documented. In this study, the item identifier was used to fetch additional data through Wikidata’s reconciliation service.

The fundamental facts about a person were the starting point. Secondly, the equivalents to the relation types of APIS, which are called properties in Wikidata, must be identified. This mapping was done for all three subnetworks and according to the relation types connecting the different pairs of entities. Regarding historical professions or professional roles related to institutions, more general notions seem to be used within Wikidata to describe similar relations between entities. Several properties are in use for describing residency at a certain place (P551) or the general importance of a place for a person (P7153), but no equivalents to the APIS relation types “travelled to” or “exhibited at” could be found. This is striking, because biographies of artists who were active in the 19th and early 20th century are full of places mentioned in these contexts. They were also an obligatory part of most artistic curriculum vitae, as a glance at archive material shows. This is probably grounded on the fact that this group of artists and

<table>
<thead>
<tr>
<th>Networks</th>
<th>Relation type in APIS</th>
<th>Property or item in Wikidata</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person-person</td>
<td>was pupil of</td>
<td>student of (P1066)</td>
</tr>
<tr>
<td></td>
<td>was teacher of</td>
<td>student (P802)</td>
</tr>
<tr>
<td>Person-place</td>
<td>was place of birth</td>
<td>place of birth (Q1322263)</td>
</tr>
<tr>
<td></td>
<td>educated at</td>
<td>educated at (P69)</td>
</tr>
<tr>
<td></td>
<td>travelled to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>was place of work</td>
<td>work location (P937)</td>
</tr>
<tr>
<td></td>
<td>exhibited at</td>
<td></td>
</tr>
<tr>
<td></td>
<td>went into exile</td>
<td></td>
</tr>
<tr>
<td></td>
<td>was place of death</td>
<td>place of death (Q18658526)</td>
</tr>
<tr>
<td>Person-institution</td>
<td>was educated at</td>
<td>educated at (P69)</td>
</tr>
<tr>
<td></td>
<td>was employee of</td>
<td>employer (P108)</td>
</tr>
<tr>
<td></td>
<td>was member of</td>
<td>member of (P463)</td>
</tr>
<tr>
<td></td>
<td>was member of [knightly order]</td>
<td>award received (P166)</td>
</tr>
</tbody>
</table>

Fig. 4. Dimensions of the person-person-network, the person-place-network and the person-institution-network, the numbers of the relevant relation types and the share of data which can be currently found in Wikidata for these persons. Categories without counterparts are crossed out.
the information about their itineraries are not in the focus of the Wikidata community yet. For the relation type “educated at,” the person-institution relation was adapted. As each institution has in Wikidata not only a relation to a place (P131) but also to geocoordinates (P625), the institution’s identifier could be used to load the location with its coordinates (fig. 4).

Regarding the figures shown in the table, it happens that most values lie below the amount of data collected in APIS. Some of the Wikidata properties, for example the equivalent for the relation type “was teacher of” (student, P802), approach two third of the APIS data. This sample shows clearly that prominent artists, such as the Austrian state opera’s architect Eduard van der Nüll, bundle in Wikidata more links of that type than lesser-known artists. The properties “student” and “student of” also seem to complement each other in Wikidata more often than in APIS, which means that the relations between prominent teachers and their no-less-prominent pupils are described from both points of view. In those cases, it results in more densely networked clusters. Other artists appear at the periphery or do not appear at all in this subnetwork. It is the other way around with the APIS data. Due to the regular structure of the ÖBL biographies, which usually start with the artist’s education followed by their career and end with a summary of their lifetime achievements, more “general information” can be found regardless of their art historical importance. Jutta Held aptly phrased this general quality of information as “schematic traces bequeathed by our written culture.”

The early biographies from the first volume, which was published in 1954, are rather scarce because the editors expected only three to four volumes to be published at that time. Nevertheless, the biographies included similar information about important teachers or pupils, educational stations and career steps, creating a link to other artists and leading to a denser biographical network.

Expanding the network further
The biographical network was extended after considering several aspects. New sources should be used for the data collection. These should be selected from the corpus of reference works already in use on the one side and should cover the same information structure as the ÖBL on the other side. The selected encyclopedias are, e.g.,

<table>
<thead>
<tr>
<th>Top-10 places</th>
<th>Austrian</th>
<th>German</th>
<th>French</th>
<th>Italian</th>
<th>Unknown</th>
<th>Other nationalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vienna</td>
<td>69%</td>
<td>6%</td>
<td>0.15%</td>
<td>2%</td>
<td>22%</td>
<td>1%</td>
</tr>
<tr>
<td>Munich</td>
<td>24%</td>
<td>52%</td>
<td>0%</td>
<td>0.85%</td>
<td>16%</td>
<td>8%</td>
</tr>
<tr>
<td>Düsseldorf</td>
<td>4%</td>
<td>69%</td>
<td>0%</td>
<td>0%</td>
<td>14%</td>
<td>13%</td>
</tr>
<tr>
<td>Berlin</td>
<td>5%</td>
<td>68%</td>
<td>0%</td>
<td>0%</td>
<td>23%</td>
<td>3%</td>
</tr>
<tr>
<td>Paris</td>
<td>11%</td>
<td>7%</td>
<td>43%</td>
<td>0.56%</td>
<td>23%</td>
<td>17%</td>
</tr>
<tr>
<td>Karlsruhe</td>
<td>5%</td>
<td>66%</td>
<td>0%</td>
<td>0%</td>
<td>24%</td>
<td>0%</td>
</tr>
<tr>
<td>Rome</td>
<td>27%</td>
<td>11%</td>
<td>0%</td>
<td>25%</td>
<td>18%</td>
<td>19%</td>
</tr>
<tr>
<td>Venice</td>
<td>23%</td>
<td>4%</td>
<td>0%</td>
<td>52%</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>Weimar</td>
<td>4%</td>
<td>64%</td>
<td>0%</td>
<td>0%</td>
<td>28%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Fig. 5. Top-10 places of residence as mentioned in the catalogs. The percentage gives the share of different “nationalities” which are the four most important above all exhibitors participating at the events. Each nationality was determined by the place of birth of an artist. Because 23.78% of all exhibitors are not identified, the nationality for those persons is “unknown.” In other cases, it is simply not listed in a catalog.
Another important point was that the new sample should be selected in such a way that new insights could be gained. To achieve that goal, a novel way of data sampling was required. Each catalog, with as the only exception the one for the jubilee exhibition in 1888, mentions the exhibitors’ current place of residence, an information that received little attention by scholars until today. Brought together, this data reveals mobility patterns. As there exist various concepts of nationality, it was necessary to define a basic analytical category to determine an artist’s origin. The place of birth was used to provide a general differentiation between a person from Austria-Hungary or from the German Reich. This could be done by loading the places of birth into the GIS-Software QGIS and using the polygons of HistoGIS, a data service for historical accurate shape files, and determining each point marker’s belonging. Next to the artists from Austria-Hungary (40.64%), artists from the German Reich (24.12%), the Kingdom of Italy (3.35%) and the Republic of France (2.05%) were the most present “nationalities” at the Künstlerhaus exhibitions.

The percentage of Austrian artists resident in Vienna is as high as the one of German artists in Berlin. The metropolises Rome and Paris appear as the place of residence for a range of nationalities (fig. 5 and 6). Düsseldorf, famous for its school of landscape painting, also has a higher share of artists belonging to other nationalities (e.g. Swedish) than Berlin.

The choice fell on the group of artists who were active in Berlin and/or Düsseldorf (BD) because the locations belong to the top-10 places of residence and, with 417 exhibitors (209 in Berlin, 188 in Düsseldorf, 9 active in both cities, 11 in APIS), form a sample almost the same size as the APIS data. A Wikidata entry exists in only 345 of the 417 cases. For another 283 (67.86%) of these artists, biographical articles within an encyclopedia were found.
The biographical building blocks, which contain the named entity, the time span and the relation type, were identified within these articles according to the guidelines defined during the APIS project. Instead of annotating these text passages, the data was entered into form fields of a relational database. The relation types are based on the Wikidata properties with two exceptions. The relations “travelled to” and “exhibited at” were nevertheless included because of their importance for analyzing artists’ itineraries.

Collecting new data: the exhibitors’ personal relations

The application of biographical data for the analyzes of exhibitor networks should be demonstrated shortly based on the personal relationships between these persons. Apart from the listing of relatives, it is a common practice to mention famous teachers at the beginning of a biography. The ÖBL-biography of the painter Christian Griepenkerl, for example, explicitly describes his influence as an academic professor for painting and the related career path. Richard Gerstl, Carl Moll and Egon Schiele are mentioned at the end of his biography as representatives of his most influential pupils. The name of Griepenkerl is also mentioned within the ÖBL-biographies of his pupils. The same practice can be observed in the Thieme & Becker.

German artists who were mentioned in ÖBL biographies could already be found in the APIS dataset. If they were part of the BD sample, the network data was gradually expanded as the data collections progressed. It was also possible that new persons appear within these texts in both roles as a teacher and as a pupil. As both datasets use the same identifiers for the persons and the same relation types mapped on the Wikidata.

Fig. 7. Updated biographical network built upon the relation type “was pupil of” and “was teacher of” (n = 656). The smaller cluster positioned in the northwest represents the data of the BD sample. Graphic by the author.
properties, they can be brought together. The resulting graph is visualized in Visone (fig. 8) and shows no singular cluster but a tightly knitted network between the artists active in Berlin and Düsseldorf as well as to the cluster of Austrian artists. After visualizing the biographical network, two questions arise: Which academic teacher was the most prominent according to these biographies? Which academic school of painting was most prominent at the annual exhibitions in the Künstlerhaus?

The network metric degree is calculated locally and by the number of a person’s direct connections in the biographical network. If an artist has more than one teacher within this network, their node can be larger in comparison to pupils who had only one teacher. The other possibility which is that a teacher could also be a pupil of the elderly generation of artists. In this case, the node would also be larger because he has more connections than the average artist. Griepenkerl (APIS) and Gude (BD), who have equally the most pupils according to the network (a), are followed in ascending order by the artists August Eisenmenger (APIS), Karl Ferdinand Sohn (BD), Wilhelm Sohn (BD), and Karl Kundmann (APIS). Besides that, the effect of the additional data from the exhibitor network shows us which teachers exhibited most in the time period 1869–1900 at the Künstlerhaus. By doing so, the order of the ranking got changed in network (b).

Wilhelm Sohn and Karl Ferdinand Sohn are the only teachers who remain from the previous ranking of the top-5 teachers. Instead of Griepenkerl, Gude and Eisenmenger, other painters are placed on these high ranks. They had not exhibited that often at the Künstlerhaus and lag far behind. The effect of using these two differently calculated values for the node degree is visible (fig. 8). In network (a), Griepenkerl and Gude are positioned and visualized according to their relevance as teachers. Network (b) showcases the presence at the annual exhibitions. In this way, Adalbert Franz Seligmann or Eduard Lebiedzki, both pupils of Griepenkerl, get larger nodes than those of their teacher. Using the information about the affiliation to a certain school of painting, the presence of different schools can be calculated chronologically for the exhibitions (fig. 9).

The art historian Julia Gelshorn describes the status quo: “inmaterial relationships always tend to be visualized in the same way as material ones, as scaffolds, plumbing, circuitry, or embroidery [...] whose causality, stability, even reality are of a different kind than those of immaterial relationships.” At the same time, she also expresses her wish to get more meaning out of historical network research. This statement coincides also with the conclusion drawn by Martin Pappenbrock and Joachim Scharloth, who had
previously pleaded for the use of biographical data to gain more insight into such data analysis.31 This point was taken up and put to the test based on the connections between biographical data and catalog data from the annual exhibitions in the Künstlerhaus from 1869 to 1900.

A dataset from the APIS project has been the starting point. Wikidata provides structured data about artists and surpasses it quantitatively by far. The comparison of the exhibitors lists published in these catalogs with both APIS and Wikidata enabled one to evaluate the available data. It showed that some of the relation types which had proven to be particularly useful for the analyzes of biographical data can also be found in Wikidata, while others could not. But the methods applied for collecting data seem to follow different priorities. If a systematic approach like in APIS could be conveyed to the Wikidata community or art historians would get more involved in the data creation, the possibilities for future research endeavors would increase.

This led to the conclusion that an exchange of data must not be limited to digitized catalog data but should also include biographical data. Such an exchange, which must necessarily reach beyond the national data storages, would bring benefits foremost for the group of international exhibitors, bear great potential for the research on exhibition catalogs in general and bring advances to art history. Here Wikidata as a data hub could play a mediating role. The efforts for publishing new datasets as linked open data will pave the way even further. The approach presented in this paper is admittedly experimental, but it was driven by the motivation to create a greater awareness for the added value of integrating biographical data into art historical research.

Maximilian Kaiser studied art history at the University of Vienna. In his dissertation, he examined the reception of the artistic avant garde by Viennese art critics. Before joining the Austrian Academy of Sciences, he worked from 2013 to 2015 as a research associate for the museum Österreichische Galerie Belvedere. From 2015 to 2019, he was part of the APIS project team. Since 2020, he has been co-project manager of the VieCPro project, responsible for historical network analysis.

Fig. 9. Presence of different schools of painting. Graphic by the author.


3. Salons et expositions de groupes (1673-1914) [URL: salons.musee-orsay.fr].

4. DoME uses information provided by Getty’s United Lists of Artists Names. See Raphael Rosenberg, Christina Bartosch et al., Database of Modern Exhibitions. European Paintings and Drawings (1905–19115) [URL: exhibitions.univie.ac.at].


6. For a better understanding of how resources are currently linked by linked open data (LOD), check the visualization of the cloud. [URL: linked-open-data-cloud.fr].


10. A complete set of catalogs is held by the Research Center of the Österreichische Galerie Belvedere in Vienna. Belvedere Digital Library [URL: digitale-bibliothek.belvedere.at/viewer/cms/1].

11. The last commemorative opus was published at the occasion of the association’s 150th anniversary and covered a wide range of scientific topics and a chronology of the exhibitions. See Peter Bogner, Richard Kurdykovsky and Johannes Stoll (eds.), Das Wiener Künstlerhaus. Kunst und Institution, Vienna, Lehner, 2015.

12. Some Wikipedians such as Benoit Desghayes have collected catalog data already within Wikidata. This study focusses on the other hand more on methods which are common practice within historical network research and follows therefore a different approach. See Benoit Desghayes, “Souvenirs de Corot. La documentation d’expositions sur Wikidata,” Do-za, 18 October 2018 [URL: zone47.com/doza/souvenirs-de-corot-la-documentation-dexpositions-sur-wikidata].


15. The research project “Mapping Historical Networks: Building the Austrian Prosopographical Information System (APIS)” started in 2015 with 18,000 articles from the ÖBL. The database’s alpha version can be reached under The Austrian Biographical Information System (APIS) [URL: apis.acdh.oeaw.ac.at].

16. The registers of artworks sent to the Künstlerhaus from 1868 to 1888 can be accessed as transcribes made by the former archivist of the association. Wladimir Aichelburg, “Einlaufbücher der Kunstwerke,” Wladimir Aichelburg [URL: www.wladimir-aichelburg.at/kuenstlerhaus/einlaufbuecher-der-kunstwerke].


18. The version 3.4.1 was used for this study. See OpenRefine [URL: openrefine.org].

19. A copy of the painter Rudolf Quittner’s curriculum vitae can be found in the ÖBL’s editorial archive. There he wrote “I travelled for study purpose to almost all of Europe, to Egypt, Tunis, Algeria, Syria, Palestine, the United States of America, partly in his company [his teacher Camile Pissaro] and partly alone.” During the Second World War, nearly all archival material got lost because of his Jewish background. The ÖBL editorial staff decided to publish the biography based on this material and newspaper articles. “Quittner, Rudolf (1872–1910) Maler,” ÖBL 1815–1950, 8/39, 1992, p. 355.

20. The term refers to information drawn for example from matriculation registers. See Matrikeldatenbank – Akademie der Bildenden Künste München [URL: matrikel.adbb.de/matrikel].


23. HistoGIS was developed by Peter Arndorfer and Matthias Schlögl at the Austrian Centre for Digital Humanities and Cultural Heritage. See HistoGIS [URL: histogis.acdh.oeaw.ac.at].
24. The percentage gives the share of all edges connected to persons with a nationality. The group of French artists, which holds the fourth place in this ranking, is followed by Belgian (1.45%), Russian (1.10%), Dutch (1.08%), British (0.99%), Swedish (0.91%), Spanish (0.89%), Swiss (0.78%), and American artists (0.33%).


28. Visual Social Networks [URL: visone.ethz.ch].

29. The top-5 ranking includes equally placed persons such as Gude and Griepenkerl or artists which were not painters such as Eduard van der Nüll or Friedrich Frh. von Schmidt.
