Digital Scholarship in the Humanities, 2026, **00**, 1–16
https://doi.org/10.1093/llc/fqag041
Full Paper

OXFORD

Between center and periphery: networks of translated German fiction authors in the German National Library

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Abstract

Translation invisibility is a common issue when working with bibliographic translation data from national libraries (Teichmann and Roman 2024) and tools to visualize the network of transfer still need to be developed for the Germanophone context. Johan Heilbron proposed a network model for translated fiction which maps the relationships between central and peripheral languages. However, it has not been explored which authors connect linguistic communities. In this paper, we build on Heilbron's center-periphery language model to investigate the following questions: Do authors form a distinct group that connect languages? Which authors connect peripheral languages to central languages and which authors are unique to language groups? By applying a network model to the bibliographic data of 31,519 translated titles originally published in German, representing 3,986 authors that have been translated into eighty-one languages extracted from the German National Library (DNB), this paper presents first-time network visualizations of the DNB's collection of translations. By applying a community detection algorithm to the network graph, we found two distinct groups of authors: representatives of the canon that connect the central to the peripheral languages, and groups of authors that stay within central and peripheral languages, whose translations are highly specialized in certain target languages and genres. Hence, we argue that we can use Heilbron's center-periphery language network model to identify authors of German fiction who played a crucial role in pushing the canon beyond its national boundaries by means of their translations, and in turn, make visible the network of translational transfer between languages.

Keywords: translations; German National Library; social network analysis; bibliographic data; German fiction; network visualization.

1. Introduction

Social network models within digital humanities research and translation studies have been mostly limited to single authors, publishers, or a set of representative authors, character relationships, or specific genres and periods, (see Tahir-Gürçağlar 2008; Kim and de Carlo 2015) and have not drawn on the larger datasets drawn from national libraries such as the DNB as a data source and object of analysis. Multiple digital humanities projects primarly focus on character networks (Elson et al. 2010; Alexander 2019), periodicals, and literary exchange with an emphasis on visualization. Most prominent is the Stanford Republic of Letters project, a network of letter correspondence between famous authors that explores the use of visualization tools to reveal new perspectives on literary exchange (see Chang et al. 2009). Additionally, several studies have applied network models to characters in fiction to confirm or refute pre-existing genre classifications in literary theory by

modeling character networks and factoring in authorship (see Park et al. 2013; Coll Adanay and Sporleder 2015). In their book *The Network Turn: Changing Perspectives in the Humanities*, Ahnert et al. provide an overview of network approaches in the humanities, specifically in digital humanities, but do not mention a single study on literary translations (see Ahnert et al. 2020). Nevertheless, there is an increasing interest in analyzing translations of mainly canonical authors, such as the project Worldliterature@UCLA, for which bibliographic translation data is used to show world literary networks of circulation. However, up until now, network analysis has primarily been limited to one author at a time (see Kim and de Carlo 2015), which is the case for multiple projects on translation networks, where a dataset only includes one publisher, one author, or one work. Tahir-Gürçağlar (2008), who did a network analysis of the Turkish publisher Altin Kitaplar, points out the current lack in scholarly literature to address questions about the canon's representation in translation. Hence, studies have not explicitly addressed the network of the world literary canon(s) in translation and its representative authors, even though their data is mainly extracted from a selected number of canonical works representative of national literature (e.g. nineteenth-century British novels, see Elson et al. 2010).[2] In other words, network models have been theoretically but not extensively quantitatively explored in translation studies or the analysis of bibliographic data from national collections.[3]

While library catalogues and their bibliographic data are a rich resource of data for network analysis, as Katrin Dennerlein's study (Dennerlein 2020) illustrates,[4] to date, network analysis has not yet found an extensive application to Germanophone national collections and the DNB in particular. This paper draws on the recently published "Mapping German fiction in translation" dataset (Teichmann 2025b), which includes bibliographic data for the timeframe 1980–2020 extracted from the German National Library that originally appeared in German and which can be found in their online catalogue[1]. The network presented in this paper represents the DNB's collected translations of German literature. In line with Venkat Mani (2013, 2017) and Adeline Koh (2014), this exploration also implicitly addresses the institutional representation of translated literature, the (in)visibility of certain authors, and their relationship to the construction of the national canon versus the world literary canon.[5] The DNB's collection policy includes works with legal ties to German publishers, authors, or businesses and therefore also collects translations published outside of Germany ("Unser Sammelauftrag"). It also includes works by Swiss, Austrian, East German, and West German authors, independent of their geographic origin, as long as they have copyrights issued originally in Germany.[6] Therefore, our study's scope is the complete DNB's collection of translated German literature published between 1980–2020, which includes publications from the FRG and GDR prior to the reunification and merging of the national libraries in Leipzig and Frankfurt in 1990.[7] The aim of this study is thereby to critically engage with the institutional representation of translated literature by the DNB as one institution that is a driving factor in canonization mechanisms.

Applying network analysis that does not limit the scope to a single publisher, author, or time period to thousands of records with multiple variables for bibliographic data on translated German fiction to investigate linguistic communities and the authors connecting or signifying them has yet to be methodologically explored. The following central research questions therefore guide our exploration of the network of transfer of German fiction in translation in the DNB: Do authors form a distinct group that connect languages? Which authors connect peripheral languages to central languages and which authors are unique to language groups?

In this paper, Johan Heilbron's theoretical model provides a blueprint for testing and developing a network model to map the literary transfer or flow between linguistic communities and identify the connections they share in terms of translated works and authors. Not only does Heilbron place translation at the center of literary transfer between languages, but it also allows us to make visible the role of translation in the transnational cultural field (Heilbron 1999: 432). He argues that we can gain a better understanding of this world-system of translation (ibid.) if we examine the positions of languages and their connecting values and categories (e.g. peripheral versus central). The problem statement of this paper was whether we can operationalize Heilbron's center-periphery model to place and identify authors in the network of translational transfer. While Heilbron's model has found limited application in preliminary case-studies on incoming translations (see Kisery and Királi 2025), it has not been applied to the Germanophone context to identify authors and their positions in the global circulation of German fiction.

He raises two main hypotheses that are of importance for this study.[8] First, he states that the language network has a hierarchical structure, with central, semi-peripheral, and peripheral languages based on the centrality of a language, as determined by its share in the market of translations (Heilbron 1999: 433). He uses the share of translations in percentages as a metric to rank and group languages. For a model of a translation network, this provides us with a structure of the network to investigate the relationships between these groups. Grouping languages into center and periphery based on the number of

translated authors they have hence was the first objective of this study. Following Heilbron's model, we can expect central languages, such as French or English, to have a large share of connecting values or edges in the network—i.e. translated authors that these languages have in common.[9] Accordingly, we apply Heilbron's model to the language-author network for grouping languages based on the authors with whom they share translations. Based on Heilbron's findings we can expect at least two groups of central and peripheral languages (Heilbron 1999: 243).

Secondly, Heilbron states that literary transfer is dependent on each language's position in the network and "what is translated from one peripheral language into the other depends on what is translated from these peripheral languages into the central languages." (Heilbron 1999: 435). Within the framework of this study, this hypothesis finds application in investigating the relationship between the center to the periphery, as well as the authors they are connected by. In other words, depending on each language's position, it is possible to identify groups of authors who link different fields in the language network (see Folaron and Buzelin 2008: 612-613). By doing so, we can map out the language network and investigate the roles of representative authors in the DNB such as Franz Kafka, Elfriede Jelinek, Herta Müller, or Hermann Hesse (who is the most translated author in the DNB with 1,035 translations into 49 languages, see Teichmann 2022: 153)[10] as bridges between linguistic communities, between central and peripheral languages. Additionally, we can also identify authors who are shared by languages in the same group and then examine their common features with qualitative analysis. Identifying authors within their language groups with the help of Heilbron's center-peripheral model, hence allows us to investigate their position in the DNB's collection and make inferences about their function of an author in the global circulation of German fiction in translation. Thereby we can locate areas of literary and canonical transfer by identifying key representatives in the DNB's translation canon.[11]

Even though the type of network analyzed in this paper differs from Heilbron's—in that it is catalogue-specific, focused on authors as connecting values, and only includes outgoing translations[12]—his central hypotheses provide the pillars of a theoretical and methodological framework to model translations as a network based on the language positions, their roles as central, intermediary, or peripheral nodes of transfer, and the relation between their positions and author communities. Modeling the language network accordingly can then conceptualize how the language network shapes the canonical and translational fields.[13] While Heilbron's model is based solely on titles as the connecting values between languages, the model proposed in this paper builds on the author as the connecting value, as well as the central social actor. Authors are at the center of what constitutes a national canon, anthologies, reading lists, and literary prizes. Nobel Prize winners, such as Herta Müller and Elfriede Jelinek, who have gained international recognition with their translations, play central roles in promoting and circulating German fiction across linguistic and national boundaries, thereby shaping the transnational and translational canon. With that in mind, the theoretical goal of the proposed language-author network model is to make visible areas of canonical and/or translational flow, examining the translation network in terms of authors connecting languages by operationalizing Heilbron's network model and hypotheses.

Drawing on Heilbron, in this paper we raise an additional hypothesis: that canonical authors function as bridges between central and peripheral languages, while another community of regionally specialized authors authors connecting languages within the same groups. The underlying premise is that canonical authors have strong ties to central languages through retranslations, thereby accumulating symbolic capital to get translated into peripheral languages, which represents their international fame. On the other hand, linguistically and regionally specialized authors may be shared among certain groups of non-central languages due to the publishing market or local interests. Our model also highlights these authors who play significant roles on a smaller scale at the periphery of the network. Heilbron's model provides us with a framework to examine these dynamics between the center and periphery. Since our model relies on authors as connections between languages, and not the share of translations on the market as is the case for Heilbron, we developed an automated approach to split the network into central and peripheral languages based on their connections through shared authors.

We used the fast-greedy optimization of modularity algorithm for community detection that divides "the vertices of a network into groups, clusters, or communities according to the pattern of edges in the network" (Newman 2010: 254). The fast-greedy algorithm was chosen because it is well-suited for a large, weighted, unimodal network that represents relationships between languages by their shared authors. By iteratively merging nodes (languages) into clusters until their modularity reaches its maximum, it can identify communities without pre-defining their number, maximize modularity. and achieve a clear set of language communities. The resulting language groups allow us to reconstruct Heilbron's categorization of central and peripheral language communities based on their shared authors. Based on the assumption that there is a set of authors unique to each group of languages and a set of authors

connecting those groups, we investigate which authors are exclusive to peripheral or central languages and which authors have a connecting role between language groups. We expect that highly canonical authors are more likely to connect the central to peripheral languages. On the other hand, we expect to find a set of authors unique to only peripheral or central languages that sets them apart from the canon of representative authors. From this approach, canonicity can hence be defined not only in terms of an overrepresentation of an author in translation (e.g. an author can have many re-translations into the same languages)[14] but also in its tendency to bridge different parts of the language-language network (e.g. center to periphery). By applying a fast-greedy community detection algorithm, we map the network of literary transfer between languages and identify the connecting authors to explore the role of canonical and regionally specialized authors in the German National Library catalogue.[15]

From here, one may further ask "how do the generic networks of canonical novels compare to those that are more obscure?" (Dewitt 2015: 176). Dewitt makes an excellent point that a network approach to periodicals reveals the invisible patterns in how genre categorization is a process of readers placing novels into context with one another. We can make a similar point regarding translations and the library catalogue. Unlike genres, translations are not categories set by readers, but their connections between languages reveal distinct groups of authors that represent the readership and publishing landscape of these literary communities. Groups of authors can highlight readership areas that share a similar set of authors and therefore have a similar understanding of German literature. By examining different linguistic or literary communities, we can gain a deeper understanding of regional canons in German translated literature and move away from the notion that there is a single, universal canon of German fiction that is widely recognized on a global scale. It can also provide indications of differences in translation and publishing practices, and highlight important agents in the network of transfer who take on multiple roles as translators, authors, and editors. According to Heilbron, "translations are a function of the social relations between language groups" (Heilbron 1999: 431). While in each language community, different actors make these relations or connections, such as editors, translators, and authors themselves, language communities represent literary communities that share works in translation and also represent readership. These communities can have a significant influence on the circulation of translations, e.g. English as the bottleneck language that may accelerate translation rates of a particular author.

As Butts argues, "to represent an empirical phenomenon as a network is a theoretical act" (Butts 2009: 416), which resonates with the decision to represent the translation network through the information contained in the bibliographic metadata (languages, titles, publishers, editions, or authors) and modeling it by applying social network analysis. In the field of translation of German fiction, a language network model enables the analysis of authors' roles in denoting and bridging different literary communities. In other words, an underlying dynamic between languages exists that shapes the movement of authors in the field. Languages share connections through publications by the same set of authors, and authors share connections by means of a language network. Based on those connections, a network is visible, in which we can locate the areas of canonical classics and contemporary works of fiction.

2. Modeling the network of translational transfer: dataset and method

Social network theory applies network models to analyze the structure of relationships among entities by representing them as nodes and edges. In this study, nodes represent languages and edges represent relationships between languages derived from shared authors. The network is constructed from translation data in which all source texts originate in German. For each author, we identify the set of target languages into which their works have been translated. Two language nodes are connected if at least one author has published translations in both languages. Therefore, authors function as the underlying relational mechanism that induces edges between language nodes.[16] The strength of a relationship between two language nodes is determined by the number of shared authors. All language-language relationships and their strengths are visualized as a weighted network.

The "Mapping German fiction in translation" dataset (Teichmann 2025b), used to build the network, was extracted in 2021 with a search query that filters the DNB's catalogue data for any editions with German as the original language (spo=ger).[17] The data encompasses the publication years between 1980 and 2020, consists of 31,519 bibliographic titles by 3,986 authors, and represents eighty-one languages.[18] The network was constructed from an author-language table, in which each row represents a single title associating one author name with one target language. For each author we aggregated the set of languages they translated to and then this was used to compute all pairwise language

combinations per author (i.e. if an author translated into English, French, and Japanese we create three language pairs {English, French}, {English, Japanese}, and {French, Japanese}). These language pairs were compiled into a weighted edge list, where the weight corresponds to the number of distinct authors that translated between the language.

This process resulted in an undirected weighted language-language network (see Fig. 1), for which the flow of information between nodes is equal and has no specific direction, e.g. from English to French. The network is also unimodal, meaning that nodes only represent languages that appear connected if they share translations by the same authors. Formally, our network can be described as a multigraph, in which multiple edges can exist between the same pair of language nodes (i.e. one relationship per shared author between the language nodes). This structure was chosen to preserve the full granularity of the author connections, rather than aggregating and collapsing shared authors into a single weighted edge. The multigraph reflects the density of translation activity between each language pair.

The resulting network of languages consists of 81 nodes (i.e. the languages) and a total of 67,817 edges between them (based on shared author translations). The degree of the language nodes ranges from 1 to 443 (shared authors between French and Spanish) with an average value of 30. The reason behind the large extent of the language node degrees in the network is due to the multigraph since this measure reflects the total count of the multiedges of a specific language node and not the total count of its immediate neighbors. Over half (50.5%) of the language pairs have an edge weight of 5 or less (the weight corresponds to the number of authors shared between any language pair), meaning that the majority of languages do not frequently co-occur or share a lot of authors.

To situate these observations within standard network analysis (see Appendix Table 1 for a full report of structural measures—provided as online supplementary material) we ran additional network measures. The graph density of 0.6830 indicates a very dense network. The average degree of 54.64 reflects the mean number of shared-author connections per language node across the full multigraph. The average clustering coefficient of 0.8873 measures the tendency of language nodes to form tightly connected triples. The average path length of 1.321 indicates that any two languages are connected through on average just over one intermediary, while the diameter of 3 means the most distant language pair is still reachable within three steps, both of these metrics being consistent with the characteristics of a tightly integrated network.

While the focus of this paper lies on the analysis of the results from the community detection of the language-language network in line with Heilbron's theoretical model, we also created two additional graphs for the interactive web application (see https://lisateichmann.github.io/dnb_trans_networks/). From the language-language network, we derived and visualized a bipartite

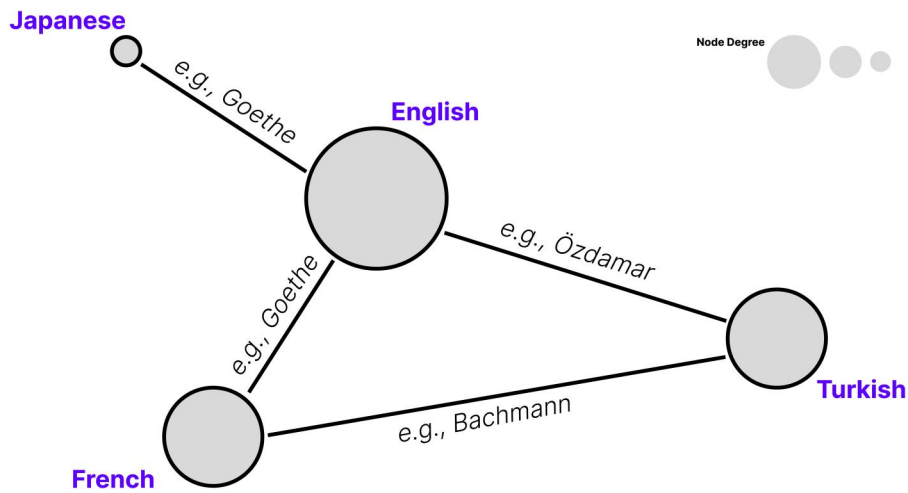

Figure 1. Example of a network graph with authors as edges and languages as nodes. The degree (sum of connections) is indicated by the number above each node. French has two authors who are also translated into English and Turkish. Turkish also has two edges representing shared authors with French and English. Japanese is the least connected language in this example, with only one author common with English. English, having the most connections, appears to be the most connected and hence a central language in the network, while Japanese appears to be the most peripheral and least connected.

network consisting of author-language relationships with the goal of mapping authors to the languages their works have been translated into. Finally, from these networks, we constructed a unimodal author-author network that presents the foundation for the interactive visualization of connections between authors who share common translation languages, revealing communities and pairings. These networks graphs offer exploratory resources in addition to the sections included in this paper.

The language-language network follows the model depicted in Fig. 1. We visualize the full network of languages in Fig. 2 as a chord diagram, which illustrates how densely connected the languages by shared authors are.[19]

We can immediately identify English, French, Dutch, Czech, and Bulgarian as languages that share the most authors with other languages. But also Italian, Hungarian, Polish and Bilingual ("ger"), stand out as highly connected.[20] From looking at the type of connections, we can visualize the flow of authors between languages in terms of their connecting functions. Coming back to our initial argument, an underlying

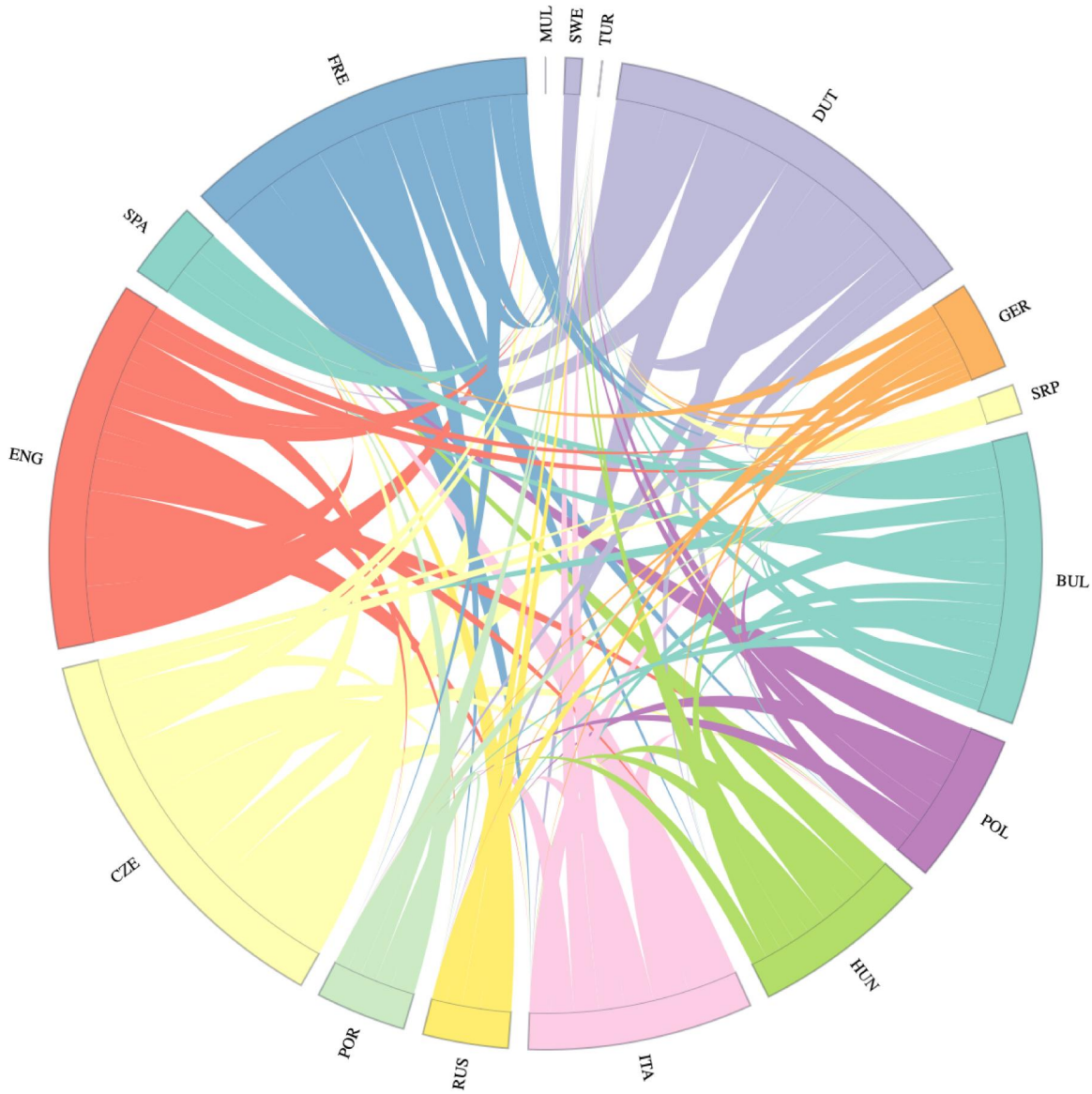

Figure 2. Chord diagram of languages with shared authors, visualizing corridors of transfer. The interactive visualization can be found in our web application (see https://lisateichmann.github.io/dnb_trans_networks/).

dynamic between languages exists that shapes the movement of authors in the field, we can see that few languages are highly connected by shared authors, and are therefore an area of transfer. While Fig. 2 gives a picture of connections and translation flow between languages, it does not give sufficient results to see a clear separation between a center and a periphery based on shared authors or provides us with which authors connect languages.

3. Language-language network

Certain authors connect the different clusters and serve as bridges between core and periphery, while other authors may exclusively appear in central or peripheral languages without connecting the two. For instance, when comparing authors of Hungarian and English, both languages have translations by 2,850 authors, In comparison, English has 894 other authors not shared with Hungarian, and Hungarian has 244 additional authors that English does not have. While providing a detailed account of the historical context of the literary exchange between German and Hungarian is beyond the scope of this study,[21] this example to illustrate that specific authors form bridges between the two languages, while others only appear in one of the two languages. Hence, some authors are exclusive to central or peripheral languages.

As the examples of English and Hungarian illustrate, languages can be connected yet also separated by authors, thereby forming readerships and routes of cultural transfer through translation. In line with Heilbron's first central hypothesis, which states that the language network is organized in a center and periphery, we ask: Do languages form distinct groups based on which authors they share? Do periphery members connect only to core members and not to other members of the periphery (Kilduff and Brass 2010: 355–56)? In this section, we further explore the function of connecting or exclusive authors by applying community detection. We follow the hypothesis that some authors are regionally specific to distinct communities within the language network, aiming to identify sub-communities of languages that are brought together by authors.

Although a network model can provide indications of groups and clusters of languages based on their positions, without applying a meaningful threshold it is not possible to split groups into center and peripheral communities of languages. Therefore, we applied the fast-greedy optimization of modularity algorithm[22] for community detection[23] to the complete language-author network graph to identify language groups, which we expect to reveal a clear separation of central and peripheral languages, following Heilbron's hypothesis. The community detection algorithm serves as a method "to separate the network into groups of vertices that have few connections between them" (Newman 2010: 371).

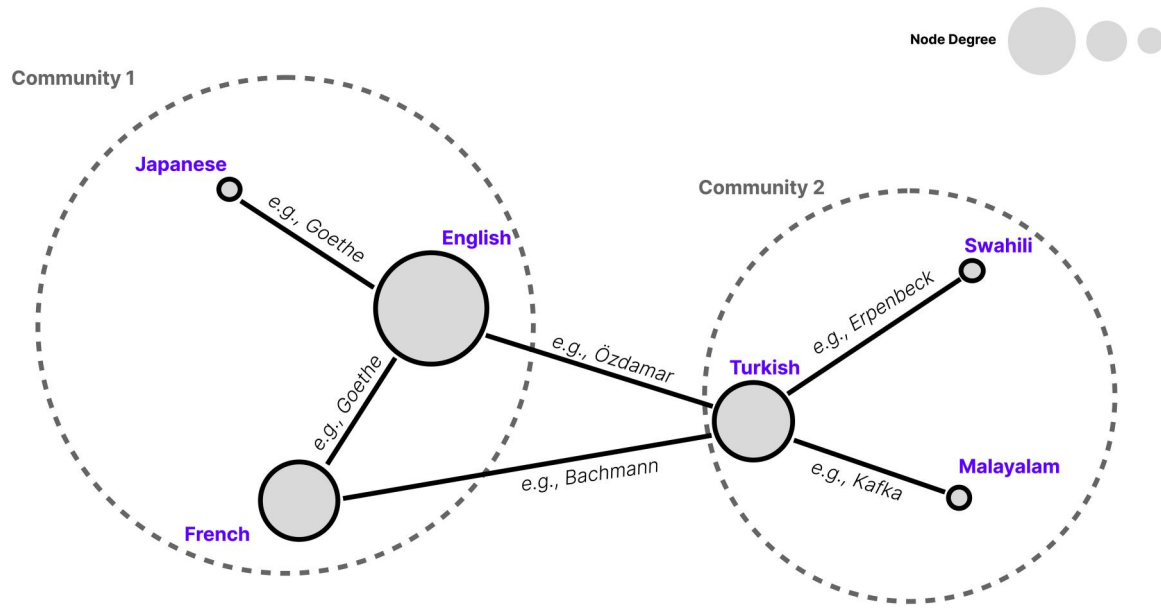

Figure 3. Example network graph of communities.

Consider Fig. 3, for example, which is an example graph of nodes representing languages connected by translated authors. By examining the edges connecting English, French, and Japanese, which are all connected, and Turkish, Swahili, and Malayalam, which are only connected by the edge between English and Turkish, we can separate these two groups into categories based on the pattern of edges they are connected by. The applied algorithm takes all connections of the network and, based on modularity, "produces *some* division of the vertices into communities, regardless of whether the network has any natural such division" (Newman 2004: 1).[24] Hence, as a result of running the algorithm on the language network, we can expect each language to fall into a group based on the edges and their positions in the network, meaning that central and peripheral languages are in separate groups. This method is used not only to differentiate center and periphery but also to investigate which authors they are connected by to then categorize them by their connecting function between language groups.

To assess the quality of the community detection algorithms, we compare their modularity score to other common approaches: Louvain, Leiden, and Infomap (see Appendix Table 2—provided as online supplementary material). The results across all four algorithms consistently return very low modularity scores, ranging from −0.01 to 0.02, which can be interpreted as an extremely dense network where it is challenging to identify bounded communities. This result also aligns with the argument of this paper, that canonical authors function as bridges across language groups and this also dissolves clear community structures. The Infomap algorithm returns a score of 0, which can be interpreted as there is no benefit to splitting the network given its density so it returns a single community as output. For all the algorithms and their comparison we used edge weights available in the language-language network.[25]

After running the fast greedy community detection algorithm on the network graph, the resulting communities (Fig. 4) are split into three groups of central and peripheral languages. As mentioned in the previous section, the network is highly dense in terms of connections between languages by shared authors. This is also reflected in the very low modularity score (0.02), which indicates that it is challenging to split the network into distinct communities and that the separation is not as definitive. However, when examining the languages within each group, we can observe tendencies that align with Heilbron's center-periphery structure. The largest group (0) consisting of 51 languages represents languages with very few edge, such as Sorbian and Malagasy (one edge). Since this group has the

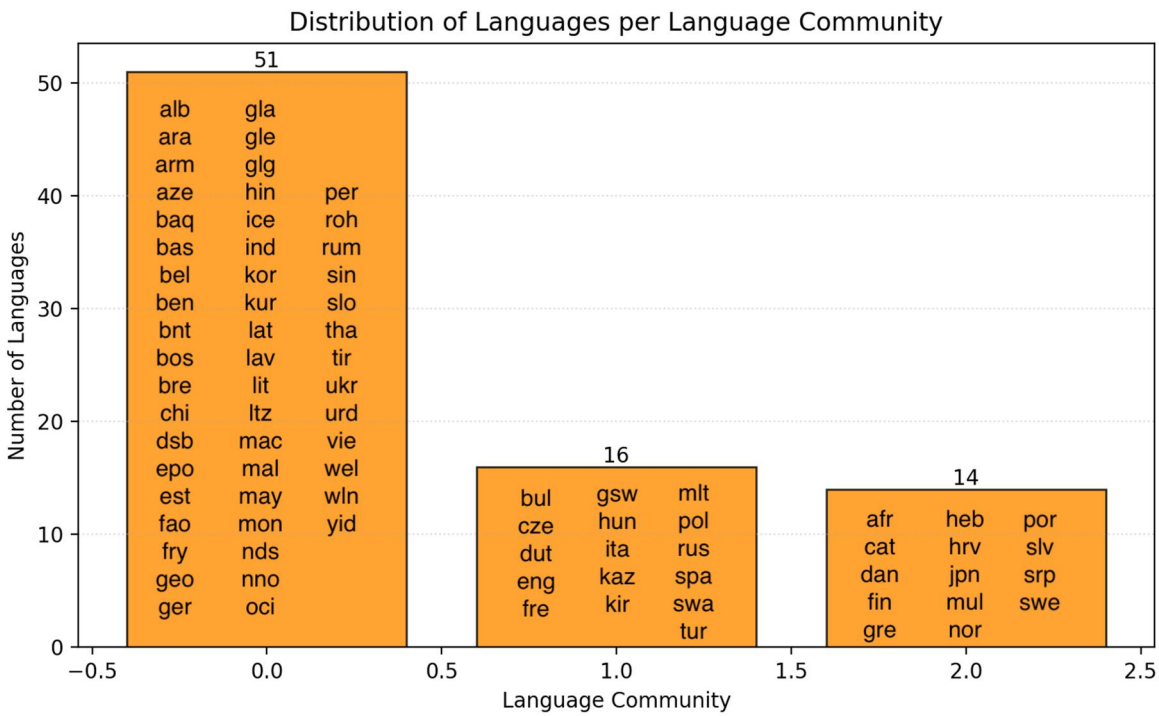

Figure 4. Histogram of communities detected by fast greedy modularity optimization.

smallest share of authors (<200), we label it peripheral. With 600–2,500 authors, community 1 is much smaller and contains 16 highly central languages, such as English, French, and Italian. Community 2 can categorized as a semi-peripheral group with 14 languages, including Catalan, Swedish, Finnish, Danish, and Japanese, with approximately 200–600 authors.

In addition, we also calculated a language centralization metric (languageCentral) that is based on the share of translations overall by language (popularity). While Heilbron uses the share of translations in percentages as a metric to rank and group languages, we use it to rank authors and identify those who play a vital role in connecting the center to the periphery. An author who has many translations into central languages such as French and English (which have a large share of the translations in the DNB) is ranked higher than an author that has translations into languages with a smaller share of translations. The calculation is performed in the following manner:

$$score(a) = \sum_{\ell \in L_a} (p_\ell \times 100) \cdot t_{a,\ell}$$

An author's score is calculated as the sum of each language's translation share multiplied by the number of times that author translated into that specific language. Where: L_a is a set of languages that author a has been translated into, P_ℓ is the popularity-ratio for language ℓ (i.e. share of total translations for each language), $t_{a\ell}$ is the count (or weighted sum, if you pass non-integer weights) of author a's translations into language ℓ. For each author we compute these values and their serve as a basis for placing them in proximity to the center on our graph visualization.

In the following section, we first use the language communities to group and identify authors to then investigate their role in the translation network. Second, we rank authors according to their scores for the languageCentral metric to investigate the most important authors in bridging language communities.

4. Authors bridging central and peripheral language groups

With the results for the language communities, it is possible to categorize a set of authors that connect central and peripheral languages in the translation network, but also to detect authors that are unique to the center and periphery. To compare the network edges and determine which authors are unique to versus connecting the central and peripheral language groups, we grouped the authors according to their language communities.

Figure 5 shows how many authors are in each community. 434 (10%) authors are shared between all three language communities and 2,943 (73%) are unique to specific language groups. An additional 609 authors are shared between two of the language groups. Language groups 0 and 2 only have 14 shared authors, representing the smallest author community. Hence, only 26.1% of all authors assume a connecting role between center

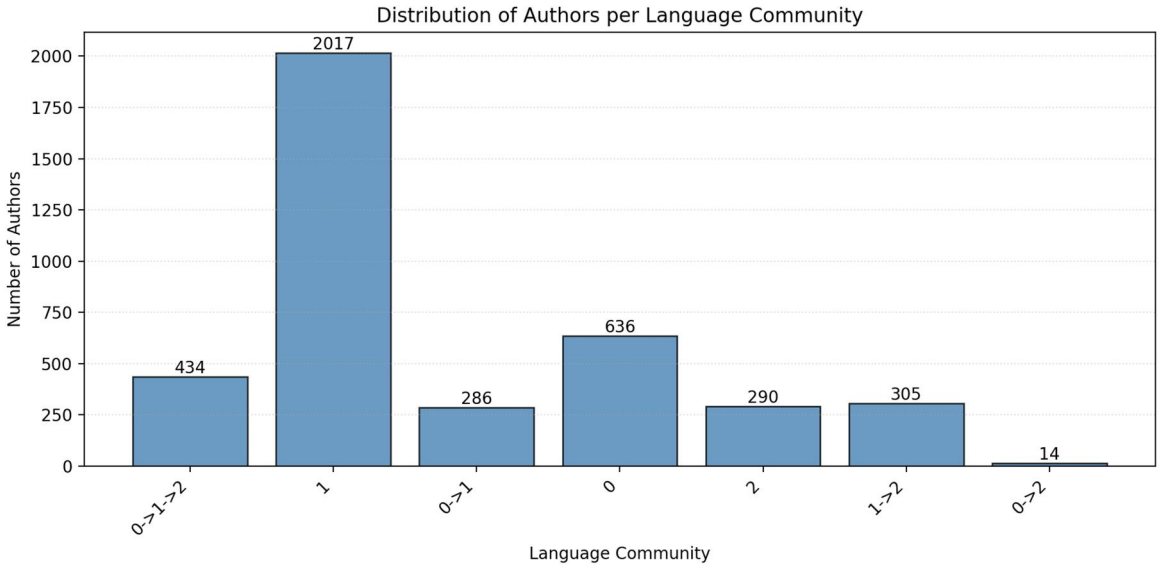

Figure 5. Histogram of communities detected by fast greedy modularity optimization with n of authors.

Table 1. Top 20 authors with the highest languageCentral score, ranked in descending order.[a]

Author	languageCommunity	languageCentral	N of titles
Hesse, Hermann	0->1->2	4,432.3847	1,035
Kafka, Franz	0->1->2	3,930.4524	749
Goethe, JohannWolfgangvon	0->1->2	2,769.4016	559
Mann, Thomas	0->1->2	2,369.7633	514
Bernhard, Thomas	0->1->2	2,233.8981	433
Handke, Peter	0->1->2	1,982.2736	345
Rilke, RainerMaria	0->1->2	1,867.7867	352
Zweig, Stefan	0->1->2	1,858.1033	326
Konsalik, HeinzG.	0->1->2	1,832.7337	362
Roth, Joseph	0->1->2	1,640.0565	281
Courths-Mahler, Hedwig	0->1->2	1,600.1428	374
Remarque, ErichMaria	0->1->2	1,560.1847	410
Link, Charlotte	0->1->2	1,533.5713	237
Grass, Günter	0->1->2	1,396.0816	306
Böll, Heinrich	0->1->2	1,388.0037	306
Brecht, Bertolt	0->1->2	1,261.8884	242
Jelinek, Elfriede	0->1->2	1,206.3265	272
Dürrenmatt, Friedrich	0->1->2	1,174.4432	243
Walser, Robert	0->1->2	1,160.6828	198
Hoffmann, E.T.A.	0->1->2	1,114.4648	206

[a] Scores on the web application are normalized, which does not affect the ranking.

and periphery in the language network, which points toward a small canon of connecting authors.

The top twenty authors with the highest languageCentral score (Table 1) that all three language communities connect (community 0->1->2->)[26] include, first and foremost, representative authors of the German national canon, such as Hermann Hesse, Franz Kafka, Johann Wolfgang von Goethe, Thomas Mann, Thomas Bernhard, Peter Handke, Rainer Maria Rilke, and Stefan Zweig, among others. We can hence support the argument that canonical authors represent bridges between central to peripheral languages. Combining a community detection approach with the languageCentral metric allows us to highlight this area of literary transfer and identify important connecting authors between readerships (Table 1).

A high languageCentral score here represents many translations into central languages. The author with the highest score, as well as the number of translations in the DNB, Hermann Hesse, has more than half (58%) of his titles translated into languages from central groups one and two. He has 141 translations into Italian, 90 into Spanish, 55 into French, followed by Portuguese, Serbian, Russian, English, Polish, Dutch, Hungarian, and Czech. He also has a maximum of five translated titles into twelve different languages from the peripheral language group, making him an especially powerful bridge between center and periphery. Franz Kafka's, Johann Wolfgang von Goethe's, and Thomas Mann's scores also reflect their dominance in central languages with the most translations into Spanish, English, French, and Russian and fewer titles (<5) into Vietnamese, Korean, Japanese, or Armenian. Besides the central position of these canonical authors, we can also observe how they connect to the periphery through a few translated titles.

Similarly, with slightly fewer titles than these highly canonical authors, we can find contemporary authors like Charlotte Link. In the top thirty we can also find contemporary authors such as the detective fiction author Charlotte Link, and the Nobel Prize winner Elfriede Jelinek (38 languages and 272 translations). 81% of Charlotte Link's titles are translated into central languages from group two with the most translations into French, Italian, Polish, Czech. She also has 16 translations into four peripheral languages, such as Korean, Litvanian, Latvian, Slovenian, and Chinese. With the most translations into central language groups one and two, such as French, Dutch, Russian, Italian, Spanish, Czech, and English, Jelinek also has translations into 15 of the peripheral languages, most prominently into Chinese (17 titles) besides Korean, Georgian, Japanese, or Hindu. While half of her translations are still into central languages from group one, compared to Link she is strongly connected to the peripheral language group.

Charlotte Link and Elfriede Jelinek, who both represent contemporary authors with a certain level of prestige and an increased number of translations in recent years, appear alongside canonical authors as bridges between language communities. Having only two women in the top twenty central authors also underlines the gender imbalance of the translational canon and the DNB.[27]

Detecting communities helps identify authors that occupy a connecting role between the center and periphery, underscoring the overrepresentation of male canonical authors in central languages alongside contemporary authors with a large network spreading from central to peripheral languages. However, the groups of authors that appear only in either the central or peripheral language group raise the question of which language group predominantly includes authors that do not occupy a connecting role. Considering that we argued earlier that canonical authors are characterized by their connecting role between center and periphery, do these authors still belong to a set of canonical representatives or instead to contemporary and regionally specialized authors?

5. Authors unique to central or peripheral languages

Following this claim and to address the number of authors not connecting the central and peripheral language groups, we now turn to the authors with no connecting edges between center and periphery. Of the 2,943 authors not shared across all three language groups, 68% (2,017) of authors appear solely in the central language group (community 1), meaning that the peripheral language groups (community 0 and 2) have fewer unique authors (926). There is an increased number of authors that signify the central language group, while the other 31.4% of authors, who are exclusively in the periphery cluster, therefore represent an independent group of authors. Who are these authors unique to each language group, that play important roles in the literary transfer of translated German fiction beyond the traditional canon? In this section, we apply the languageCentral score together with the language communities as an exploratory method to identify authors that occupy important roles in the network of transfer.

Again, we ranked authors by languageCentral score and investigated the authors with the highest score. For the central language group (community 2), which includes languages with the highest share of translations overall, the languageCentral score is an indicator of authors, who specialize in central languages. The erotic fiction author Sandrine Jopaire, for example, has the highest languageCentral score (844.56501) in the central language group, because her 95 titles are all translations into English, the third most popular target language. The second most central language is the writer of mainly romantic novels, Friede Birkner. Almost half of her 74 translations are into Hungarian, a third into Czech, and a third into Polish. Patricia Vandenberg, another romantic serial novel writer, is the third most central author with 33 translated titles in Polish and one translation into Czech. In the top five are also the historical fiction author Siegfried Obermaier, whose translations are specialized in Czech, as well as Polish and Spanish, and Marie Cordonnierová, a writer of romantic, serial, and youth novels and a translator, whose 25 translations are all into Czech. From these examples, we can see a different group of authors, mostly serial novel writers, who are highly specialized in specific target languages and positioned centrally in the network of transfer.[28]

Language community 2, which we label as the semi-peripheral language group, is dominated by authors specialized in languages such as Japanese, Danish, or Swedish. All five authors with the highest languageCentral score (Kurt Mahr, H.G. Ewers, William Voltz, H.G. Francis, and Marianne Sydow) in this group have almost exclusively translations into Japanese and are writers of science fiction and fantasy. The latter three were part of the bestselling Perry-Rhodan series of weekly dime novels, which has been published since 1961. Investigating the semi-periphery reveals not only a correlation between genres and target languages, but also relationships across languages and linguistic communities such as those in northern Europe and Japan.

The peripheral language group (community 0) has predominantly bilingual translations (language code “ger”). Bilingual translations are texts that include both the translated text and the original text. Accordingly, the authors with the highest languageCentral score have almost uniquely bilingual translations. Among the authors with the highest languageCentral score, we can find contemporary authors and translators of bilingual poetry collections such as the Spanish-German poet and translator Ursula Heinze de Lorenzo, Edith Sommer (pseudonym of Edith Mrázek), who has several self-translated bilingual French-German poetry collections, or Inge Buck, whose poetry editions focus on German-Persian bilingual editions paired with cartoons. Investigating this group highlights the role of literary agents who work at the intersection of writing, translation, and publishing in the network of literary transfer, and therefore most significantly represent a translational community.[29]

Coming back to the idea that canonical authors connect the center and the periphery, we can now argue

that author communities unique to a group of languages share the common characteristic of specialization, both in terms of target language and genre. For the central language group, authors are highly specialized in central languages and romantic serial novels. For the semi-peripheral language group, this was also the case, with a high linguistic specialization paired with a focus on science fiction and fantasy novels. Likewise, the peripheral language group specializes is in bilingual poetry collections.

Returning to our argument that canonical authors connect central and peripheral language communities, we can add that authors unique to language groups reveal regional canons that specialize in certain target languages and genres, thereby challenging the notion of a universal canon of German literature. Especially bilingual authors transgress these boundaries through their translationalism, their multilingualism, and multi-agency in the network of transfer.

To revisit the initial question regarding the function of authors in the author-language network, by applying community detection, we found that canonical authors are situated at the routes of transfer between the center and the periphery. In contrast, authors unique to specific language groups function as strong connections between target languages by means of regional and genre specialization. While a set of canonical authors and central languages, such as French and English, appear to be well-established in the translational network (see Teichmann 2022: 94–97), this study suggests that examining authors unique to a language community highlights the importance of regional sub-communities of authors in the field of translation. Applying Heilbron's center-periphery network model of languages in combination with the languageCentral score enabled us to identify authors based on the languages they connect and the sub-communities they are part of. This approach allows us to look beyond the translational canon and expand the understanding of it by highlighting these regional canons and areas of translational transfer.

6. Conclusion

In this paper, we propose a method to operationalize Heilbron's center-periphery model using the DNB's bibliographic translation data to locate and identify authors within the network of translational transfer. We addressed the following hypotheses, based on Heilbron's model:

1) The network of translational transfer has a hierarchical structure, comprising central, semi-peripheral, and peripheral languages.

We applied the fast-greedy community detection algorithm on the language-language network to group languages based on the authors they share. Despite the low modularity score, we found that the resulting language communities matched Heilbron's observations, providing us with a center-, semi-periphery, and periphery structure of linguistic communities.

2) The literary transfer of translations is dependent on each language's position in the network.

We introduced the languageCentral score to measure the share of translations in percentages for each language and as a means to identify authors who are central in each language group. For each language group, we identified the most central authors by ranking them according to their languageCentral score.

3) Canonical authors function as bridges between central and peripheral languages, while specialized authors connect languages within groups.

From our results of the community detection, we identified authors that bridge the periphery and the central languages, and authors that are unique to each language group. Through community detection, the authors' connecting center to the periphery and supporting reach to marginal languages could be identified as belonging to a set of canonical classics, forming bridges between language groups. For authors within the central and peripheral language groups with a high languageCentral score, we found that especially genre and target language specialization are common factors of authors that occupy important roles in the network of transfer.[30]

The central argument that connects these hypotheses and our findings is that an underlying dynamic (center-periphery) between languages exists that shapes the movement of authors in the field. Our model, therefore, builds on the underlying premise that languages share connections by publications of the same set of authors, and authors share connections by languages. In the first and second section of this paper, we argued that the dynamics between languages are indicative of the areas of translational transfer with a focus on bridges through canonical authors. In Section Three, we found that central and peripheral languages reveal a different set of authors who are specialized in particular genres or target language. These arguments and related findings demonstrate that mapping the canonical space in the library catalogue as a network can visualize the connections between languages through authorial circulation, while also helping to identify which authors cross linguistic boundaries to form the channels of transfer, and highlighting the non-canonical spaces or literary transfer. In conclusion, the findings of this paper show that a network model of the German National Library catalogue allows us to re-define the world literary canon as a

category in terms of its connecting function in the language network, while also stressing the importance of authors that are significant to literary communities and hence are part of regional canons.

Hence, mapping translation networks of library catalogue data with the help of social network methods offers a fruitful approach for visualizing the dynamics between languages and their communities, as well as the different functions of representative authors of the literary canon in translation. Adapting Heilbron's model enabled the identification of the relationship between the center and periphery, as well as the positioning of languages within the network. Precisely because this approach is based on the language-author network, rather than being limited to the social aspects of the network, as has been the focus in prior studies, dynamics of transfer have been revealed that were formerly not accounted for. By taking up on Dewitt's contribution and expanding its object of study to translations within the DNB library catalogue, the network model explored in this paper addresses this lack of network analysis by exploring translation data of German outgoing fiction with special attention to the role of authors in connecting literary communities as a sign of their canonicity or their specialization for a specific linguistic community. Further, the definition of the world literary canon is extended by attributing it to the connecting function of authors between the center and periphery. Investigating the dynamics in the field of translation hence allows us to identify the authors that bridge and distinguish linguistic and literary communities.

In this paper, we categorized and investigated the function of authors as central or peripheral, as bridging or specializing, as a way to reflect on the translational canon(s) and the library collection as a representative archive. Again, considering the visibility of translations and specific authors within the library catalogue, their positions are defined by their relations and marginal, peripheral positions in the network. Mapping the languages and authors' positions allows us to look beyond the center of the collection and come closer to making visible who the national collection represents. The communities of authors and their connecting functions not only situate them within the network but also constitute an additional method for locating canonical and specialized authors. In other words, making visible the translation networks between languages offers a way to explore translations in the DNB by challenging the concept of national library catalogues as representative collections of a literary history based on a national canon. Modeling translations, as we argue in this paper, makes visible the dynamics and sub-communities present in library collections, allowing for the re-evaluation of what constitutes a national canon within a national collection.

By introducing an automated method to group languages according to Heilbron's model, together with the languageCentral score, we aim to further expand the discussion on centrality in the context of the language network of translations. Although our study is limited to the fast greedy community detection algorithm, we hope that our main workflow will find application with additional clustering algorithms for large network datasets extracted from different national libraries.

Additionally, we have created an interactive web application (https://lisateichmann.github.io/dnb_trans_networks/) that introduces visualizations as a novel way to represent connections between languages based on their shared authors (see Fig. 1), and to position authors in the translational field. This is but a first step toward making the network of transfer more visible and explorable to readers, editors, librarians, and students of translation and book history. This paper is but an initial study in the context of the DNB's collection, which of course, is limited in terms of the scope and timeframe; however future studies on different national collections and their data can benefit from our reproducible workflow, visualizations, and model to make visible the network of translations and its important representative authors.

Author contributions

Lisa Teichmann (Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing—original draft, Writing—review & editing), and Velitchko Filipov (Data curation, Methodology, Software, Validation, Visualization)

Supplementary material

Supplementary material is available at *Digital Scholarship in the Humanities* online.

Conflicts of interest. None declared.

Funding

None declared.

Data availability

The data and visualizations are available on Github: https://github.com/lisateichmann/dnb_trans_networks;

Interactive web application: https://lisateichmann.github.io/dnb_trans_networks/.

Notes

1. This paper is partially based on chapter 3 of Teichmann (2022).
2. "Our corpus of 60 novels was selected for its representativeness, particularly following categories: authorial (novels from the major canonical authors of the period), historical (novels from each decade), generic (from the major sub-genres of nineteenth-century fiction)" (Elson et al. 2010: 138–139).
3. Reynolds and Vitali's study (2021) on the translation network of the novel *Jane Eyre* is an excellent example of drawing on Heilbron in the anglophone context. In the course of working on this article, Andras Kisery and Péter Királi further developed their project "Cold War networks of literary transfer" (see Kisery and Királi 2025) that is based on Heilbron's model to analyze translation flow for translations of the Hungarian.
4. Dennerlein uses the Austrian National Library data to create a theater play network analysis of authors that connect specific collections in the library catalogue
5. See Teichmann (2022: 85) for a detailed discussion on the library as a site of constructed knowledge and memory regarding translation.
6. According to the legal deposit regulation (PflAV), "all publications issued in Germany, irrespective of their language" and "media works published abroad for which a publisher or a person who has a legal domicile, business premises or their principal residence in Germany has sold (licensed) the right to publish the work abroad" need to be deposited at the German National Library. The latter includes explicitly translations published outside of Germany. (Teichmann 2022: 63).
7. There are around 1,250 translations for the years 1980–1989 (see Teichmann 2022: 67).
8. He also raised the hypothesis that the language network is longitudinal ("dynamic constellation"), meaning that the position of language groups changes over time, either gradually (due to cultural reorientation) or suddenly (due to the shift of political power to a strong centre or regime). However, testing this hypothesis lies beyond the scope of this study, as longitudinal data extracted from the German National Library Catalogue alone are not reliable enough (Teichmann 2022: 181).
9. While Heilbron considers prestige (literary prizes), which may also shift a language to a more central position (e.g. international recognition may prompt shifts in an author's popularity in peripheral literature), he does not include it in his model. Literary prizes and other features of prestige lie beyond the scope of this study since it would require a comprehensive manual data collection.
10. The high title count of Hesse indicates that he has been re-translated into the same languages. As an example, his "novel *Siddhartha* has 127 translated editions in 47 languages, 14 of which are in Spanish, nine in English, four in Hungarian and Bulgarian, with single editions in Armenian, Thai, Malayalam, and Kurdish among others." (Teichmann 2022: 95). The importance of re-translations of *Siddhartha* into central languages, such as Spanish and English, underlines Hesse's canonical role in these linguistic environments.
11. Heilbron also argues that "centrality implies Variety": "The more central a language is in the international translation system, the more types of books are translated from this language" (Heilbron 1999: 438). Here, he refers to book categories such as "religion," "law," and "leisure." Since the library catalogue data only includes sparse genre descriptors, testing this hypothesis lies outside of the scope of this study.
12. According to Heilbron, "it is not so much the national tradition, but rather the international position of national cultures, which determines the level of cultural importation" (Heilbron 1999: 440). From the proportionally high percentage of translation into German, we can also assume its central position as an original language for outgoing translations.
13. Drawing on Bourdieu's field theory that defines the artistic field as a "The space of literary or artistic position-takings, i.e. the structured set of the manifestations of the social agents involved in the field" (Bourdieu and Johnson 1993: 312), we use the term field of translation to describe the space in which authors, languages, and publishing places are positioned in and whose positioning condition the circulation of translations. In addition, we use the term translational field to describe the space within the field of translations, which is composed of authors who are linguistically widely distributed. Especially in recent years, more and more studies have revisited Bourdieu's field theory using computational methods, with a strong focus on publishers rather than languages and authors (see Marin-Lacarta 2019).
14. In previous research (Teichmann 2022), the term "concentration" was used for an increased number of titles per author or language, e.g. the more

editions an author has, the higher their concentration. Heilbron also points out that concentration is a proxy for the position of the language in the network. Languages with a high concentration of titles, therefore, occupy a central position. In this paper we apply our languageCentral score to account for both concentration and the share of translations as conceptualized by Helbron.

15. While Heilbron defines the centrality of a language according to its share in the market of translation (Heilbron 1999), our definition is limited to its share in the German National Library catalogue.
16. See Butts (2009): "The network is represented by a graph, which is defined as the set of nodes together with the set of pairwise relationships among them" (325).
17. For an account on how the data was extracted, see Teichmann (2025a) and for the related challenges for bibliographic translation data, see Teichmann and Roman (2024).
18. For a detailed data quality evaluation, sampling bias, and how the data has been extracted, see Teichmann (2025a).
19. Initially we also visualized the full network, however, due to its density the resulting graph was barely readable and excluded from this paper.
20. Initially we also measured degree, betweenness, and eigenvector centrality (see Teichmann 2022: 111–128).
21. For a detailed account of the history of translation and language exchange between Germanophone countries and Hungary see Bart and Klaudy (1996).
22. See Clauset et al. (2004).
23. In comparison with community detection based on edge betweenness (see Newman and Girvan 2004), the fast-greedy algorithm produced the best results compared to the results from the centrality measures. The central and peripheral language groups corresponded to the cluster in the centrality network graphs.
24. This is done by using modularity (Q), as Newman describes: "Starting with a state in which each vertex is the sole member of one of n communities, we repeatedly join communities together in pairs, choosing at each step the join that results in the greatest increase (or smallest decrease) (Q)" (Newman 2004: 2).
25. For more detailed results we refer to our repository that has the full analysis (https://github.com/lisateichmann/dnb_trans_networks).
26. See data repository for table: author_nodes_community_bridges.csv
27. Discussed in more detail in a forthcoming article on the gender gap in the DNB (see Teichmann, forthcoming).
28. These authors have previously been identified as specialized also in terms of their publishing places (see Teichmann 2022: 176)
29. Roland Oliver, who has the highest score, for instance, has seven bilingual editions of love poems that include the original text in German with translations into Portuguese, Afrikaans, or Frisian, all of which were published with his own publisher, AZUR Verlag.
30. While the author's origin can also be an important factor for their role in the network of literary transfer, it has yet to be explored in future studies, drawing on the GND for additional biographical data.

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