ELO, KIMMO

Geospatial Social Networks of East German Opposition (1975-1989/90)

Keywords

Abstract

During the last two decades single photographs and photograph corpora have gained in popularity as sources for historical research. In addition to their important function as carriers of the past, photographs also contain valuable information about past social relations. However, to utilise this information a researcher needs a more structured dataset, a photograph corpus containing rich metadata, which allows us to explore and analyse contextual information stored in alphanumeric form. My paper will exemplify how photography corpora could be used as a source for network analysis seeking to explore, reconstruct and visualise hidden historical social networks. The empirical case of my paper revolves around regional and interregional networks of East German dissident movement. The main empirical material explored for network analysis and visualisations consists of a large enriched photograph corpus on East German dissident movement maintained by Robert Havemann Foundation in Berlin. Based on this corpus my paper will explore the structure and dynamics of regional and interregional networks of East German opposition. The results introduce evidence that regional connectedness based on personal mobility among the East

German dissidents both changes and increases over time, thus resulting in continuously evolving patterns of social interaction. Further, the analysis of Roland Jahn's geospatial networks evidences the usefulness and power of historical network analysis when it comes to tackling changes in patterns of social interaction.

1 Introduction*

Sometimes a single event can trigger people to take the step that turns a loose group of friends into a tightly connected, political network. For the topic of this article, the regional networks of the East German opposition, the death of young political activist Matthias Domaschk on 12 April 1981 in Gera in a pretrial detention of the East German security service (*Ministerium für Staatssicherheit*, abbr. the Stasi) after 13 hours of continuous interrogations, was that trigger. On 16 April 1981 Domaschk was buried in Jena in the presence of almost three hundred friends and collaborators, among them also Roland Jahn, a close friend of Domaschk.[1] For Jahn and his close friends the death of Domaschk was a turning point, the triggering event to get radical and start creating an underground platform for political opposition.

In March 1983 Jahn and his collaborators succeeded in establishing *Jenaer Friedensgemeinschaft* (Jena Peace Community) as an organised form of political opposition. The Jena Peace Community rapidly became one of the most important forums of organised political activism in the system-immanent competition between the Jena dissident community and the ruling Socialist Unity Party (*Sozialistische Einheitspartei Deutschlands*, SED). The community was also one of the first major opposition communities established *outside* the protective walls of the Evangelical church. Founders of the Jena Peace Community were disillusioned with the reluctant resistance of the Evangelical church against the state repression and, hence, sought to establish a new, independent platform under the umbrella of the European Peace movement. Another reason was the fact that the *Junge Gemeinde* (Young Congregation), from which the Jena Peace Community emerged, was heavily infiltrated and

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[1] "Biografie Matthias Domaschk", edited by Bundeszentrale für politische Bildung and Robert-Havemann-Gesellschaft e.V., last modification: October 2017. [Online: www.jugendopposition.de/145407. Last visited: 27 June 2018].

observed by the Stasi after the expulsion of Wolf Biermann[2] in 1976. These circumstances resulted in a growing demand for a new political platform residing outside the church.[3]

Taking the Jena dissident scene as its starting point this article has two main objectives. The first objective is to analyse the structure and dynamics of the geospatial social networks based on selected key figures in the Jena dissident community. By exploring the networks of these dissidents, we are able to discover how oppositional thoughts spread not just among people, but also between geographical regions. Within these networks we focus on changes in Roland Jahn's social networks and seek to evidence, how changes in his social networks correlate with changes in his personal biography. The second objective is to evidence the usability of digitised historical photography corpora as a source for network re-construction. In this respect we will also tackle questions related to the quality of meta-data and to data preparation process. Since historians and social scientist interested in benefitting from the growing availability of digitised, non-native digital materials, we should also pay (more) attention to problems emerging from the digitisation process itself, i.e. problems related to poor image quality, missing or incomplete meta-data or false positives. Since quantity cannot replace quality, scholars in Digital Humanities exploiting methods of distant reading should pay specific attention to source criticism and data quality in order to avoid biased interpretations.

The bulk of studies on the GDR opposition and resistance have thus far been dominated by research focusing on certain phenomena or periods of time from the perspective of historical research. Undoubtedly, these studies have enriched and improved our understanding of this complex phenomenon. Complex, because we need to keep in mind the pitfalls hiding it the source material. Hence, on the one hand, it is a well-known fact, that the Stasi never fully understood the informal logic, thinking or motives behind its most important internal enemy, and as a result, the Stasi apparatus produced a lot of false interpretations and incorrect assessments. On the other hand, due to the permanent risk of leaks, opposition and dissident groups were extremely careful when it came to sharing written materials or other documents.[4] However, although we possess

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[2]   Wolf Biermann was a famous East German song-writer, whose nonconformist views alarmed the East German establishment already in the early 1960s. He was banned from performing several times and in December 1965 he was denounced as a "class traitor" and blacklisted his performances and publications. In 1976 Biermann was on an officially au-thored tour in West Germany as he was strip of his citizenship. (See https://wolf-bier-mann.de/vita.) Reactions on the Biermann expulsion are well documented in the Stasi's as-sessments of the situation, see Suckut 2009; Bispinck 2012.

[3]   Veen et al. 2000, 106; Scheer 1999, 201, 231.

[4]   Veen et al. 2000, 13.

a reasonably reliable historical understanding of the dissident movement scene in the GDR and – thanks to several well-prepared reference books and biographies – also know "who was who" in the GDR opposition movement, we lack a systematic understanding of the structures and dynamics of the social networks behind and underlying the East German opposition. This might be due to the fact that the mainstream of studies focusing on the GDR opposition has been interested in events, epochs, developments or single persons from a chronological, historical perspective, and to the best of my knowledge, no single study has thus far made an attempt to obtain *relational* data from the sources and study complex relational patterns – affiliations, interactions or collocations – "behind the scene".

The structure of this article is as follows. In the first section we present our primary material and discuss questions related to our method. The second section contains the main analysis, which builds on network visualisations. We end the article with concluding remarks in which we sum up the most important results and their implications.

2 Opposition, Resistance and State Repression in the GDR: A Historical Framework

One of the main tasks of the East German security apparatus was to underpin all attempts to build a system of opposition or resistance against the party dictatorship in the GDR. In accordance with this agenda, real or suspected members of the political opposition, dissidents and resistance groups were systematically haunted by the state security.[5] However, like in other socialist countries in Eastern Central Europe, also in East Germany the opposition was not a monolithic bloc, but instead, its internal structure and setting, goal-setting and means were under a continuous, dynamic evolution during the existence of the GDR from 1945/49 to 1989/90.[6] This evolution is, at least in retrospect, understandable, even natural, as it follows the general political development in the GDR. During the early years of the GDR (1949-1953) the main goal was a rapid reunification of Germany, supported by attempts to foster the creation of a pluralist party system and resistance against the "block policy" of the SED. Between 1953 and 1961 – the failed uprising in June 1953 and the construction of the Berlin wall in August 1961 – the history of the opposition is almost identical with the "republic flee" from the GDR in Western Germany. This phase

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[5] Weber 1999, 130.

[6] Neubert (1998, 29-33) differentiates between three forms of political dissidence: opposition (Opposition), resistance (Widerstand) and political protest (politischer Widerspruch).

of "voting with the feet" marks a period of mass resistance against the SED regime, abruptly ended by the building of the Berlin Wall and followed by a period of economic and political stabilisation, which greatly undermined the role and status of the political resistance and opposition.[7]

The temporal focus of this article is the period between 1975 and 1989/90. This period was preceded by several political events shaping also the political space of the opposition and resistance groups. First of all, the *Conference on Security and Cooperation in Europe* (CSCE) held in Helsinki in August 1975 resulted in the second half of the 1970s in growing tensions within the Soviet empire, including the GDR. The East German party leadership was increasingly concerned with the destabilising impact of the CSCE on its power and sought to underpin all opposition activities drawing from the CSCE.[8] The numerous repressive actions by the state leadership against the dissidents and opposition groups – the most prominent example of this being the expulsion of Wolf Biermann in 1976 – evidence the growing fear among the party leadership of the destabilising effect of dissisident activities on the East German dictatorship. The same strategy – targeted actions and sanctions against a single visible member of the opposition – was also used in the 1980s against the peace movement that was questioning the GDR's self-image as a "peace state". Overall, the main aim of the repression was to scatter the resistance and opposition by eliminating their leading personalities.[9]

Considering the history of the East German opposition, Jena was, together with Berlin region, one of the most important regions what comes to the structure, means, motives and dynamics of the opposition groups in the GDR. During the whole history of the GDR, Jena was one of the cities where the discrepancy between democracy and dictatorship resulted over-proportionally often in open conflicts. As a result of both the "1968" in Western Europe and especially the "Prague spring", Jena rapidly became *the* region for political opposition in the GDR. It was also called the secret capital of the GDR opposition reflecting the complex domestic conflict between the state apparatus, church and opposition in the GDR.[10] For example, a political thesis paper published in December 1970 entitled "*Sozialismus in der DDR - Anspruch und Wirklichkeit*" (Socialism in the GDR - Ideal and Reality) triggered the Stasi's countermeasures

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[7]   Veen et al. 2000, 8-9.

[8]   E.g. Schroeder 1998, 233ff.; Gieseke 2008.

[9]   Veen et al. 2000, 27-29.

[10]   See   http://www.bstu.bund.de/DE/InDerRegion/Gera/Regionalgeschichten/Aktion-Gegen-schlag/20130507_jena_aktion-gegenschlag-kowalczuk-vortrag.html [online. Last visited: 27 June 2018].

(operation "Anarchist") against the Jena opposition group around Jochen Anton Friedel and Reinhard Fuhrmann.[11]

The Jena Peace Community established after Matthias Domaschk's funeral was a dissident platform of short duration, but of long-lasting impact. Of short duration, because already in the spring of 1983 the security authorities were alarmed about the developments in Jena and decided to destroy the Jena Peace Community once and for all. The operation "*Gegenschlag*" (Counter-strike) in May 1983 was a targeted operation against the core group of the Jena. Circa 40 persons, Jahn included, were expelled, causing an almost complete destruction of one of the most active opposition groups in the GDR. Of long-lasting impact, because the counter-strike of the Stasi did not achieve its main goal, and between 1983 and 1989 Jena remained an unsettled city and one of the most important places for the political opposition.[12]

3   Method and Material

The structure and dynamics between the issues, events and people underlying historical phenomena are the key interest areas of historical research. Together with the expansion of digitised materials and advances in the availability of digital research tools have opened up totally new possibilities for the application of formal methods to historical empirical material in order to model and analyse patterns of social interaction underlying certain phenomena. Among these methods, historical network analysis (HNR) - rooted in social network analysis (SNA) - enjoys a growing popularity among historians and historically oriented social scientists interested in examining social or institutional relations or interactions of past communities in an aggregated historical context[13]:

With SNA, we are only interested in individuals as part of a much bigger whole. In fact, one advantage to the technique is that SNA helps us view an entire community and figure out which individuals we should be truly interested in and which ones were perhaps less significant. When we study past relationships systematically as SNA allows us to do, the method will prevent us from misunderstanding the function of an individual's relationships or exaggerating the distinctiveness of those relations.[14]

Although network research itself dates back to the late 19th century, it was the development of powerful personal computers and easy-to-use software allowing powerful graphical presentations, that is, visualizations of networks

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[11]   Veen et al. 2000, 190-192.

[12]   Neubert 1998, 488. The operation "Counter-strike" is documented in: BStU 2013.

[13]   E.g. Bearman et al. 2012; Brughmans 2013; Epple 2017. For a more detailed discussion about historical network research, see http://historicalnetworkresearch.org/.

[14]   Morrissey 2015, 69–70.

that has increased the interest in network research among historians. In recent years, network visualizations have gained a central position in network research. This mostly, because network visualizations are an effective form of presenting complex relationships in an intuitive and (quite) easy-to-understand form. Additionally, different visualization layouts offer new possibilities for highlighting network-related attributes or visualising a node's relevance in regard to its close neighborhood or the complete network.[15]

This article exploits an experimental approach to explore geospatial social networks of the East German dissident community with data obtained from a digitised enriched photograph corpus. The primary source consist of a heterogeneous photograph corpus maintained by the Robert Havemann Society in Berlin as part of its archive of the East German Opposition and consisting of ca. 60.000 digitised photographs[16], exemplified in Figure 1. The digitised corpus has a relatively rich meta-data providing information about the date the photograph was taken and the photographer, a descriptive title, keywords (also including regional/geographical information), and information about the persons to which the photograph is related.

The primary material used in this article is a filtered dataset selected by applying two selection criteria. First, all photographs taken between 1975 and 1990 were selected. Second, based on previous studies we created a list of the most prominent figures of the East German dissident scene. We then used this list to filter the most frequently occurring persons in our database and to select the ten (10) most prominent persons: Matthias Domaschk, Jürgen Fuchs[17], Roland Jahn, Robert Havemann[18], Katja Havemann[19], Bettina Wegner[20], Carlo

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[15]   For more, see e.g. Scott 2013; Schultz-Jones 2009; During and Stark 2011.

[16]   See further: https://www.havemann-gesellschaft.de/archiv-der-ddr-opposition/bildarchiv/ [online. Last visited: 10 October 2018].

[17]   Jürgen Fuchs studied in Jena, moved to East Berlin in 1975 and was expelled to West Berlin in 1977 where he engaged himself in the peace movement.

[18]   Robert Havemann (1910-1982) was a committed socialist, a former resistance fighter against the Nazi regime and - until 1964 - a professor at the Humbolt University in Berlin. By 1956 he was increasingly in opposition to the East German political leadership and lived out his last years in a house arrest.

[19]   Katja Havemann married Robert Havemann in 1974 and supported her husband in his dangerous work as a political writer. She lived in Berlin/Grüneheide and engaged herself in the opposition movement, especially in the Neues Forum, in the latter half of the 1980s.

[20]   Bettina Wegner was an East German song-writer and lyricist. In 1983 she was threatened with prison and forced to leave the GDR for West Berlin.

Jordan[21], Gerd Poppe[22], Bärbel Bohley[23], and Tom Sello[24]. The final primary dataset contains only records of photographs having at least one of the key figures mentioned in its meta-data.

Foto: Albrecht/Kleindienst, Quelle: Robert-Havemann-Gesellschaft
Jena, 19.5.1983, Jenaer Friedensgemeinschaft beteiligt sich mit eigenen Transparenten an offizieller Demonstration anläßlich des Pfingsttreffens der FDJ

Figure 1: Example photograph from the material corpus (source: *Bildarchiv Robert-Havemann-Gesellschaft*, signature RHG_Fo_HAB_11308).

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[21] Carlo Jordan joined the protest group against the expulsion of Wolf Biermann in 1976. There-after he was continuously on the radar of the Stasi and was forced to break up his academic studies due to political reasons. In the 1980s Jordan engaged himself in the environmental movement.

[22] Gerd Poppe was a political activist who fought for human rights in the GDR. He was also actively engaged in the publication and dissemination of several illegal underground publi-cation (Samisdat). Poppe was subject to the Stasi's intensive observation and repressive ac-tivities.

[23] Bärbel Bohley was an East German opposition figure and artist. She was one of the co-found-ers of the Initiative for Peace and Human Rights (1985) and of Neues Forum (1989).

[24] Tom Sello engaged himself in several dissident groups in the GDR, especially in the 1980s. He also wrote for several underground Samisdat-publications and was repeatedly attacked by the Stasi.

During the data extraction process some problems with the material already became evident. The biggest problem probably were the inconsistencies and pure typos in referencing the people in the pictures. Since the meta-data has been created afterwards, persons not accurately recognised were marked as "unknown". Other problem were misspelled or incomplete names. Our solution was to create a so-called alias table consisting of all unique person name entries from the database in one column and the correct form in another column. The original, uncorrected data had over 900 unique person references, in the cleaned data this number was slightly under 600, thus illustrating the bias caused by incorrect and misspelled person references.

Our cleaned and filtered database contained 841 records (photographs) with 171 unique person references. On average, each record had 2.5 person references within the range from 1 to 15. This database was then processed further to extract geographical information available either in the title or in the keywords field. First, we processed the keyword entries and collected all recognised geographical names (e.g. Berlin, Jena, Bad Frankenhausen). We also stored sub-regional information like street names or city districts. Second, all the records not containing identified geolocations were processed manually in order to find out whether the geolocation could be identified by indirect information like known places, buildings etc. In total, almost 3/4 of the photographs included in our analysis could be connected with a geographical location.

Once the data preparation process was finished, the data table was imported to the statistical package R for further processing. The network data creation was carried out as follows. First, we created a person-to-person link list by connecting each person mentioned in one record with all other persons mentioned in the same record. In other words, we treated each photograph as a fully connected small world network. We also attached the original record signature as well as the geographical (names of places) and temporal data (year) to each link list item. The geographical names were also used in order to obtain geocodes, that is coordinates (latitude and longitude), to be used in geospatial visualisations. The resulting dataset was used to reconstruct temporal social networks. Second, we created a geospatial network data where two geographical places were connected if the person had been photographed in both places. For example, if Roland Jahn was photographed in Berlin and Jena, these two cities were connected. At this point we also added temporal information to the link list data in order to be able to analyse network dynamics over time. All these steps were carried out with the R scripting language in the RStudio environment. The network data was then exported from R and

imported in Visone[25] for network visualisations and analysis. It should be noted here that Visone offers the possibility to use geocodes in order to visualise connections between geographical locations.

4 Analysis and Results

We have split our analysis into two main parts. We will first turn to geospatial networks presenting interregional connections and analyse how regions were connected through social mobility of the members of the East German opposition community, and second, exemplify the impact of social change on social networks by analysing Roland Jahn's geospatial social networks prior and after his expulsion in 1983.

Our analysis is based on graphical network visualisation. A (network) graph is, according to graph theory, a set of dots (nodes, vertices) and connecting lines (edges) between the nodes.[26] Both the nodes and the edges can be enriched by attaching both quantitative and qualitative attributes to them, and these attributes can be used in the analysis. As described in the previous section we have added geocodes and time related attributes to our edge data, whereas personal names and city names are used as node attributes. The main purpose of using attributes, however, is to ensure that the formal network model, the network topology, describes its real-world counterpart as exactly as possible and, thus, provides valid, reliable and appropriate information concerning the research question. Network analysis is based on the assumption that both the units (nodes) selected for the analysis and the connections (edges) between these units are significant when it comes to understanding and explaining the phenomenon the network is connected to. From this perspective, network analysis is expected to provide quantitative information about dependencies between variables in the data, thus improving our understanding of the phenomenon subject to analysis.[27]
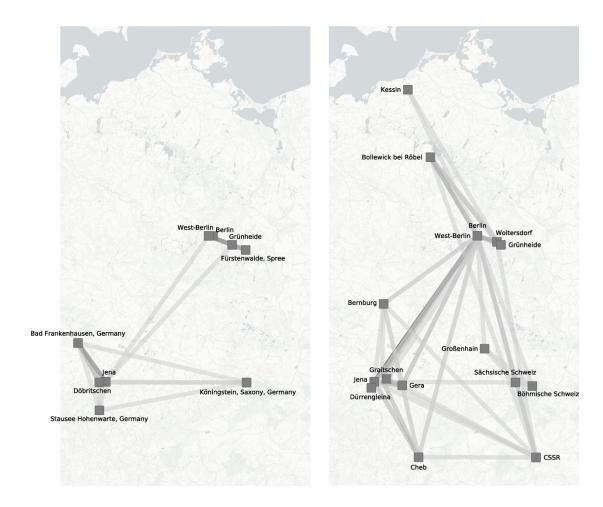
4.1 Regional Connectedness

Figure 2 tackles the question of geospatial dynamics of the East German opposition by visualising interregional connections based on geographical references in the database andusing geocodes to position the nodes in the networks. The graph is made with Visone, which allows the use of coordinate data and online map resources (OSM database) in order to generate the background map.

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[25]   Visone is an powerful, yet easy to use open-source software for network analysis and visu-
       alisation. Homepage: https://visone.org
[26]   For a good introduction to graph theory, see Ruohonen 2013.
[27]   Morrissey 2015-

Figures 2a and 2b: Person to person via location networks: (a, left) 1975-1979, (b, right) 1980-1984

Each map covers the same geographical area (11.0-15.0 longitude, 50.0-54.5 latitude), but the networks present the geographical connections in three, equally-sized time widows: 1) 1975-1979, 2) 1980-1984, and 3) 1985-1990. The link colour is based on interpolation from light grey to black and is proportional to the number of geographical co-occurrences, thus helping us to identify the most important geographical connections.

We consider the fact that the resulting time frames are rather different what comes to the number of photographs (1975-79: 383, 1980-84: 604, 1985-1990: 1157) quite natural and unproblematic when put in the historical context. Oppositional activities in the GDR increased during the whole of the 1980s, but

the trend was extremely strong during the latter half of the 1980s. Our figures support this general understanding, as the number of photographs is roughly double of that of the first half on the 1980s.
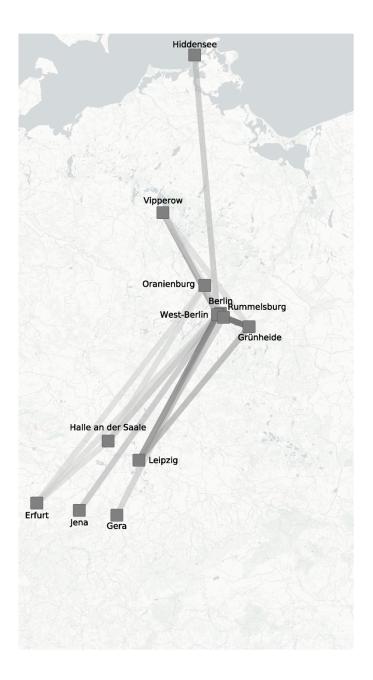

Figure 2c: Person to person via location networks: (c) 1985-1990.

As regard to the regional connectedness, the clearest change over time occurs between Jena and Berlin. Until 1984, Jena remains the most important region, thus confirming previous studies stressing the importance of the Jena region for the East German dissident community. From 1985 onwards, Berlin gains in importance and becomes the most frequently referenced region in our data. This development is well in line with the overall course of events during the second half of the 1980s. Also, many of the photographs documenting the late 1980s have references to the *Umweltbibliothek* in East Berlin. The *Umweltbibliothek* was founded in 1986 in the cellar rooms of the *Zionsgemeinde* in East Berlin and it rapidly became one of the central communities of the East German dissident movement.

Another aspect worth mentioning is the regional mobility among the dissidents. As the geospatial visualisations evidence, in the first period (1975-1979) main activities seem to have revolved around the Jena region with some "excursions" to Berlin. The towns Fürstenwalde (Spree) and Grüneheide were closely connected to Robert Havemann, who was sentenced to house arrest in 1976. Most of the photographs referring to Havemann document his life under the house arrest and people visiting him.

Compared to the late 1970s, the regional mobility of the East German dissidents seems to have increased quite a lot during the first half of the 1980s, although Jena and Berlin still remained the most important regions. The regional mobility in the last period (1985-1990) is well in line with the overall developments in the GDR. For example, the rise of Leipzig to one of the key regions evidences not only the establishment of new opposition groups in other regions of the GDR, but also their emancipation from the evangelical church.[28] One important factor explaining the regional mobility documented in our database is the establishment of new political platforms and movements like *Neues Forum*, *Demokratischer Aufbruch* or *Demokratie jetzt*, offering an interregional, GDR-wide platform for the leading personalities of the new East German opposition movement.[29]

Overall, our regional connectedness analysis clearly shows how the political erosion of the GDR increased the room of manoeuvring of different, independent opposition groups. The regional hotspots dominating our database are well-known in the literature, but our analysis evidenced that same persons were actively engaged in different regions. This, in turn, supports the argument

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[28]   Dietrich and Jander 1999.
[29]   Knabe 1999.

that the actual "hard core" of the East German opposition was rather small in number.[30]

4.2 Dynamics of Geospatial Social Networks: the Case of Roland Jahn

In order to exemplify the geospatial dynamics of the social networks related to the East German opposition, we decided to take a closer look at how the social networks of Roland Jahn, a prominent figure in Jena, changed over time. Roland Jahn was a close friend of Matthias Domaschk and an active member in the Jena dissident community. Jahn himself had been on the Stasi's radar already since the mid-1970s when he engaged himself as a young university student in protest actions against the expulsion of Wolf Biermann. As a result, Jahn was ex-matriculated from the University of Jena in 1977.[31] In 1980 Jahn got involved with the Polish "Solidarność" movement and was arrested several times by the security authorities. Later, in 1982 Jahn was condemned to 18 months' imprisonment, but was freed in February 1983 thanks to international protests against his imprisonment. Shortly thereafter, in May 1983, Jahn was among those 40 persons who were expelled to West Germany in the Stasi's operation "*Gegenschlag*". However, also after his expulsion Jahn continued to support the East German opposition movement.

Against this background, we assumed it to be possible to identify a structural change in Jahn's social networks before and after his expulsion both in regard to personal connections and to geospatial structure. Our assumption leaned on previous studies that have shown that the actual "hard core" of the Jena community was rather small in number.[32]

Figure 3 visualises the whole social network we could reconstruct from our database for the time period 1975-1990 and is the person-to-person network data created as described in section 3. The resulting graph is quite dense, but it does appear to have a relatively clear structure. There are a total of 315 nodes representing persons and 1510 edges representing co-occurrences of different persons.[33]

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[30] Neubert 1998; Veen et al. 2000.
[31] On resistance and repression at the University of Jena, see Fritsch & Nöckel 2006 and Lenski 2017.
[32] Scheer 1999.
[33] Thanks to Visone's capabilities to handle multiple edges between the same two nodes the Figure 3 correctly visualises also connections between two persons having been photographed together in two different geographical location. In such a case there exists multiple connections between the two persons, each of them representing a unique location.
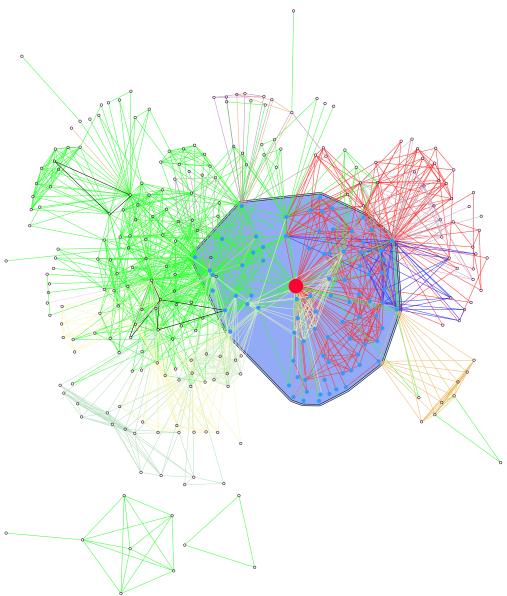
Figure 3: Roland Jahn's social network within the whole network structure between 1975-1990. Red node: Roland Jahn. Blue nodes: Jahn's direct neighbours. Layout: stress minimisation. Red edges = JENA, Green edges = BERLIN AREA, other colours = diverse geographical connections.

We have applied stress minimisation layout in ordeg to visualise sub-communities in the graph structure and to highlight the most important nodes by collecting them tn the centre of the graph. Further, we have added some visual effects helpful for understanding Roland Jahn's position and status in the network structure. Jahn's node is marked with red and members of his ego

network are marked wit blue, whereas nodes and edges not belonging to Jahn's ego network are greyed out by adding transparency. Edges coloured in red are connections located in Jena, whereas Berlin-based connections are coloured in green

Jahn's position in the opposition network an be described as that of a mediator, a position which also strongly related to his expulsion. He stays between the two main clusters in the graph and has a dense network of ego connections in both clusters. Jahn's ego network consists of 84 persons, a relatively high number evidencing his broad activities within this community. A closer look into the underlying network data reveals, that Jahn's Berlin connections (coloured in green in Figure 3) were mainly established after his expulsion.

In order to analyse the impact of Jahn's expulsion in 1983 on his social networks we divided Jahn's networks into two temporal networks, one reconstructing his social network prior to, and another after his expulsion. Our underlying assumption was that Jahn's expulsion marked an interruption, a break even in his oppositional activities. Based on this assumption we expected Jahn's social networks to reflect this interruption both in regard to its geospatial and to its co-occurrence structure.

The results of this zooming in are visualised in Figure 4. Since Jahn's ego network is close to what network analysis knows as small world, we have applied a specific layout called "quadrilateral Simmelian backbone layout". This layout tries to tackle the so-called hairball problem caused when force-directed layouts are applied to small-world graphs with low average distance and high density or conductance.[34] As we can see, the resulting visualisation is not just morr readable, but it also allows us to identify nodes deeply embedded within the community without losing the general understanding of the connectedness of the whole network. In other words, the layout helps us to untangle hairballs created by force-directed layouts.

Once again, extra visual effects are used to highlight elements important for our analysis and interpretation. An edge between two nodes indicates that the two persons represented by the connected nodes are referenced to in the same photograph. Additionally, each edge has an attribute containing the geographical information about the connection. Thus, each connection is a geographical linkage as well, making the graph to visualise geospatially grounded social networks.

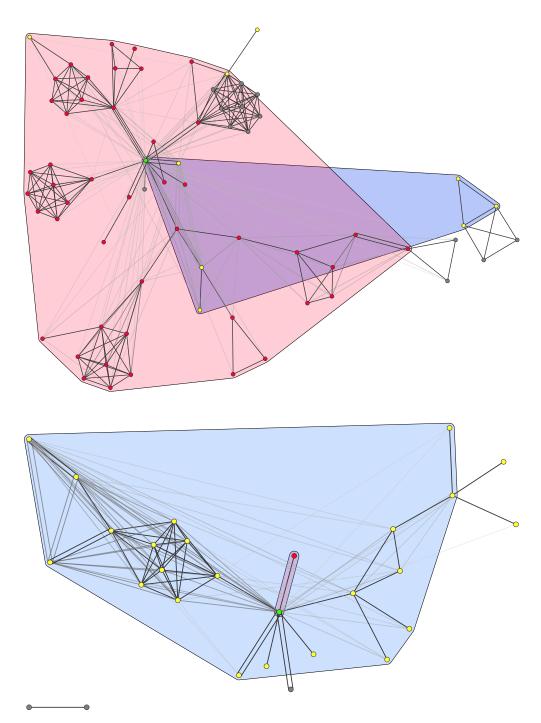[34]   See further Nocaj et al. 2015.

Figure 4: Roland Jahn's geospatial social network (a, top) prior to (1975-1983) and (b, bottom) after 1984-1990. Berlin connections in yellow, Jena connections in red. Layout: backbone (quadrilateral Simmelian).

Both visualisations use the same colouring schema. Roland Jahn's node is coloured in green, connections re-constructed by photographs taken in Berlin (both West and East) are coloured in yellow, and connections re-constructed by photographs taken in Jena are coloured in red. In addition, we have created group nodes for both main regions, Berlin and Jena, in order to better highlight the geospatial social connections. These group nodes are visible as partly overlapping areas, coloured in red (Jena) and blue (Berlin).

The visualisations give support to the assumption that Jahn's expulsion resulted in significant changes in his social networks. Considering, first, the geographical dimension, we can see a clear shift from the Jena region to Berlin. Photographs taken prior to Jahn's expulsion are dominantly taken in the Jena region, whereas a majority of the photographs taken after his expulsion have been taken in the Berlin region.

A similar significant change occurred in Jahn's social connectedness. In fact, only 11 out of 69 persons from Jahn's ego network prior to his expulsion can be found in his social network after 1983. These 11 persons are visualised as larger white nodes in Figure 5. This is an interesting finding, since Jahn illegally visited the GDR also after his expulsion. One possible interpretation is, that Jahn tried to protect his former collaborators by not showing up with them in situations where the risk of being photographed was real. This interpretation gain support from previous studies focusing on opposition movements in other dictatorships[35].

But there is also an alternative (or better: complementary) explanation for this minimal overlap between the two networks. Many of the names connected to Jahn's post-expulsion photographs are not directly linked with the Jena region. Instead, these findings provide support for previous studies which have shown that after his expulsion Jahn became a key mediator between the East German opposition movement and Western politicians and journalists.[36]A closer look at selected names of these 11 persons gives support for both interpretations: Peter Rösch was one of Jahn's collaborators in the hard core of the Jena opposition. Bodo Sturhann, Gerold Hildebrand, Ulrike and Gerd Poppe, Reinhard Weißhuhn, and Carsten Hahn, in turn, were activist in different opposition groups especially in the Berlin region.[37] However, all of them started their engagement in different dissident communities already in the 1970s or the early 1980s and were involved in the same activities – such as

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[35]   E.g. Düring and Beer 2011.
[36]   See especially Veen et al. 2000, 189-190; Scheer 1999; Praschl 2011; http://www.bstu.bund.de/DE/BundesbeauftragterUndBehoerde/Bundesbeauftrag-ter/_node.html [online. Last visited: 10 October 2018].
[37]   Neubert 1998, 432.

protests against Biermann's expulsion – as Jahn. Hence, Jahn seems to have maintained and exploited these old connections also after his expulsion. Jürgen Fuchs, in turn, was expelled to West Berlin already in 1977, but he remained involved in the East German dissident community until 1990, especially via Lutz Rathenow, who was also continuously present in Jahn's ego networks. Another important linkage between West and East was Petra Kelly, a Green activist involved in the peace movement in the 1980s.
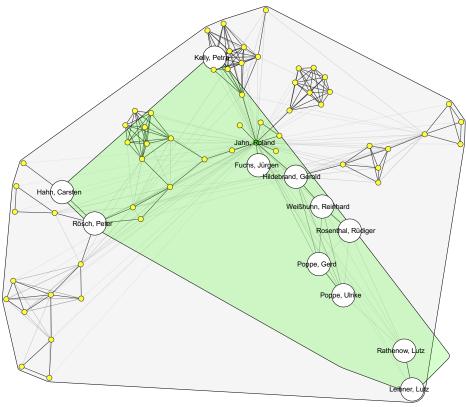

Figure 5: Change in Roland Jahn's geospatial social network after his expulsion from the GDR. Layout: backbone (quadrilateral Simmelian).

5   Discussion

This article sought to exemplify how a digitised photograph corpus can be exploited for network analysis focusing on the structure and dynamics of geospatial social networks. Our analysis shows how the regional connectedness based on personal mobility among the East German dissidents both changes and increases over time, thus resulting in continuously evolving patterns of social interaction. Further, the analysis of Roland Jahn's geospatial networks evidences the usefulness and power of historical network analysis when it comes to

tackling changes in patterns of social interaction. In all communist countries, the GDR included, dissident movements were torn between the search forpublicity and visibility, and permanent repression. The numerous expulsions of leading persons of the East German opposition movement underline the importance of social networks, also in the eyes of the Stasi. Consequently, the GDR opposition did its best to protect its social networks, while at the same time documenting its political actions and supporters by photographs. Photographs were also used as illustrations in underground magazines like "die andere" or "Umweltblätter".

Focusing on one crucial tipping point of the Jena opposition, the years 1982-1983, we followed the assumption that major changes in a person's situation would result in changes in geospatial social networks as well. Although this might sound self-evident, but the opposite direction provides an interesting methodological conclusion for exploratory research: exploring major changes in the social network structures could help us to identify turning points thus far lacking a plausible explanation or having escaped scholars attention.

There are two important, theoretical aspects relevant for understanding social cohesion and closeness among the East German dissident community. First, as already pointed out, previous studies have shown that the East German dissident movement revolved around a rather small number of core members. Our empirical analysis of Roland Jahn's social networks seems to confirm this. Speaking more generally, dissident communities can be assumed to be, at least to a great extent, emotional communities bringing similarly minded people together. And as previous research has evidenced, smaller networks tend to produce a higher level of emotional closeness.[38]

Second, geographical closeness – in this article in the form of regional connectedness – seems to support social closeness by strengthening other existing ties between the individuals.[39] Considering the space–time dimension, we can conclude that emotional and geographical closeness reduced the time needed for communication. Hence, mobile dissidents helped to overcome – or at least to reduce – the geographical distance by acting as transmission lines between regions. This rather theoretical consideration on the importance of geographical closeness gains support from Figure 3, where Roland Jahn acts as mediator connecting geographically rather distant regions. Naturalle, Jahn was not the only mobile dissident, but his case well illustrates the point. According to the structure of the network, Jahn seem to have had contact to regional "hubs", that is the core members in regional opposition communities. These

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[38]   Roberts and Dunbar 2011.
[39]   Yin and Shaw 2015.

regional hubs had, in turn, their own local social networks (visible in Figure 3 as nodes connected to nodes in Jahn's ego network but not to Jahn himself), resulting in a sub-network with an inner and outer layer, where the personal *non-tie* between a person in the outer layer and the ego is just as important as a tie itself.[40] It seems that these geographical links are "weak links" dividing the network structure into an "inner" and "outer" layer, whereas the ego-related links are "strong links" indicating also a stronger emotional closeness, in our case caused by the engagement in the opposition movement.[41] Our analysis also seems to confirm the finding of Roberts and Dunbar (2011) that the importance of "weak ties" lies in their function to provide "access to a greater variety of information, ideas, and experience than the stronger ties at the inner layers of the network".

Despite the rather promising analytical results discussed above, the analysis presented in this article has certain limitations the reader should be aware of. First, like any analysis, also our analysis is highly dependent on the data used. Although the photograph corpus used in this paper is quite large, neither the corpus itself nor its meta-data can be considered perfect or complete. Hence, there is a modest risk that the data itself can cause bias and, thus, compromise the results. We have tried to avoid over-interpretations, as well as under-interpretations, and sought to reflect our findings against previous studies in order to critically consider the relevance, validity and reliability of the results.

Second, this paper's focus has been on geospatial social networks obtained from photographs and, thus, can only be used to explore and analyse personal and regional connections and ties among a certain part of the East German dissident movement. One positive result is, that the networks re-constructed and analysed in this article fit quite well with the historical facts about the East German opposition. Another positive result is, that theoretical considerations on the role and impact of geographical and emotional closeness seem to explain – at least to a great extent – our findings. However, we cannot estimate how much data is missing or whether a bigger sample would have affected our results differently. Network analysis is known to be quite sensitive to missing data, a challenge relevant to all historians interested in applying network analysis. A proper understanding of the corpus serving as the primary source is indispensable, as well as understanding that historical network analysis is a research method, not an explanatory theory, and the results are always subject to context-related interpretation.

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[40]   Morrissey 2015, 72.
[41]   For "weak" and "strong" ties, see especially Granovetter 1973.

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