

ANALYSING CULTURAL NETWORKS IN CROSS-BORDER METROPOLITAN REGIONS. THE CASE OF THE UPPER RHINE REGION (GERMANY–SWITZERLAND–FRANCE)

AHMED BAKRY and ANNA GROWE

With 10 figures, 4 tables and 2 appendices

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Summary: In the last few decades, cross-border metropolitan regions (CBMRs) have been examined through the lens of binary prevailing network analysis, with substantial focus being placed on economy, innovations, and governance. However, the analysis of cultural networks is underrepresented in these contexts, although several voices have enquired about new concepts and practices for measuring spatial cultural networks and social proximities. This study was concerned with measuring cultural networks, as one step towards obtaining a deeper understanding of CBMRs. When focusing on cultural networks in border studies, it is necessary to understand: 1) how spatio-cultural networks can be conceptualised and measured from an interdisciplinary perspective; and 2) how cultural networks influence cross-border relations. Some of the literature has identified culture as the complex interrelation of values, artefacts, and behaviours, which presents multiple difficulties for analysing culture, per se. To analyse the influence of cultural networks in cross-border areas, this work took the Upper Rhine (UR), between the nation states of Germany, France, and Switzerland, as a case study. In the literature, this region is mainly referred to as being one coherent, integrated CBMR that shares similar dominant values. However, with regard to border cultural networks and national identities, this is empirically questionable. The UR region was analysed using two datasets, one quantitative and one qualitative. The analytical framework was based on the interlocking network model (INM) developed by TAYLOR (2001), which measures network and city centralities. Some adaptations were made to the INM to specifically analyse cultural networks in cross-border regions, giving rise to an ‘extended’ INM (EINM). Firstly, it was found that, although well-established cultural interrelations were identifiable in the UR cross-border region, a negative national border effect exists, leading to an uneven integration of German, Swiss and French cities into the cultural networks. Secondly, there was a significant difference between the INM and EINM, in terms of the number of relations and network centralities that could be captured, which led to different conclusions.

Zusammenfassung: In den letzten Jahrzehnten wurden grenzübergreifende Metropolregionen (CBMR) überwiegend durch die Perspektive der Netzwerkanalyse untersucht, wobei bislang ein Schwerpunkt auf die Analyse von wirtschaftlichen Netzwerken, Innovations- und Governance-Netzwerken gelegt wurde. Die Analyse kultureller Netzwerke ist jedoch unterrepräsentiert, obwohl mehrere Stimmen neue Konzepte und Praktiken zur Messung räumlicher kultureller Netzwerke gefordert haben. Dieser Beitrag befasste sich mit der Messung kultureller Netzwerke als einem Schritt zu einem tieferen Verständnis der CBMR. Will man kulturelle Netzwerke in Grenzräumen verstehen, so muss man analysieren, 1) wie kulturelle Netzwerke aus einer interdisziplinären Perspektive räumlich konzeptualisiert und gemessen werden können und 2) wie kulturelle Netzwerke grenzüberschreitend organisiert sind. In einem Teil der Literatur wird Kultur als komplexe Wechselbeziehung von Werten, Artefakten und Verhaltensweisen beschrieben, was die Analyse von „Kultur an sich“ erschwert. Um den Einfluss kultureller Netzwerke in grenzüberschreitenden Gebieten zu analysieren, wurde in dieser Arbeit die Oberrheinregion (UR) als Fallstudie herangezogen, die Teile von Deutschland, Frankreich und der Schweiz umfasst. In der Literatur zu Grenzregionen wird diese Region überwiegend als eine integrierte CBMR bezeichnet, die ähnliche dominante Werte teilt. Im Hinblick auf kulturelle Netzwerke und nationale Identitäten ist dies jedoch weniger eindeutig. In diesem Beitrag wurde die UR-Region mit Hilfe eines quantitativen und eines qualitativen Datensatzes analysiert. Der analytische Rahmen basierte auf dem von TAYLOR (2001) entwickelten Interlocking Network Model (INM), das die Zentralität von Städten in Netzwerken misst. Um speziell kulturelle Netzwerke in grenzüberschreitenden Regionen zu analysieren, wurden einige Anpassungen am INM vorgenommen, die zu einem ‘erweiterten INM’ (EINM) führten. Erstens wurde festgestellt, dass in der grenzüberschreitenden Region UR zwar gut etablierte kulturelle Verflechtungen festzustellen sind, dass aber ein negativer nationaler Grenzeffekt besteht, der zu einer ungleichen Integration deutscher, schweizerischer und französischer Städte in die kulturellen Netzwerke führt. Zweitens führt die Erweiterung der quantitativen INM-Analyse um qualitative Informationen in der EINM-Analyse, zu neuen Erkenntnissen zur Durchlässigkeit der Grenze in der UR-Region.

Keywords: cultural networks, cross-border interrelations, national border effect, cross-border metropolitan regions, culture values



1 Introduction

“Strong differences of a linguistic, *cultural*, ethnic, institutional or political nature between adjoining regions *could* cause various types of incompatibility and distance, resulting in impediments to industrial integration and trans-frontier innovation interactions” (TRIPPL 2009, 154, authors’ emphasis).

Regional and border studies of the last decade have been dominated by interaction and network analyses coming from political or economic viewpoints. These analyses have offered a wide range of intercity linkages and central city network rankings. However, while studying such city networks, other factors, beyond the political and economic aspects, have also been found to affect the relations between cities. These can be factors such as socio-institutional proximities, the amount of face-to-face contact between actors located in the different cities, cultural similarities and differences, common patterns of values, behaviours and routines, languages barriers, mental distances, and identities (PAASI 2011). These cultural factors need to be understood before any economic or innovative regional ambitions can be realised (HARRISON et al. 2019). Regional planners in border regions and geographers have requested new vantage points, with a new culture of theorising (HARRISON et al. 2019; ROBINSON 2016). They have pointed out the significance of considering culture as an aspect that influences spatial development and knowledge exchange (LÜTHI et al. 2018; SASSEN et al. 2008; TAYLOR 2004, 2005; TAYLOR and CATALANO 2002; TAYLOR et al. 2010, 2013).

HARRISON and GROWE (2014a) argued that relationally networked spaces can be linked to either geo-economic or geo-political logics, depending on the scale being addressed, in terms of city regions or cross-border regions. Each trajectory has its own nodal power, which pulls all networks towards their own interests to produce new regional metropolitan spaces. However, by focusing on the cultural component in regional development, new geo-cultural perspectives can be addressed at both scales. It has also been mentioned that regional network logics can be affected by a region’s culture, social behaviours, and interactions. Thus, regional culture is worthy of further examination, as it has been under researched in the literature. Hence, there is a geo-cultural network logic that may influence cross-border metropolitan regions (CBMRs) and that can be captured through network interrelation models (DERUDDER and PARNREITER 2014; HARRISON and GROWE 2014b).

This work aimed to examine cultural networks in order to provide a broader understanding of regionalism, while also introducing a new tool for use in network analysis. Opening the black box of spatial cultural networks by conceptualising spatio-culture from an anthropological as well as geographical perspective, we aimed to understand and measure spatial cultural networks and to analyse how these networks influence cross-border relations. In the study, we focused on two questions: 1) do cultural interactions cross all national borders equally in the case study CBMR; and 2) are cultural interactions across national borders more or less important than cultural interactions within the respective national parts of the case study CBMR? Answers to these questions led to a discussion of the effect of national borders on cultural exchanges in the case study CBMR in Europe.

The paper is structured as follows: Section 2 introduces the cultural spatial networks and the cultural aspect in border regions. In Section 3, a framework for conceptualising cultural networks in space is introduced, with special emphasis being placed on the relationships among values, artefacts, and behaviours. Section 4 introduces the new extended interlocking network model (EINM) for analysing cultural networks in space, the data used in the study, and the Upper Rhine (UR) case-study region. Section 5 includes the results of our examination of both the interlocking network model (INM) and the EINM, and the influence of cultural network analysis on the border.

2 Cultural spatial networks in border regions

2.1 Cultural networks in space

‘Culture’ is an elusive and complex concept that is used in several disciplines. Moreover, cultural networks are difficult to conceptualise, measure and analyse. According to THARP (2009), in 1952, there were more than 164 different definitions. However, culture can best be described as *values*, languages, beliefs, myths, rituals, and habits. ROHNER (1993) identified culture from two perspectives - anthropological and sociological. The anthropological perspective is related to a system of beliefs, *values*, and symbolic meanings that exist in people’s minds *that control* behaviours and interactions. The sociological perspective is related to human behaviours, and includes artefacts, technology, modes of economy, settlement patterns, modes of social grouping, and po-

litical organisation. This latter perspective has been criticised, as not providing sufficient understanding of what people share in their minds and what inspires them and their actions (KANG et al. 2007). “Culture in the anthropological sense often refers to a “whole way of life” of a people. In sociology, however, the term has usually been applied in a more specialized manner, referring to particular subjects (like the arts) or to symbols” (BORER 2006, 180).

Building on this, THARP (2009) identified three dimensions of culture, based on what we think, do and make. These dimensions can be differentiated between one invisible aspect - ‘values’ - and two visible aspects - ‘behaviours’ and ‘artefacts’ (see Fig. 1). Values are the most significant influential force affecting and inspiring the responses, behaviours, and artefacts of different communities. These values underlie social practices, interactions (behaviours) and specific institutions (artefacts) (SCHWARTZ 2014). Different values might result in different meanings for the same or similar artefacts and behaviours or might result in different artefacts and behaviours. Thus, values can be understood as a basis for culture (FOUBERG and MURPHY 2020; VINKEN et al. 2002).

“The frequencies of particular primes, expectations, constraints, affordances, and taken-for-granted practices in a society express the underlying normative *value* emphases *that are the heart of the culture*... This is especially necessary for *cross-cultural studies* because people in one culture or subculture *may reject values from other cultures*” (SCHWARTZ 2014, 549–554, authors’ emphasis).

However, values, as such, cannot be seen or spatially analysed, although, according to SCOTT (1997), culture is place-bound, with places still being undeniably a depository for distinctive cultures. Specific places, cities and regions are the spatially tangible repositories and reservoirs for culture, where all human interactions occur. On one hand, the physi-

cal territory of communities or nations provides spaces for artefacts, for behaviour, such as face-to-face contact, and for practicing culture (territorial space of place) (Castells 2010). On the other hand, behaviour, such as interaction, links various places, resulting in the formation of city networks (network space of flow) (ANDERSON 2020; CASTELLS 2010; GAMSU and DONNELLY 2020). “Communities that interact frequently over time eventually generate a *cultural network* consisting of clusters of common concepts, emotions, and practices” (KOROTAYEV and DE MUNCK 2003, 355, authors’ emphasis). In this respect, there are significant relations between cities as places (geographical component), communities that practice culture (human component) and networks of flow between places (interaction component). In that sense, culture is both territorial and network-based, and it can be analysed from both perspectives.

2.2 Cross-border metropolitan regions and cultural identity

Cross-border regions are defined as spaces that incorporate the neighbouring territories of several nation states. They can differ in size and form. However, in the EU they are defined by the European Commission (2017) as areas in EU member states that are within 25 km of each intra-European border. Due to the negative border effects affecting EU border regions and EU citizens within those border regions, there has been a specific focus on these regions by the European Commission. Difficulties concern trans-frontier cooperation, social integration processes, accessibility, administrative and legal barriers, and economic disparities. However, the most challenging obstacles are *cultural and mental differences*, including trust, fear of the ‘un-

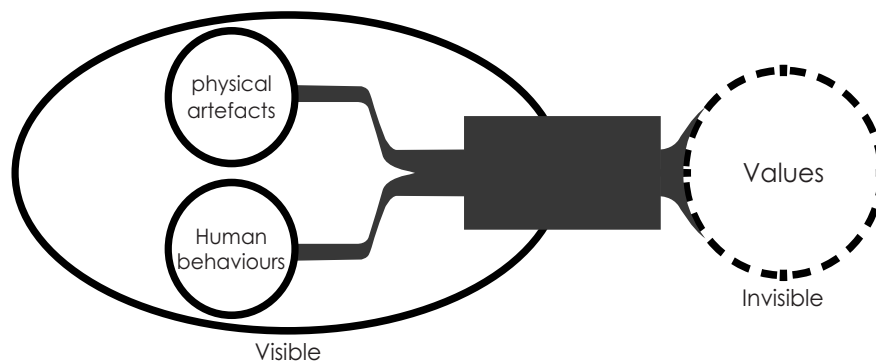


Fig. 1: Identifying culture

known' on the other side, stereotypes, language barriers and different identities (BECK 2017; European Commission 2017).

Several concepts have aimed to overcome such negative border effects. One example is the CBMR, which has adopted the positive effects of metropolisation, and which operates on both sides of a border, potentially resulting in systems of cross-border regional innovation. The concept of the CBMR also covers various governance approaches, with joint cross-border solutions being key (BECK 2015, 2018). Key to CBMRs is knowledge generation and diffusion through beyond-border interactions, resulting in networks that link places on both sides of the border. CBMRs emphasise the relevance of the socio-institutional dimension in border regions, which is composed of formal institutions (laws, regulations), as well as informal institutions (cultures, values, routines) (CAPPELLANO and MAKKONEN 2020). "Socio-cultural and institutional proximity [are] assumed to be important prerequisites for systemic innovation activities" (LUNDQUIST and TRIPPL 2013, 451). Thus, cultural networks, as informal institutions, can be understood as preconditions for knowledge exchange in networks and as prior conditions to the formation of governance beyond borders.

Several cross-border studies have tried to tackle the subjects of border opportunities and hindrances. However, these have been approached from economic, infrastructural or political points of view (CAPPELLANO and RIZZO 2019). "A review of the keywords of publications on border regions does of course find some obvious themes: (1) cooperation and integration; (2) regional (economic) development; (3) governance, policy and politics; and (4) mobility: migration, tourism and labour markets. Other clear, but less prominent, themes involved discussions about globalization versus regionalization, as well as on *ethnicity and identity*" (MAKKONEN and WILLIAMS 2016, 360, authors' emphasis). Although several scholars have aimed to tackle culture, trust, neighbour perceptions, and social proximities in relation to border regions, there has yet to be a framework for the quantitative analysis of cross-border cultural networks (BOSCHMA 2005; CAPELLO et al. 2018; DECOVILLE and DURAND 2019; DECOVILLE et al. 2013; MAKKONEN and WILLIAMS 2018). Other scholars have examined border effects through social network analysis. However, they were mainly focused on governance and transportation actor networks (DÖRRY and DECOVILLE 2016). Cultural networks are therefore underrepresented in cross-border network analyses.

Important in this context is that CBMRs do not fit neatly with national, regional or local identities and cultures (HAGEN and DIENER 2019; HARRISON and GROWE 2014b; PAASI 2011). "Current cross-border regions are often units that have emerged rapidly from the desks of planners, politicians and business coalitions, not from long historical regionalization processes and the daily struggles of citizens. And which does not have any real political, *cultural* or economic meaning" (PAASI 2003, 480, authors' emphasis). Regional identities cannot be easily created. They require cultural relations, trust, solidarity, social meaning, and emotion through 'institutional thickness' (ASHIZAWA 2008; RAAGMAA 2002). These are influential institutions that create socio-cultural networks and represent a region's various cultures, values, and identities. In cross-border regions, cultures, values and identities may result in multi-level fragmented identities for cross-border citizens; for example, fragmented between the national identity and the new cross-border identity (PAINTER 2002). This poses questions about whether cultural networks in CBMRs are integrated beyond national borders and thereby support the experience of cross-border identities, or whether the national borders still have negative effects on cultural networks. In this respect, the level of cultural interaction will influence the mental distance between the border citizens. The more interaction takes place, the less negative border effects can be assumed (European Commission 2017).

3 Conceptualising cultural networks in space

3.1 Challenges

There have been several attempts to support cultural analyses in regional and border studies (BAIL 2014; BAILEY et al. 2018; MARKUSEN and GADWA 2010). However, they have suffered from several shortcomings, in terms of the conceptualisation and measurement of culture. Firstly, several spatio-cultural analyses have dealt with the territorial aspects, without referring to the existence of cultural networks and relational flows, and links between cultural nodes, with one example being an attempt to measure culture as one metropolitan function in Europe, according to the BBSR (2011). Secondly, selecting only one specific indicator to measure culture, as a precondition for identities in different spatial contexts, might be questionable. For example, CASET and DERUDDER (2017) identi-

fied global cultural cities by using the cities' "centrality in 'field-configuring events', such as festivals, biennials, and fairs" (CASET and DERUDDER 2017, 238). According to their approach, cities that did not offer sufficient integration in global exhibition networks were not included on the world culture map. This approach represents the sociological perspective on culture; however, it does not support the findings concerning culture as a precondition for identity formation. To understand the overlapping and changing of various identities in cross-border regions, an anthropological perspective on culture is necessary. Thus, it might be argued that selecting one indicator to measure world cultural hubs is unlikely to reveal the genuine meaning of culture for each region. Thirdly, the analysis of culture can be differentiated based on whether a qualitative or quantitative approach is applied. When dealing with cultural values, perceptions and rituals, most analyses focus on qualitative cultural mapping, such as that of BORER (2006), which relied on narrations by individuals to identify community cultures for development purposes. Using qualitative approaches promotes an understanding of specific regional networks and actor constellations. However, quantitative approaches allow the comparison of structural differences and similarities in networks in multiple regions. Thus, to compare the cultural networks in several regions, a quantitative framework for analysing those cultural networks needs to be developed.

3.2 Two phases for conceptualising cultural networks

To conceptualise cultural networks, the following findings, developed in the theoretical part of this study, were used as starting points:

- Understanding culture and cultural networks is a precondition for understanding other forms of exchange, especially in border regions;
- Cultural networks can be analysed from a territorial, as well as from a network, perspective;
- To compare structural similarities and differences, cultural networks need to be analysed through a quantitative perspective; and
- Culture and cultural networks cannot be measured and compared from an anthropological perspective when choosing only one indicator. Because people interact and behave differently according to their values, different indicators that serve as proxies for those values might be

chosen. Thus, cultural networks for each border region can only be examined after identifying the indicator that best reflects each region's most dominant values.

The conceptualisation of a framework for measuring cultural networks in border regions was conducted in two phases. In Phase 1, the regional/national values were identified, while in Phase 2, the invisible and intangible values were translated into measurable indicators, based on cultural artefacts and behaviours. Thus, the analysis of cultural networks requires the measurement of both these aspects - physical artefacts and human behaviour - to represent and serve as proxies for the non-measurable cultural values.

3.2.1 Phase 1: Identifying cultural values as a primary interest

Only a few studies have tried to map the cultural values of different nations or regions spatially, among which are those published by INGLEHART and BAKER (2007) and SCHWARTZ (2014). Both studies mapped the different national priorities for cultural values. SCHWARTZ (2014) suggested grouping nations in a circular structure according to their different main values, with nations having opposing main values being positioned opposite to each other, along an axis cutting through the circular structure. The author distinguished eight main world regions in relation to seven cultural-value axes. According to SCHWARTZ (2014), France, Germany and Switzerland are part of the world region classed as 'West Europe', which relies on the main values of 'intellectual autonomy and egalitarianism'. These two main values host a set of sub-values - namely equality, honesty, helpfulness, creativity, open-mindedness, freedom, and curiosity (Appendix 1). "West European culture is the highest of all regions on egalitarianism, intellectual autonomy, and harmony, and the lowest on hierarchy and embeddedness" (SCHWARTZ 2014, 561). Although SCHWARTZ's (2014) model refers to national values, it also provides a starting point from which to understand cultural values in cross-border regions. The author argued that neighbouring regions exchange, and thus influence, each other's values. "Most regions reflect some geographical proximity. Hence, some of the cultural similarity within regions is doubtless due to diffusion of values, norms, practices, and institutions across national borders" (SCHWARTZ 2014, 260).

The idea of cross-border values is also picked up in the concept of the CBMR. The CBMR concept assumes positive effects in border regions due to cooperation and exchange within polycentric urban systems in one cross-border region. According to SCHWARTZ (2014), neighbouring border nations share similar and joint dominant values. Using shared similar values in the CBMR concept supports collaboration, cultural integration, and the citizens' acceptance of the other part of the cross-border region, as well as the development of a new identity in the cross-border region (see Fig. 2). Figure 2 (left side) depicts a cross-border region with few interactions, which has resulted in solidifying national identities, even though the spatial proximity in the cross-border region enables an approximation of values. Figure 2 (right side) shows a cross-border region in which cross-border interaction and networks have been intensified in polycentric urban structures in the region. This intensification in exchange and networks has led to an approximation of values and to the development of a new cross-border regional identity.

Although SCHWARTZ (2014) mapped the nation states based on one main value, it must be emphasised that the other values could also be found in each nation state, although they were of lower priority. No nation, region or community participates in only one value group (BORER 2006). In other words, in each region and nation, culture is composed of several cultural frames. The individuals living in those nations and regions are part of these

structures, albeit some cultural frames dominate over others (PÉCOUD 2010).

To summarise, values are of primary interest because they form the basis for culture and cultural exchange. However, values are invisible and intangible and cannot be measured, per se. Thus, in Phase 2, while conceptualising an analytical framework for cultural networks, proxies had to be identified that allowed unmeasurable values to be understood.

3.2.2. Phase 2: Identifying physical artefacts and human behaviour as proxies for measuring cultural values

In Phase, 2, values were translated into measurable indicators. Three dimensions of culture - what we think, do, and make (see also Fig. 1) - have been identified (THARP 2009). While values (what we think) cannot be observed directly, what we do (human behaviour) and what we make (cultural artefacts) can be observed. Therefore, in Phase 2, appropriate proxies with which to analyse values indirectly were identified (see Fig. 3).

With regard to a spatial analysis of cultural networks, the main focus of regional or national values has to be translated into spatially relevant human behaviour and physical artefacts. As the main focus of cultural values in the case study region is determined through the West European main value of "intellectual autonomy and egalitarianism" (SCHWARTZ 2014, 561), with the sub-values of equality, honesty, help-

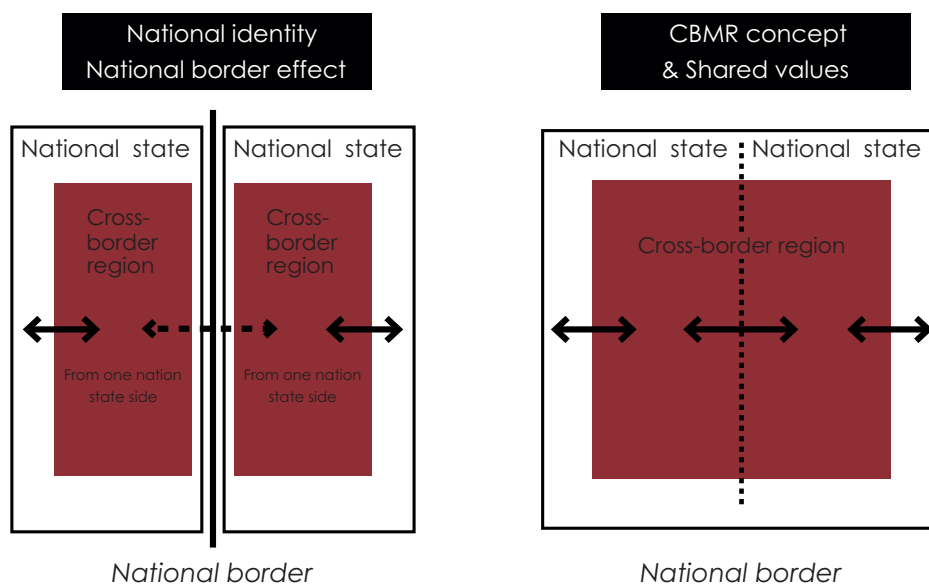


Fig. 2: Different extent of cross-border exchanges with and without cross-border polycentric urban systems

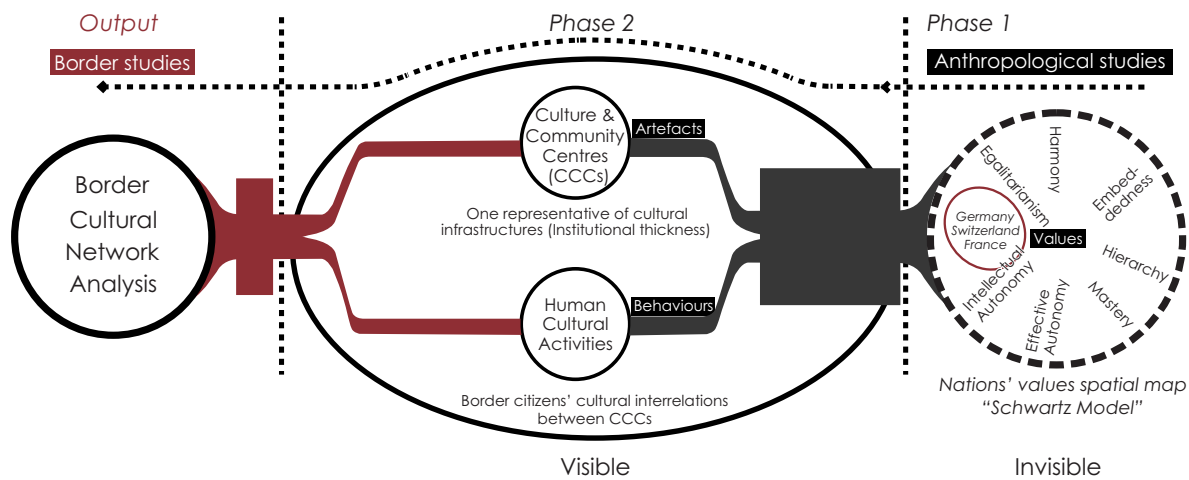


Fig. 3: Developing measurable proxies for analysing cultural values

fulness, creativity, open-mindedness, freedom and curiosity, our aim was to identify measurable spatially relevant human behaviour and physical artefacts that reflect these values.

Physical artefacts with spatial relevance are understood as physical infrastructure with a distinct location (EVANS 2001; PECK 2005). MAGER and WAGNER (in press) offered a typology of nine different types of cultural infrastructure. To analyse the physical cultural infrastructure in the cross-border regions, culture and community centres (CCCs) were chosen. MAGER (2014) considered CCCs to be creative spaces designed for sustainable meetings that engendered communication, integration, innovation, and self-determination. Thus, CCCs serve as a representative proxy for measuring intellectual autonomy and egalitarianism, highlighting the sub-values of creativity, open-mindedness, and curiosity.

Such centres offer one or more of the following activities: workshops; educational classes and courses; seminars; learning studios; art and musical events; theatre performances; dances and festivals; general gatherings; exhibitions; poetry slams; and social services. "These *social institutions* continually expose the individuals living in the society to primes, affordances, and expectations consistent with the underlying cultural values" (SCHWARTZ 2014, 550).

While CCCs are, of course, not the only possible proxy for understanding cultural networks, they provide advantages for empirical analyses. CCCs can be public, civic, or private spaces and, thus, can reflect various networks. They usually share non-profit aims. Other indicators, such as museums, sports arenas, or opera houses, are likely to be more touristic or to host singular cultural events. This might

restrict individuals from visiting and, thus, could affect the measured cultural network. CCCs offer the possibility to analyse networks of CCC branches, but also incorporate the breadth of the catchment area of each centre in terms of people's everyday activities, such as attending educational classes and courses and participating in special activities, such as performances and exhibitions. In this respect, CCCs serve as cultural nodes in a world that is shifting from bound to mobile territories with flows of communication, interaction and human activity (PAASI 2002; SCOTT 2001), and cultural flows between individuals, especially experienced by cross-border commuters (CASTELLS 1996).

In a nutshell, CCCs combine the specific location and importance of cultural infrastructure (artefacts), whilst also serving as hubs in branch networks of CCCs. Beyond the branch networks, however, CCCs also serve as anchor points in individual flows and human activities, creating another layer of cultural networks through the sharing of ideas, values, routines, and traditions, while meeting in CCCs (behaviour). Human behaviour can be conceptualised in terms of individuals who are travelling from one city to another to attend a cultural event, or employees travelling from one city to another to work in another cultural centre, or a cultural centre organising a cultural event in a different city. For this study, qualitative information about such activities was gathered and used to represent cultural behaviour. In this sense, cultural networks of artefacts and behaviours can be captured through the indicators of centres and their branch networks, as well as the catchment area of each CCC (see also Fig. 3).

4 Measuring cultural networks in the Upper Rhine region

4.1 Suggested model

After identifying CCCs as an appropriate indicator for analysing cultural behaviour and artefacts, and as a proxy for understanding cultural networks against the background of the sub-values of creativity, open-mindedness and curiosity, this section describes how to go about measuring them. There are not many methods available for measuring spatial networks in a quantitative way. One of the most prominent, however, is the INM, originated in the late 1990s by Peter Taylor. The INM is an approach for studying global network connectivities between cities, using office locations of advanced producer-service firms (TAYLOR 2001). Although the INM was first applied to understanding global economic networks, it can also measure various network types based on the chosen indicators and be combined with various other analyses (GROWE and BLOTEVOGEL 2011; GROWE and VOLGMANN 2016). In the context of our analysis of cultural networks, modifications to the INM, resulting in an EINM, were required, for the following reasons:

- The INM is based only on a quantitative dataset, which might present difficulties when dealing with a relational topic such as culture;
- The INM measures hypothetical network flows between the branches of institutions, but it does not add human activities or individual behaviours to the process; and
- The INM uses only a bimodal analysis by relying on the sub-nodal level. However, by integrating a unimodal analysis, a broader image can be captured (DERUDDER and PARNREITER 2014).

Accordingly, the EINM was introduced as a complementary version to the INM in order to overcome its shortcomings regarding culture. The EINM is composed of two components - a basic layer (the INM) and an extended layer. This extended layer introduces a human-activity component into the network analysis, based on a unimodal network type and a qualitative dataset.

4.1.1 The basic layer

The basic layer (the INM) provides a service value, v_{ij} , for the presence of central branch j in city i . These reflections can be arrayed as a service-value

matrix, V , producing relational measurements. The v_{ij} is provided according to the regional functionality of the examined branches (DERUDDER and TAYLOR 2018; LIU et al. 2014; TAYLOR et al. 2014). The city dyad connectivity (CDC) between city x and city y , according to the V matrix, can be measured according to the equation:

$$CDC_{x,y} = \sum_j v_{xj} \cdot v_{yj}, \text{ where } x \neq y \quad (1)$$

Accordingly, the total network connectivity (TNC) can be calculated for city x using other cities through the network centres:

$$TNC_x = \sum_y CDC_{x,y} = \sum_{yj} v_{xj} \cdot v_{yj}, \text{ where } x \neq y \quad (2)$$

The CCCs in the UR act as the sub-nodal level. A city that hosts a branch is called type a . Hypothetically, flows of cultural information, ideas, knowledge, etc. occur via their several office locations. Accordingly, City a acts as a sender and receiver of culture. The service-value standardisations range from 0 to 4. A city that hosts the headquarters of a centre that has other, different branches in the analysed cities was scored as 4, with 0 for cities with no existing centre and 1–3 representing the functionality of the branch. A score of 1 was given if a centre had no other official branches, but had a partnership with another centre in the analysed cities. A score of 2 or 3 was given to centres if they had other official branches in the analysed cities, with a 2 being given to a small centre hosting fewer than 24 cultural events per year and a 3 to one with more than 24.

4.1.2 The extended layer

As explained above, the extended layer deals with the direct human activities that occur in different cities. The EINM introduces two extra types of cities - City b , which hosts only the human activity of the extended layer, and City c , which hosts both a central branch and extended human activity. These two extra city types also gain service values due to their participation in the network. The activities that the extended layer adopts are either one or all of the following:

- Sending employees from City b to work in a City a centre;
- Sending several participants from City b to attend regular cultural events in City a ; and/or
- City b hosting external events organised by a City a centre.

In other words, cities attract service values that are then transferred to the cultural network if they have either a CCC branch or they participate in at least one of the human activities of the extended layer, or both. Figure 4 summarises the differences between the INM and EINM.

Still, the extended layer cannot function without the basic layer and having a centre as an anchor, so that human activities can take place. Accordingly, it is not valid to have a network between City *b* and another City *b*. The differences between the INM and the extended layer were reflected on while designing the extended layer service value loads. The basic INM layer has a wider range of values (0–4) due to its dominance in transferring knowledge using fixed structures, while the extended layer values only range from 0 to 2. These values can be flexibly designed according to the study’s perspective and the nature of the network. If these values are changed, the interrelations and results will change. Figure 5 illustrates the EINM loads in detail, with a particular focus on the extended layer.

Tables 1 and 2 describe a hypothetical example using an EINM for the three different types of cities (*a*, *b*, *c*), and using five different centre cases. As shown, the service values can be aggregated in cases where the city participates in more cultural activi-

ties. The numbers in black represent the existence of branches, while the numbers in colour represent the extended layer; these would not have been captured if dealing only with the INM. For example, in the case of Centre 4, there is a relation between Cities *a* and *b*, which takes place in real life. However, when relying on the INM, this centre would not be integrated into the network analysis. In the example of Centre 3, City *b* is receiving (hosting) events and sending participants to Cities *a* and/or *c*, while City *c* is sending employees to City *a*. Accordingly, City *b* deserves to attract service values and participate in the cultural network. This ends up capturing wider interactions, and providing a better understanding of cross-border regions and their cultural cooperation, social proximity and ties, similarities and differences, and levels of trust and acceptance.

4.2 Case study: The Upper Rhine metropolitan region

Since 1975, and the signing of the Bonn Agreement for cross-border cooperation in the UR region, many programmes, projects, policies, and conferences have taken place. According to this

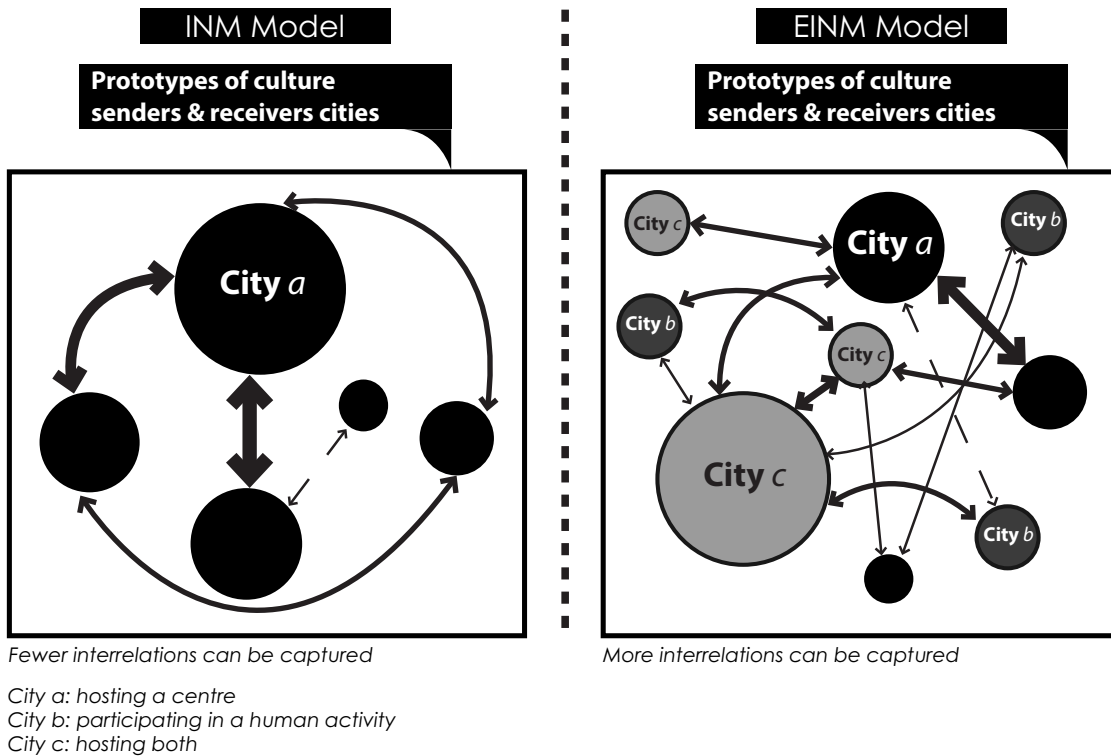


Fig. 4: Difference between the interlocking network model (INM) and extended version (EINM)

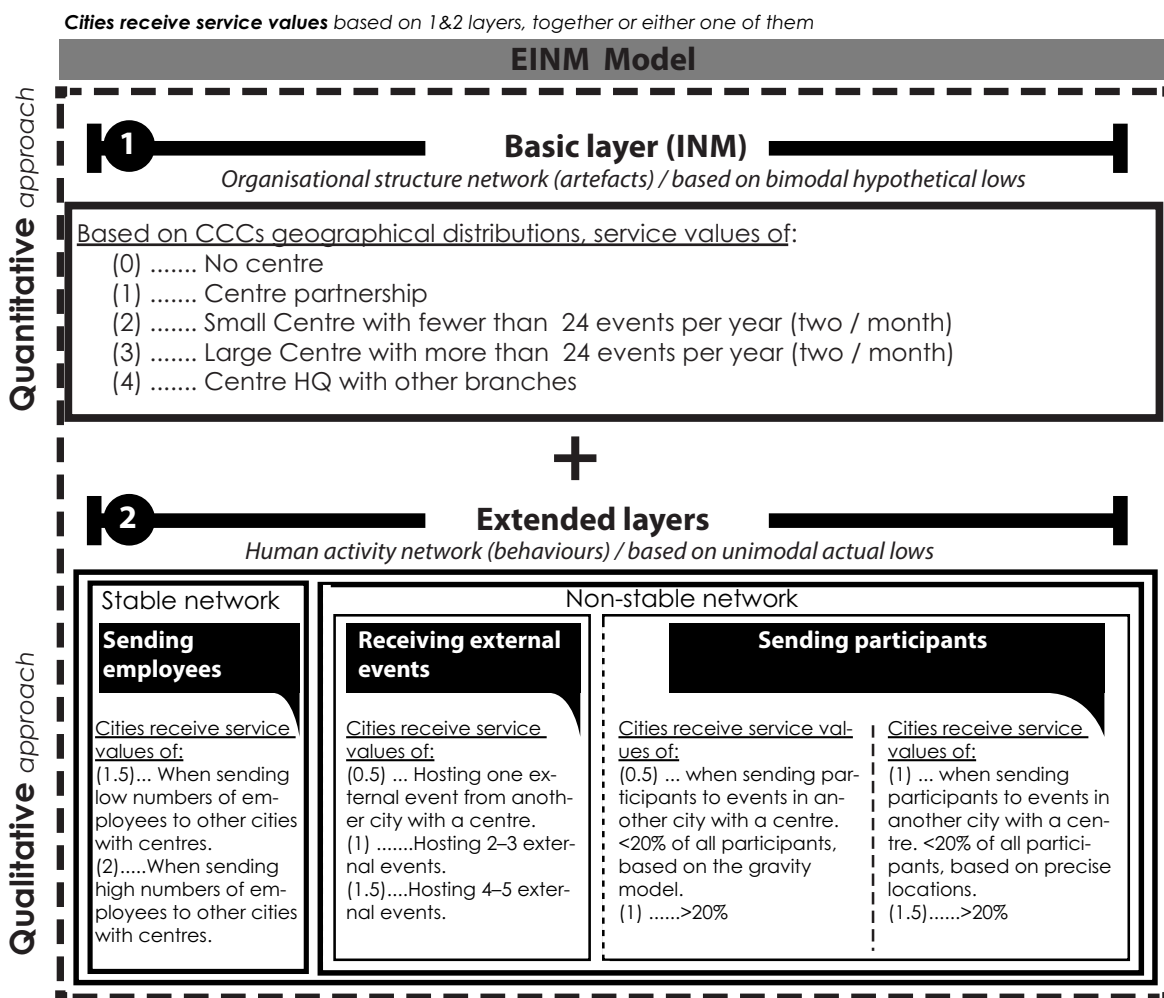


Fig. 5: Extended interlocking network model (EINM) description and service-value loads

agreement, an UR conference is held twice a year, where governmental bodies of the three countries meet (UR Conference 2021). The Bonn Agreement also created an intergovernmental commission, consisting of eight members, that works as an intermediary between the UR and representative governments

in matters that cannot be solved at the regional level. The French, German and Swiss governments shared a joint desire for cross-border cooperation and the creation of common links (SOHN and REITEL 2016). Accordingly, several activities regarding cross-border cooperation have taken place, including:

Tab. 1: Hypothetical example of a service-values (V) matrix based on the extended interlocking network model (EINM)

	EINM					
	Centre 1	Centre 2	Centre 3	Centre 4	Centre 5	Service values sum
City a	4 HQ	4	3	2	4	17
City b	1.5 + 1		1 + 1.5	1.5	2 + 0.5	9
City c	2 + 1	2 + 0.5	4 + 1.5		1 + 0.5	12.5

Notes: INM basic layer: black: centre functionality; extended layer: red: sending employees; blue: receiving events; green: sending participants

Tab. 2: Total network connectivity matrix based on table 1

	City <i>a</i>	City <i>b</i>	City <i>c</i>	Centrality sum
City <i>a</i>		30.5	44.5	75
City <i>b</i>	30.5		25	55.5
City <i>c</i>	44.5	25		69.5

- The formation of four Euro-regions Pamina, Strasbourg-Ortenau, Freiburg-centre et sud Alsace and trinational Basel;
- The establishment of the Rhin supérieur–Oberrhein cross-border cooperation programme through European territorial cooperation (Interreg), under the European regional development fund of the European Union cohesion policy. This programme started in 1989 and renews its goals every seven years. It works on various vital axes, such as smart growth, sustainable growth, inclusive growth, and territorial cohesion (INTERREG 2021);
- The founding of an UR council in 1997, consisting of 71 members;
- The creation of the Rhine Metropolitan Trinational Region at Offenburg in 2010 by the Trinational Conference, following the political discussions at the Tripartite Congress in 2008. It works on four pillars (science, economy, civil society, and politics) geared towards enhancing regional competitiveness, and its attractiveness as a living space for sustainable future development (UR Conference 2021); and
- The gaining of political support for the UR metropolitan region from both the German and French sides after its admission into both policy strategies by the Initiativkreis Metropolitare Grenzregionen in Germany in 2013 and the Mission Opérationnelle Transfrontalière in France (BMVBS 2013; HARRISON and GROWE 2014a).

All these activities have various cross-border cooperation goals, with the emphasis on encouraging citizens in cross-border activities, promoting cooperation between cultural and social institutions, and overcoming cultural and language differences (FRICKE 2015; WALTHER and REITEL 2013). One main theme in the UR conference is culture:

“*Cultural exchange* makes national borders more permeable and helps overcome barriers – language and others. [A] culture forum should make it possible to promote a rapprochement and the emergence of a *tri-national cultural collaboration* between the territories of the Upper Rhine” (UR Conference website 2021, authors’ emphasis).

However, there are questions about whether these activities will empirically create a new homogeneous border culture without barriers, or a new trinational culture with intense cultural interactions. Particular questions centre around whether the UR border citizens - who already shared similar dominant values - will share the same acceptance and trust of each other’s perceptions of the CBMR, and whether these activities will reduce the national border effect.

Therefore, the UR region is a relevant case study for measuring cultural networks, testing the EINM, and producing empirical evidence for cross-border community integration. To identify suitable polycentric urban systems as a basis for the network analysis, several criteria, city comparisons, and qualitative and quantitative information were taken into consideration. Cities were taken into consideration based on similarities in their total number of populations on each side of the border, their territorial size on each side of the border, and the average distances between the chosen cities and the physical border on each side of the border. Nevertheless, on the top of these criteria, the nearest two corresponding cities to the border were selected from each Euro-region. This resulted in the determination of nine border-zone cities: Zone 1 - Karlsruhe and Lauterbourg; Zone 2 - Kehl and Strasbourg; Zone 3 - Freiburg and Colmar; and Zone 4 - Lörrach, Saint Louis and Basel. Figure 6 shows the selected cities. Thus, from a statistical point of view, the cities representing each side of the border can be compared, and there is no overbalance when selecting cities from one side of the border over the other.

4.3 Data-gathering

It was difficult to find a reliable source that had gathered all the data regarding the registered CCCs in the three different countries with the same level of detail and information. Also, as the analysis was aimed at measuring the local cultural network through human and organisational interactions along the border, it was beneficial to use an open-source, easily accessible method. The analysis passed through three steps. Firstly, a database was created by listing all the CCCs in the UR region using the Google Maps search engine. The search terms used were ‘cultural centre’ and ‘community centre’ for each of the stated nine cities, in three languages (German, French and English). For a centre to be listed, it had to provide a working website and describe itself as a cultural or community centre in Google Maps. The gathered data was narrowed down to the centres located within the administrative

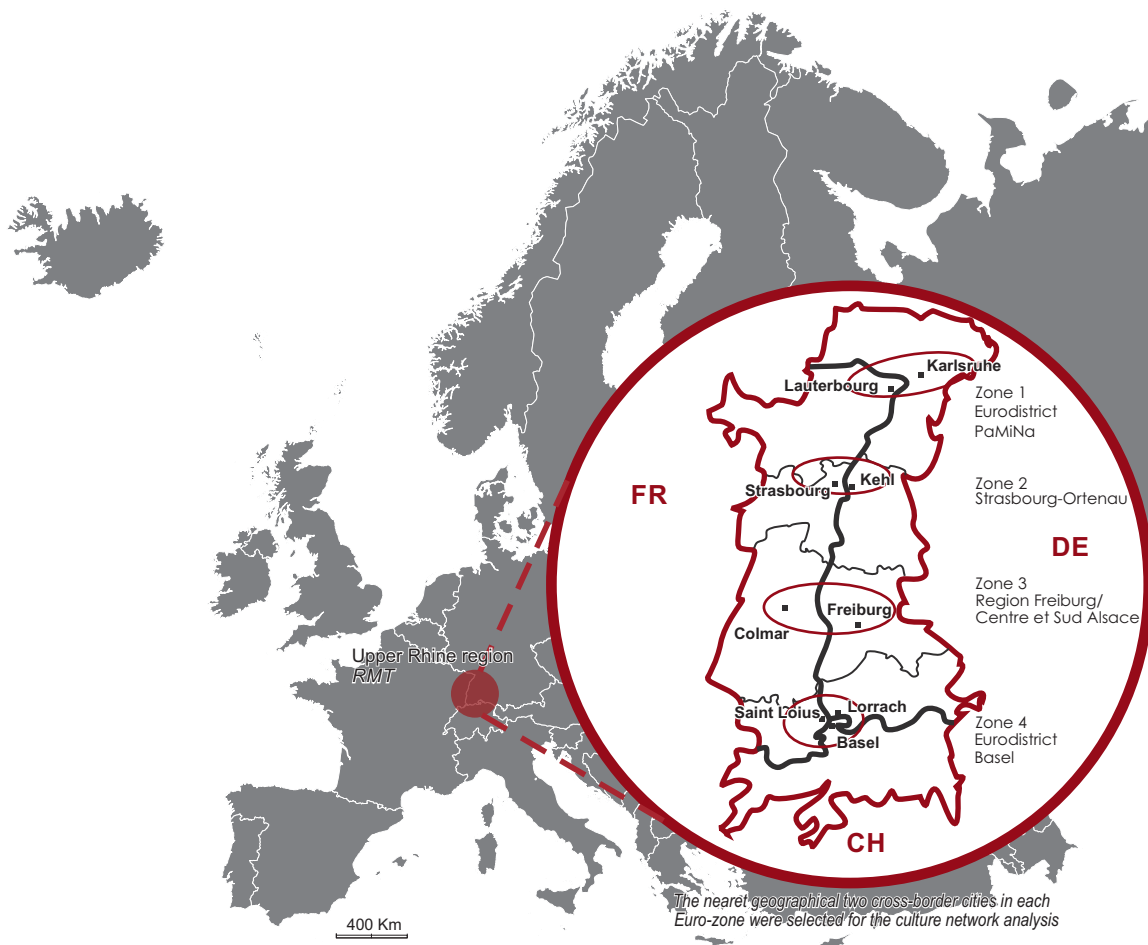


Fig. 6: Upper Rhine region case study, showing its four euro-districts and the selected cities

borders of the nine selected cities. Centres captured outside the administrative borders of the nine selected cities were neglected. This resulted in 99 centres in 2019. However, not all of these were used in the network analysis. Some were eliminated because the centre did not have another branch in one of the selected cities, or did not participate in one of the three sub-layers of the extended layer.

Secondly, for the INM analysis, CCCs with several branches in the selected UR cities were identified. This reduced the number of centres to six out of 99. These six centres had 15 branches across the nine cities. Then, the service loads were distributed according to the functionality of each branch. Thirdly, regarding the EINM, a qualitative questionnaire was applied to identify the extended layer. This information was obtained by either emailing a questionnaire to the 99 centres, or by obtaining information from their websites or representative social media pages. The resultant qualitative dataset could have been enhanced by conducting in-

depth interviews with representatives of the 99 centres; however, this was impossible due to the COVID-19 pandemic situation and the lockdowns at several borders. Also, performing this large number of in-depth interviews in three different countries and nine different cities would have involved an inordinate amount of time and effort. Accordingly, we considered only 22 centres out of the 99 listed ones (Appendix 2). Ten centres responded to the questionnaire, which included the following questions:

- Where does each centre employee come from?;
- Does the centre hold external events? If yes, where?; and
- Where does the average number of event participants in the host centre come from?

The data were collected without bias, with each side of each border considered according to what it could offer culturally in relation to the study, and with the same methodology applied evenly.

5 Upper Rhine cultural network analysis

5.1 Cultural networks in the Upper Rhine region through the basic-layer interlocking network model

Regarding the INM, a basic cultural network could be captured without the involvement of all the cities. The most cultural central city was Freiburg, followed by Karlsruhe, Kehl and Basel. Although Strasbourg acts as the French capital for the eastern Alsace border region, it was fragile in the network. The German cities showed a high dominance regarding cultural networks, while there was a very weak participation from the French side. The German side had centralities of 97 out of 116, whereas the French side had only five out of 116. The French side even fell below Switzerland, which had a centrality value of 14, even though Switzerland participated in this network analysis with only one city - Basel. According to the INM, the French cities were subdued, although they were relatively active in the following EINM analysis. Table 3 shows the relative connectivity, considering Freiburg as '1'.

5.2 Cultural networks in the Upper Rhine region through the extended interlocking network model

There were various obvious cultural relations among the nine cities, without excluding any of them from the EINM. Karlsruhe came out on top of the list, followed by Basel, Freiburg, and

Strasbourg. This means that Karlsruhe acted as the central node, controlling the flow of cultural interactions from the north side of the region, while Basel played almost the same role from the south. In each Euro-region zone, interaction was taking place between the two corresponding cities. However, there was more activity in Zone 4, between Basel and Lörrach, followed by Strasbourg and Kehl in Zone 2. Regarding physical proximity, although Karlsruhe acted as the main central node, it still did not seem to have significant connections with the corresponding city on the French side (Lauterbourg), rather preferring its relationship with the other capital of Alsace, Strasbourg. Also, Freiburg was relatively connected to Strasbourg and Karlsruhe, even though they were farther away. It can be concluded that, not only does close physical proximity play a significant role, but so does a central position and being a capital city. "Being geographically close does not automatically mean that relational proximity abounds" (LUNDQUIST and TRIPPL 2013, 454). Table 4 shows the relative connectivity, considering Karlsruhe as '1'. Generally, when the centralities on the German side were aggregated, equating to 232 out of 395, this was more than double the French side, which was 100.25 out of 395. It seems that German cities that reflect the German nation state in the UR have high centralities and control the cultural network flow.

When comparing the INM and EINM flows, the order of city centrality changed tremendously (cf. also Fig. 7 and Fig. 8). In the INM, Freiburg came out on top of the list, whereas in the EINM,

Tab. 3: Order of cultural network connectivity using the interlocking network model (INM)

UR city	Relative TNC	TNC
Freiburg	1.00	37
Karlsruhe	0.81	30
Kehl	0.54	20
Basel	0.37	14
Lörrach	0.27	10
Strasbourg	0.13	5
Saint Louis	0.00	0
Colmar	0.00	0
Lauterbourg	0.00	0
Sum		116

Tab. 4: Order of cultural network connectivity using the extended interlocking network model (EINM)

UR city	Relative TNC	TNC
Karlsruhe	1.00	69.00
Basel	0.90	62.75
Freiburg	0.88	61.25
Strasbourg	0.82	57.25
Kehl	0.77	53.50
Lörrach	0.69	48.25
Saint Louis	0.29	20.25
Colmar	0.22	15.25
Lauterbourg	0.10	7.50
Sum		395

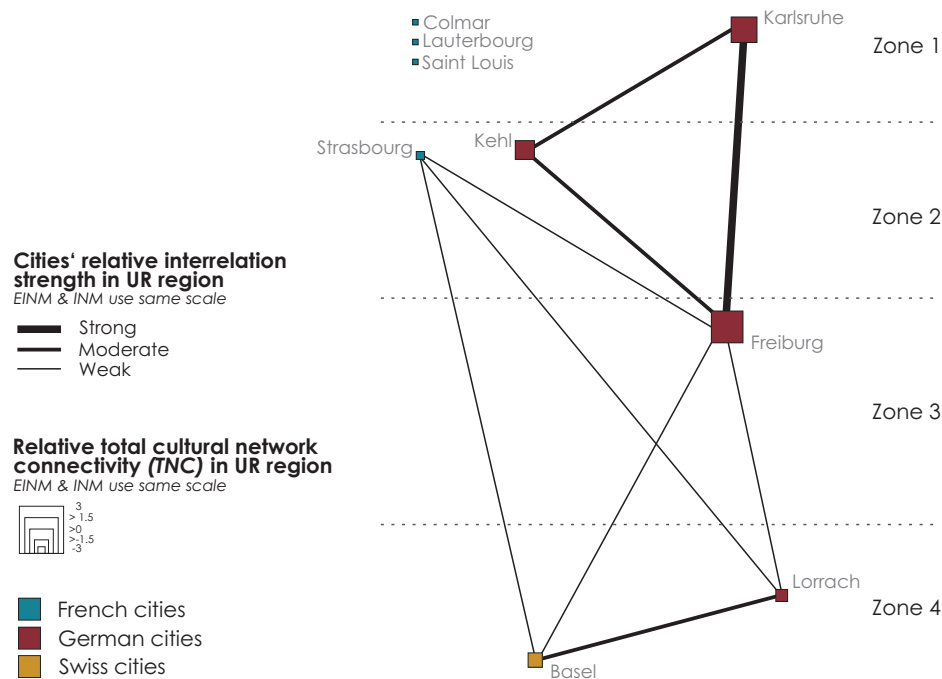


Fig. 7: Upper Rhine cultural network based on the interlocking network model (INM)

Karlsruhe came out on top, and Freiburg was in third place. However, both models agreed on the cities at the bottom of the list. In addition, the EINM captured more interlinkages between the cities, and all the cities were integrated into the cultural network analysis. Different information can be derived from different patterns, especially regarding cross-border interrelations. Several strong interrelations were found by the EINM that were not obvious in the INM, such as Kehl–Strasbourg, Karlsruhe–Strasbourg/Basel, Freiburg–Colmar, and Basel–Saint Louis. Still, the EINM could not capture all the actual city relations, even though it provided a better regional view and understanding than the INM. In terms of the number of centres in the network analysis, the INM considered only 27% of what the EINM did, as the INM depended on six centres, while the EINM relied on 22. In terms of centralities, the INM captured 29% of what the EINM could, as the sum of the TNCs for all the cities in the INM was 116, while it was 395 in the EINM. It can be concluded that, in terms of the number of cities involved in the network analysis, the number of interrelations captured, and the strength of the relations, the EINM can provide a broader network analysis because it relies not only on the organisational structures, but also on human interrelations.

From another perspective, the centralities on the French side leapt from five to 100.25 from the INM to EINM - a percentage increase of 1905% - whilst the centralities on the German side went from 97 to 232 centralities - an increase of 139%. The huge increase on the French side revealed how they were more interested in human activities and citizen cultural mobility between different branches in different cities, rather than opening a new centre branch in a new city. However, the German side was more aligned with the basic layer of networking, through opening several official branches. The huge increase in the French centralities would not have been captured without introducing the extended layer to the model.

By focusing on the statistics of the EINM when considering the 22 centres, it was found that 16 made the nine chosen cities act as *b*-type cities, three as *a*-types and three as *c*-types. In the *b*- and *c*-type cities, which hosted the extended layer for human interactions, 45 human interactions were captured, which then translated into service values for the corresponding cities. Five of these 45 human interactions (11%) were for employee mobility, whereas 16 human interactions (35.5%) were directed to external events and 24 (53.5%) resulted from external participants. The mobility of event participants obtained the highest share as a sub-

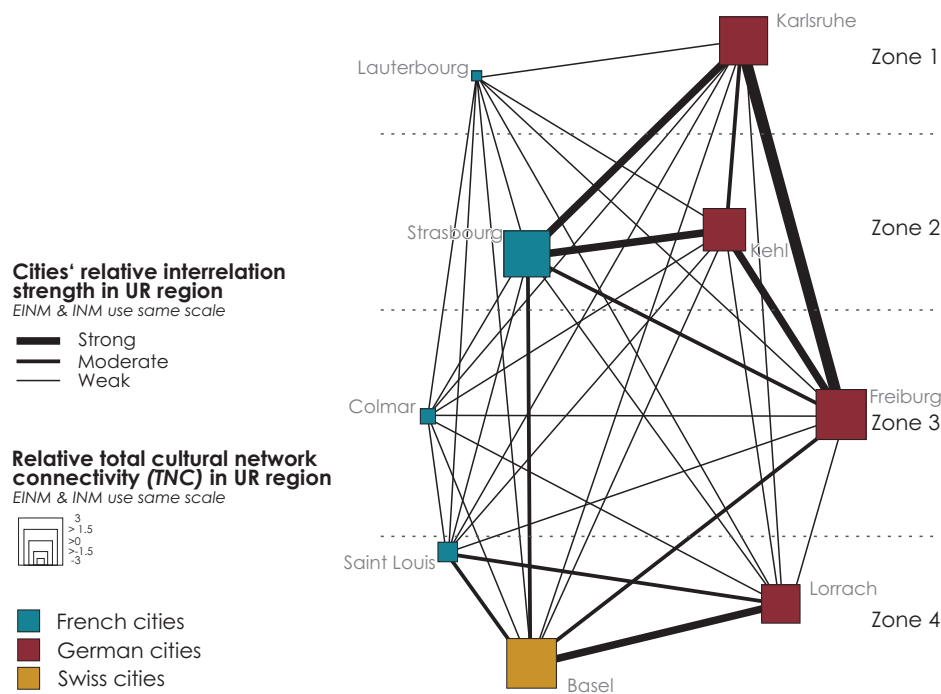


Fig. 8: Upper Rhine cultural network based on the extended interlocking network model (EINM)

layer in the extended layer. This supports the argument that people will travel from one city to another, even across borders, to attend cultural events in a different atmosphere. This finding supports the assumption that, firstly, cultural values in the UR focus on curiosity and open-mindedness and, secondly, these values can be understood through CCCs as a proxy for analysing cultural behaviour and artefacts. In the UR border region, citizens are curious about being exposed to other cultures, attending cultural events in cities all over the cross-border region. Finally, it can be concluded that there is high significance to these human activities, and it is important to measure and integrate them into the model.

5.3 Focusing on cross-border interrelations

In the EINM, although the German cities still dominated the network, in terms of cross-border cultural relations, they were more connected to the other German cities, except for Strasbourg and Basel. Nevertheless, the triangle between Karlsruhe, Freiburg and Kehl was strongly apparent. On the French side, each French city had strong relations with the other cross-border cities, rather than with the other French cities. The cross-border relations

were almost 83 % of all the French-side centralities (83.25 out of 100.25), whilst these were 42.8 % on the German side (99.5 out of 232). It can be interpreted that the French side is more connected to the German and Swiss sides, although the German side is still more connected to the German side, gaining its network dominance from self-interrelations. This means that, although border interrelations exist from the German side, a negative national border effect still exists, acting as a barrier to cultural networks and cross-border exchanges, and decreasing the development of a cross-border identity. In contrast, the French side might be more oriented towards the CBMR identity. Figure 9 presents the percentage of cross-border cultural relations for each country, based on the EINM.

Finally, we focused on cross-border relations, investigating their percentages in all the network centralities from both models. By considering only the German and French sides, and excluding Basel because all its interrelations would be considered cross-border, thus negatively affecting the percentages, the summation of the network centralities for the INM decreased to 88, and to 269.5 for the EINM. It was calculated that, in the case of the INM, only two cross-border centralities were captured out of 88, giving a percentage of 2.2 %. In the case of the EINM, 60 cross-border centralities

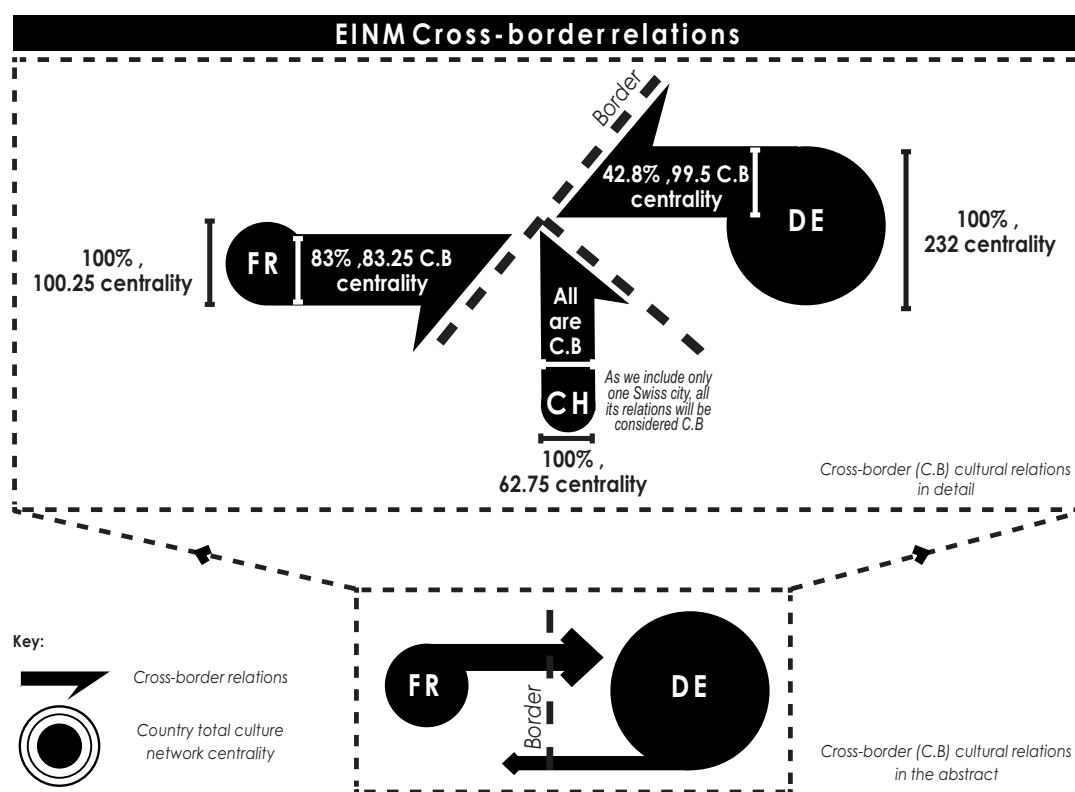


Fig. 9: Share of cross-border cultural relations for each country based on the extended interlocking network model (EINM)

were revealed, out of 269.5, giving a percentage of 22%. Although the EINM captured more cultural border relations, both models proved the fragility and vulnerability of these. This could be taken as further evidence for a negative national border effect for the entire network of the UR region. This might alert policy-makers to several problems, such as the existence of trust issues across these borders, fear of the 'unknown' lurking on the other side, the low integration and acceptance of cross-border people, and the low cross-border cultural network and socio-institutional proximity (European Commission 2017). This could be used as evidence to direct future development programmes in the region towards more nuanced goals. Figure 10 shows the percentage of cross-border cultural relations in the entire network from both models.

The findings of this study support the assumption that a high share of interactions in the same country lead to negative national border effects for cultural flows. This becomes visible on the German side of the cross-border region more than the French side. Yet, due to the French side low centralities, the overall network analysis accorded best with low border interaction.

6 Conclusions

We aimed to answer, firstly, how spatio-cultural networks can be conceptualised and measured, and, secondly, how cultural networks influence cross-border relations. Developing a new framework and methodology, this work attempted to cover the elusive topic of culture in cross-border studies from a new angle, combining anthropological and geographical perspectives. The study relied on three dimensions of culture (values, artefacts, and behaviours), transferring an anthropological understanding of culture into the spatial network analyses.

Our research introduced a geo-cultural approach, along with well-tested geo-economic and geo-political logics. While economic and political logics and networks have been extensively analysed, cultural networks - as important preconditions for understanding and developing economic and political exchange - have been less of a focus. It can be argued that it is difficult for EU policy-makers to achieve cohesive policy goals without first examining the cultural networks in border regions, understanding their similarities

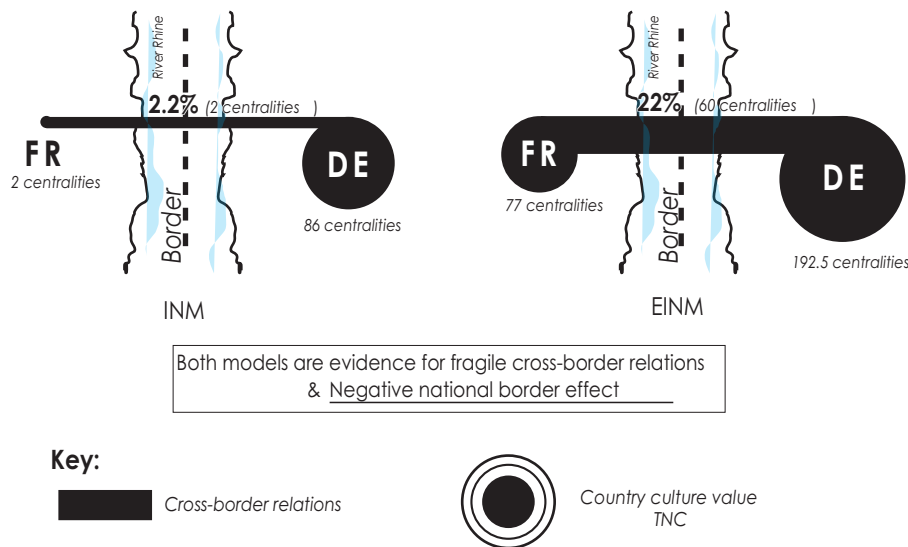


Fig. 10: Cross-border cultural relations from the entire cultural network in the INM and EINM

and differences in different border regions, and being aware of the level of cultural integration in various border regions. The politically supported CBMRs, and the assumption of a coherent cross-border community, need the support of further empirical evidence to prove that culture without borders exists.

In our paper, we showed that national borders still have a negative effect on cultural networks and the exchange of border citizens. Thus, this cross-border region still has some way to go before a culture without borders is achieved. It is not easy to dissolve border cultural barriers because they may be related to a long history of dependency. In addition, it is not easy to create a new CBMR identity.

This study contributes to the knowledge base in several different ways. First, cultural networks were conceptualised from an anthropological perspective in order to cover a gap in the border research literature. Second, we introduced a quantitative analysis of cultural networks. Third, we added a complementary EINM tool to the INM by introducing an extended layer to accommodate human behaviours and activities, by capturing wider interrelations, and by providing a better understanding of the interrelation between cultural behaviour and physical cultural places in the analysed region. The analysis raised key questions for future research, such as com-

paring cultural networks in different border regions. Broader results for various border regions may help us to understand the networks in the context of ethnic communities and the influence of cultural exchange on regional identities. Our findings provide several insights for border policy-makers, which may help them to refine their strategies for future socio-physical development. Policy-makers could work on reducing border effects, and encouraging and providing incentives for border citizens to intermingle and exchange cultures. Understanding and supporting cultural networks might help to support other forms of exchange; for example, to support innovation and economic interrelations. Finally, the study also draws attention to the need for future qualitative research on the causes of the negative national border effects that can be identified even in CBMRs such as the UR region.

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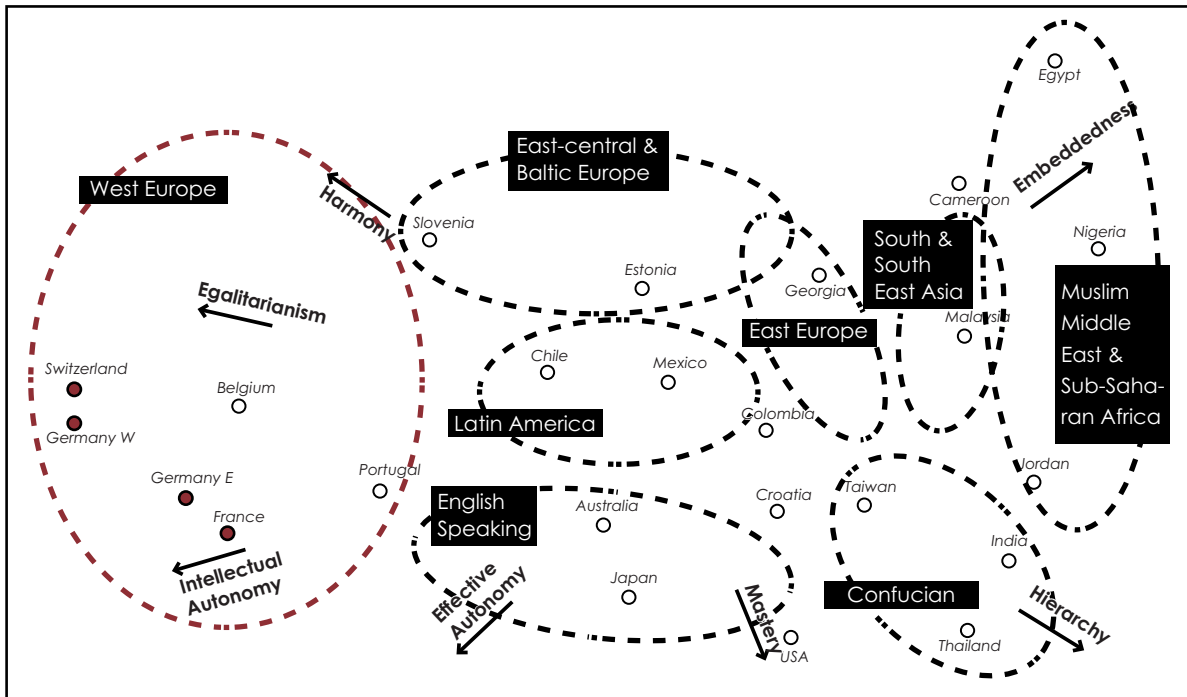
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Authors

Ahmed Bakry
 Department of Geography
 Heidelberg University
 Berliner Str. 48
 69120 Heidelberg
 Germany
ahmed.bakry@stud.uni-heidelberg.de
 and
 Ain Shams University
 Faculty of Engineering
 Urban design and planning department
 Cairo
 Egypt

Jun.-Prof. Dr. Anna Growe
 Department of Geography
 Heidelberg University
 Berliner Str. 48
 69120 Heidelberg
 Germany
anna.growe@uni-heidelberg.de

Appendix



Appendix 1: Cultural value orientation groups and world regions. Source: Authors' design based on SCHWARTZ 2014

Appendix 2: The considered centres by both models (INM & EINM) in the UR region and their service value scores. The service value scores used the same colour code of the hypothetical example of the EINM (Tab. 2).

	City type	Culture and Community centre	Country involved	EINM/INM service values scores (In INM part, only the black numbers which represents the centre branch are considered)									
				Basel Stadt	Saint Louis	Lorrach	Colmar	Freiburg	Strasbourg	Kehl	Lauterbourg	Karlsruhe	
EINM	INM (for city <i>e</i> , it only considered the different branches, not the human activities)	City <i>a</i> type	Kaserne Basel	CH, DE, FR	3		1		1	1			
			Alteswasserwerk	DE, CH	1		3						
			Kulturpark Freiburg GmbH & Co. KG	DE					4				3
	City <i>c</i> type	Kulturzentrum-kesselhaus	DE, CH	1+1+2		3							
		Capocira	DE, FR					3	0.5	3		3	
		Die-Kunst-der-Loesung	DE				2			1+ 0.5			
	City <i>b</i> type	Union Kultur- und Begegnungszentrum	CH, DE, FR	4	1	1							
		Saint Louis agglomeration	FR, CH, DE	1+1	2	1+1							
		Center for Popular Culture and Music	DE, FR			1	0.5	2		1		1	
		Istituto Italiano di Cultura di Strasburgo	FR, DE			1		1	3	1		1	
		Culture-bilinguisme	FR, DE						2	1.5			
		Colataxiokay	DE, FR, CH	0.5	0.5	0.5	0.5	0.5	1	1	1	3	
		Atelier Libert'arts ART & YOGA	FR, CH	1.5			2		2				
		Kunstvereinfreiburg	DE, CH	1				3					
		Kulturagentur	DE, FR, CH	0.5			0.5	0.5	0.5	2			
		Galerie art course	DE, FR, CH	0.5	0.5				2			0.5	
		Gallery art park Meyer-riegge	DE, FR, DE, CH						1.5			2	
		Quartiertreffpunkt	CH, DE, FR	3	0.5	0.5							
		Eurometropole	FR, DE						3	1+1			
		Syndicat Potentiel	FR, CH	0.5					3				
Zone-d-art.	FR,DE						2			1.5			