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Digital methods in difficult ethnographic fields: studying knowledge flows as complex networks through a Facebook analysis

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Digital methods in difficult ethnographic fields: studying knowledge flows as complex networks through a Facebook analysis

Abstracts

This article explores how digital methods, such as the analysis of *Facebook page like networks*, can complement ethnographic fieldwork, especially in cases of difficult access to a field. Drawing from anthropology, geography, and media studies, we present two case studies where ethnographic access is challenging: one organic farm in Pakistan, and an NGO that circulates knowledge on psychoactive drugs. On a pragmatic level, we argue that network visualizations based on social media are insightful for difficult fields, but, like ›satellite images‹, they need ethnographic contextualization. On the conceptual level, we understand these networks as complex knowledge networks, where large-scale structures emerge through small-scale action.

Dieser Artikel untersucht, wie digitale Methoden, z. B. die Analyse von *Facebook page like networks*, bei schwer zugänglichen Forschungsfeldern ethnographische Methoden ergänzen können. Mit Ansätzen aus Geographie, Ethnologie und Medienwissenschaften diskutieren wir zwei Fallstudien mit schwierigem Zugang zum Feld: Ein biolandwirtschaftlicher Betrieb in Pakistan und eine NGO, die Wissen über psychoaktive Drogen zirkuliert. Methodisch argumentieren wir, dass Netzwerk-Visualisierungen von sozialen Medien eine sinnvolle Erweiterung des Methodenspektrums darstellen, sie jedoch ethnographische Kontextualisierung benötigen. Auf konzeptioneller Ebene verstehen wir diese Netzwerke als komplexe Wissenssysteme, in denen großen Strukturen durch kleine Bewegungen entstehen.

1. Introduction

In the digital age, where many people use social media for networking and as a knowledge source that increasingly replaces traditional news media,[1] new ways of understanding knowledge flows are required for ethnographers. In specific research contexts, such as when exploring legal grey areas, regions that are politically unstable, or areas that are difficult to access geographically, digital methods can provide a good and quick overview and broaden ethnographers' horizons.

In this article, we will explore digital methods and social media analysis, in particular the *Facebook page like network*, in combination with ethnographic fieldwork. Our perspective is interdisciplinary: we combine approaches from anthropology,[2] geography,[3] and media studies.[4] We will discuss how to access and analyze data from public Facebook pages, and illustrate our argument with two case studies. Considering these *page like networks* as *complex knowledge networks* from a vantage point of complexity theory[5] will allow us to view knowledge flows on Facebook pages as decentralized and emerging, and as co-produced by small-scale behavior and large-scale structures.

We explore here how both the research object of knowledge flows and the issue of difficult fields with limited access can inspire interdisciplinary discussions about digital methodologies, and how they can tie in with ethnographic methods.

We will start this venture with a conceptual section, where we discuss the role of Facebook for ethnographic research, the Facebook *like* and the like network, and how such a Facebook *page like network* can be considered a knowledge network and complex system. We then move on to present our case studies and their respective Facebook *page like networks*. The case studies are different in terms of their content, but united by the fact that they represent fields of difficult access.

The first case study discusses the Facebook presence of the *non-governmental organization* (NGO) Erowid Center, an online portal for knowledge about licit and illicit psychoactive drugs. On Facebook, Erowid is connected to other organizations and pages with similar interests and agendas, and the administrators post information about beneficial effects of drugs as well as warnings about risky practices. While *information* about illegal drugs is not as such illegal, the field of self-experimentation with psychoactives is a legal grey area, and knowledge and involvement in this scene are sensitive issues. Ethnographic face-to-face access to informants can be difficult, and people might not speak openly.

[1] Boyer 2010, passim; Elwood / Mitchell 2015, passim; Fader / Gottlieb 2015, passim; Howard 2002, passim; Juris 2012, passim; Loader / Mercea 2011, passim.
[2] Coleman 2010, passim; Fischer et al. 2013, passim; Miller 2011, passim; Miller / Slater 2000, passim.
[3] Elwood / Mitchell 2015, passim; Goldman / Turner 2011, passim.
[4] Rieder 2013a, passim; Rogers 2013, passim.
[5] Byrne / Callaghan 2014, passim; Fischer et al. 2013, passim.

The second case study will discuss Isloo Fresh, a provider of organic farming products in Pakistan, who uses Facebook for marketing. As a conflict-ridden area, Pakistan's political stability fluctuates. Access to and safety of certain areas can change rapidly with changing power balance, impeding research. Access to informants and particular areas can be limited and unsafe. Knowledge networks on Facebook provide a good overview for researchers, farmers and consumers in Pakistan alike.

A discussion about the conceptual and pragmatic implications of using Facebook *page like networks* in this context follows the empirical section.

2. Anthropology, Facebook, and Networks

2.1 Facebook research in anthropology

Anthropologists are increasingly intrigued by Facebook, and many different anthropological research projects have focused on the social media platform during the last decades.[6] Miller and Slater[7] have been among the first to conduct ethnographic research concerning the uses of Facebook in Trinidad, and Miller[8] has pioneered the idea that Facebook is not a global and universal construct, but rather embedded in particular local relations and value systems. This notion is also present in e.g. Hine's view of the *embedded Internet*,[9] a space with manifold connections to other spaces. More recently, Miller et al.[10] have put forward a definition of social media as a kind of scalable sociality, relating to »the colonisation of the space between traditional broadcast and private dyadic communication, providing people with a scale of group size and degrees of privacy«. This characteristic of a fluid scale, that e.g. also Facebook provides with individual friendships, closed groups, open groups, and pages, makes it especially interesting to combine methodologies that can access the different scales, while acknowledging the embedded character of online spaces. Ethnography is especially well fitted to explore in depth small-scale sociality, while a visualization of the digital page like network as we will describe here can be used to explore the large- and medium-scale, depending on how far one zooms in or out. Ethnography is also well suited to take a Facebook page like network visualization as a starting point, and explore the other spaces to which it is connected, thus taking the embedded character of online spaces into account.

We argue that the analysis of data emerging from particular affordances of new media assemblages can complement ethnographic research, what Rogers[11] terms a research practice that learns from the methods of online devices, repurposes them, and seeks to ground claims about cultural change and societal conditions in web data. Such data is interesting for social scientists because it is grounded in actual behavior.[12] Newly emerging digital data based on new affordances of media assemblages can consist in e.g. forum posts, the editing history of a Wikipedia article, or a Facebook *like*, including the kind of data that we look at in this article: the *likes* between Facebook pages.

2.2 What's in a like?

Facebook supports different kinds of profiles or entities, with different possibilities and limitations for privacy, visibility, and acting. Personal profiles are among those, but also groups and pages. The Facebook *page* is at the center of our attention here. Such pages are public, and are used to represent businesses, organisations, artists, brands, or causes.[13] They can be *liked* by individual profiles (followers), the page administrators can post on the page's own wall, allow other users to comment, like, and write posts, and they can also like other pages and be liked by pages. By clicking the *like*-button – a stylized *thumbs-up* icon, Facebook users can react to a post, or a page. Recently, Facebook has changed the like-button, and introduced more ways to react to posts, such as ›love‹, or ›sad‹.[14] For pages, however, *liking* remains the only possible reaction.

Studies from the angle of marketing and advertising have analyzed *likes*,[15] and *likes* have been controversially discussed from a legal perspective concerning their status as free speech, and whether they deserve protection as such.[16] In general, likes are characterized by obscurity: the significance of the like is not clear. It is binary: a like-connection either exists or it does not.

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[6] Fattal 2012, passim; Gershon 2011, passim; Hillewaert 2015, passim; Horst / Miller 2012, passim; Miller 2011, passim; Miller et al. 2016, passim; Miller / Slater 2000, passim.
[7] Miller / Slater 2000, passim.
[8] Miller 2011, p. 158.
[9] Hine 2015, p. 32ff.
[10] Miller et al 2016, p. 9.
[11] Rogers 2013, p. 19.
[12] Rieder 2013b, p. 347.
[13] See the Facebook: Create a page Facebook page.
[14] Krug 2016, passim.
[15] Mariani / Mohammed 2014, passim.
[16] Sarapin / Morris 2014, passim.

There is no half-like. The reasons for a like or non-like, however, often remain invisible. They can include, we assume, support and solidarity of a cause, interest in more information from the liked page, a personal favor to a friend, an attempt for getting attention for one's own page and hoping for a reciprocal like. In addition, a hostile like seems possible, in order to stay up to date on one's opponent's activities. The likes' obscurity also means that stable and strong relations between organisations appear as a like in exactly the same manner as recent like-relations, those established by mistake, or out of momentary curiosity. In the data that can be downloaded from Facebook (as will be discussed in detail in chapter 3.2), the likes are atemporal, their history blank. Also the purposeful omission of a like is invisible on Facebook. Such an omission, however, establishes boundaries between page communities, which can be visualized and objectified in a network graph.

In spite of all these limitations, likes *do* establish connections and networks that can be valuable for research. We agree with new media scholar Rieder[17] that Facebook practices »revolve around elements that have cultural significance – liking a page of a political party is more than 'clicking'«. We propose that examining a *page like network* offers information about a page as it is embedded in dynamic connections with other pages. The like network surrounding one page shows a dynamic environment of relations. It shows clusters of more and less tightly connected pages, and invites interpretation.[18] As such, a *page like network* can give an interesting overview of a landscape of pages – and thus of organizations, communities, and causes – and of how they are connected. It is a distant view that the reader receives from such a network, and it has a large horizon that is difficult to achieve with ethnographic research on the ground. However, it is also shallow and two-dimensional, in need of contextualisation to gain depth. It is important to note that a like network in its visual form is merely a snapshot based on deliberate algorithms whereas the like network in its digital form is ever-emergent and dynamic. Considering its limitations, a Facebook *page like network* is an interesting research tool for ethnographers.

3. Our Approach: building complex networks with social media

3.1 Ethical considerations and privacy issues

Working with data from the Internet always poses challenges for researchers in terms of research ethics and the protection of privacy. Very large data sets often carry an illusion of anonymity, which however can be deceiving, as the case of the AOL search data leak in 2006 showed.[19] Facebook's recent privacy regulations allow only access to distinctly public data with apps such as the one used here, Netvizz. We thus do not get access to data of private users, but only to public *pages* and the connections between them. Whether the distinction of online spaces in public versus private makes sense in terms of research ethics is debatable. Many scholars point out the ethical difficulties in precisely the blurred boundaries between public and private.[20] Some scholars consider online spaces such as message boards as public spaces, and thus use the information available there freely.[21] Other scholars have argued that also what is public from a copyright point of view, can be perceived as private by users, a notion which should be respected by researchers.[22] Different degrees of anonymisation are used to protect the privacy of those who created the online data. Thus, some scholars quote material gathered online verbatim, but change user pseudonyms.[23] Others change not only user names, but also the text gathered online, in order to make it impossible to google an online quote.[24] Similarly to Boellstorff et al.[25] and Pentzold[26], also Garcia et al.[27] suggest to comply with the specific social norms of online spaces, a view which we share.

Facebook pages are open and public on Facebook, and used to connect to other pages and to publish information, as opposed to e.g. closed groups, which are distinctly non-public. The downloaded data also only identifies pages and the connections between them, and no personal profiles or data of individuals. Thus, we expose no individual through our research. We assume that the attention that the Facebook pages might receive through our research are in accordance with their values as a page, which is a format distinctly for publication and circulation.

[17] Rieder 2013b, p. 347.
[18] Bounegru et al. 2017, passim; Venturini et al. 2017, passim.
[19] Barbaro /Zeller 2006.
[20] Barratt et al. 2014, passim; Garcia et al. 2009, passim; Pentzold 2017, passim.
[21] Bassett / O'Riordan 2002, p. 238, Riley et al. 2009, p. 352.
[22] Boellstorff et al. 2012, passim; Pentzold 2017, passim.
[23] Barratt et al. 2014, p. 911.
[24] Berning / Hardon 2016, passim.
[25] Boellstorff et al. 2012, passim.
[26] Pentzold 2017, passim.
[27] Garcia et al. 2009, p. 60.

3.2 Building a Facebook page like network

For building a page like network, we first used the application Netvizz[28] to download the data. The data contains only general information about public Facebook pages, and the like connections between them. Data about private profiles is not part of this. Starting from one *seed* page, we proceeded in two steps: first, we downloaded the direct links connecting the seed page to other pages (one level depth), and in a second step we used those first level connections as seed pages, and downloaded also their networks. This gives us a network of two levels depth centered around a seed page, where the nodes of the network are *pages*, and the links between them are established through *likes*. As a like is created by one page towards another one, the network is directed, i.e. the links between the nodes have a direction. As an output, Netvizz creates a *.gdf file*, which is a simple network file that can be read by the open source network visualisation program Gephi. In Gephi, node attributes, like the number of connections a page has, or its category,[29] can be visualized as size or colour, making the network easier to interpret. An algorithm like ForceAtlas2 can be used to automatically arrange the network spatially. ForceAtlas2 is based on the mutual repulsion of nodes, and the attraction through links. This leads to a spatial arrangement where more densely interlinked communities of nodes cluster together, and move away from other nodes and clusters[30]. The resulting visualisation represents an exploratory tool to discover the relations between nodes and clusters, and emerging patterns and topics.

3.3 Knowledge networks and complex systems

We understand the like networks as complex knowledge networks. Complex because the »whole is greater than the sum of its parts«[31] – like networks are not only the static image depicted in the visualisation, but translate the affective digital practice of digital liking into dynamic networks of pages. We also think of them as central to understanding how knowledge is produced and circulated on Facebook. Knowledge is no static entity, but rather travels through a myriad of different institutions before being ›adapted‹ to the realities of the place of concern.[32] In both our studies, knowledge on certain things is important at the place of concern, be it a farming technology or a drug dosage. Through the complex (not predefined yet also not random) networks of pages, knowledge is generated and circulated. The complexity of the knowledge allows for the creation of new knowledges and the emergence of central themes immanent to the respective network.

Networks can represent systems of local interactions, and help to understand how they contribute to the creation of global phenomena. The challenges of integrating emerging global phenomena and local interactions have been discussed by complexity theorists in the natural and the social sciences, and with interdisciplinary approaches.[33] Mathematically speaking, complex systems present problems of *organized complexity*,[34] challenging scientists because they »involve dealing simultaneously with a sizable number of factors which are interrelated into an organic whole«.[35] Complexity theory accounts for mutual influences between different scales: the structure of a complex system shapes the behavior of its single elements, and the behavior of the elements shapes the structure of the systems, creating emerging effects that cannot be described by simply adding up single actions.[36] Already two decades ago, Escobar et al.[37] argued that complexity studies and anthropology should enter a partnership and enrich each other. Escobar expressed his interest in complex adaptive systems and cultural complexity, concluding that »[c]omplexity [...] needs to be anthropologized, but at the same time it may offer insights to anthropology«.[38] Fischer et al.[39] claim that complexity theory and computational methods are especially useful for anthropologists to understand the relevance and the embeddedness of particular phenomena in a larger context. Computational methods, he argues, will furthermore contribute to the interoperability between disciplines and researchers.[40] Complexity theory is of particular interest to anthropologists because it holds the promise of finding a middle ground between structuralist and post-structuralist approaches.[41] Aggregated small-scale actions, such as liking a page on Facebook, can be described with complexity theory as collective behavior, from which large-scale patterns emerge. Network visualisations make such patterns visible and thus interpretable.The shape of a network on the large scale has an impact on how knowledge flows through the network. A like-connection is also a connection through which content flows: information posted by a page gets distributed to its followers. The location of a page in the like network is thus meaningful for the knowledge flows in which it participates. In this context, we consider liking as a knowledge practice, as it is paramount for the establishment of networks through which knowledge flows.The problem of relating the local and particular to the general and global is especially challenging in the context of integrating large digital datasets, such as Facebook likes, with ethnographic data,

[28] Rieder 2013b, passim.
[29] Categories are pre-assigned by the page administrator.
[30] Jacomy et al. 2014, passim.
[31] Byrne / Callaghan 2014, p. 4.
[32] Goldman / Turner 2011, p. 5.
[33] Barabási 2002, passim; Byrne / Callaghan 2014, passim; Hidalgo 2016, passim; Latour et al. 2012, passim; Lazer et al. 2009, passim; Smith / Jenks 2013, passim; Strogatz 2011, passim.
[34] Weaver 1948, p. 539.
[35] Weaver 1948, p. 539.
[36] Hidalgo 2016, p. 2, Byrne / Callighan 2014 , p. 22.
[37] Escobar et al. 1994, p. 222f und 225.
[38] Escobar et al. 1994, p. 222f.
[39] Fischer et al. 2013, p. 12f.
[40] Fischer et al. 2013, p. 5f.
[41] Smith / Jenks 2006, p. 23, Fischer et al. 2013, p. 4.

which are often small and particular. Conversations between these different kinds of data are most likely to succeed from the vantage point of complexity. In complex networks, the large-scale structure *emerges* from small-scale behavior. For the *page like networks* visualized here, this means that large-scale categories and structures are not imposed from above, or implemented by the researchers, but that they result from the complex small-scale interactions. Large-scale structures (such as network clusters) emerge from small-scale behavior (liking), which in turn is shaped through the existence of clusters (e.g. through the biased access to knowledge on Facebook).

4. Two Case Studies: Organic Farming and Psychoactive Drugs

Both case studies exemplify field sites where global, online knowledge flows are important, while severe limitations for the ethnographer exist on the ground. In the case of the drug-education NGO Erowid, the field is a legal grey area, where talking openly is difficult and interlocutors and their communities are particularly vulnerable. In the case of organic farming in Pakistan, the issues of difficult geographical access to field sites and challenging political contexts pose limitations.

4.1 Erowid – Psychoactive Drug Information

Erowid is an online portal and an NGO that aims to distribute information about psychoactive drugs, promote harm reduction, and unbiased drug research concerning potential medical benefits. Erowid was started in 1996 by a US-based couple working under the pseudonyms of *Earth* and *Fire*. The website's self-description reads as follows:

> »Erowid is a member-supported organization providing access to reliable, non-judgmental information about psychoactive plants, chemicals, and related issues. We work with academic, medical, and experiential experts to develop and publish new resources, as well as to improve and increase access to already existing resources. We also strive to ensure that these resources are maintained and preserved as a historical record for the future«.[42]

Erowid is built on a community of drug users sharing their experiences. The website's experience vault features some 20.000 *trip reports*, containing both positive and negative experiences with drugs. These trip reports contain biomedical facts, such as the heart rate, age and gender of users, measurements of drug dosage, the time of consumption, the road of ingestion, as well as the subjective, narrated drug experience. The reports are written by drug users, and selected and edited by Erowid's administrators.The knowledge produced by Erowid is acknowledged also by academic scholars, who refer to Erowid as a *drug library*,[43] and as a balanced and trustworthy knowledge source.[44] Production and circulation of knowledge are thus central for Erowid. In the ChemicalYouth research project, of which the first author was part at the time of research and writing, we are interested in the circulation of knowledge about drugs and in practices of harm reduction. This interest finds expression in numerous ethnographic research projects in our team, such as risk management of drug use through knowledge exchange in online for a,[45] using drugs together with peers,[46] and several still ongoing research projects on e.g. dosing practices and medical uses of psychoactive substances, as well as digital data analyses of the knowledge distributed on Erowid,[47] and of knowledge flows about drugs on Wikipedia.[48] In our analysis presented here, we wanted to contextualize our team's ethnographic knowledge through getting a larger overview of the networks through which information flows. As a starting point for such an analysis, we used Erowid's Facebook page like network as a proxy.

4.2 Erowid's Facebook page like network: methodology and results

We downloaded the Facebook *page like network* of Erowid Center in spring 2015 in two steps, using the application Netvizz. The first level network was downloaded first, meaning all the nodes that are directly connected to Erowid through likes. In a second step, the list of these nodes was entered manually in Netvizz, downloading also their respective *page like networks*, which were added to the original network in Gephi.

[42] Erowid 2000.
[43] Bogenschutz 2000, passim.
[44] Moore 2008, passim; Murguía et al. 2007, passim.
[45] Berning / Hardon 2016, passim.
[46] Van Schipstal et al. 2016, passim.
[47] Krieg et al. 2016, passim.
[48] Azzi et al. 2017, passim; Dijkstra / Krieg 2016, passim.

After a process of filtering out the less connected nodes, adapting the node size to the number of connections (node degree), setting the node colour to fit the sub-community resulting from the modularity calculation [49], and using the layout algorithm ForceAtlas2 for spatially arranging the nodes, we received a clearly clustered network (Figure 1), featuring four peripheral, and two to three central clusters, which can be distinguished visually. The colour of the clusters is derived from the calculation of modularity, which computes subcommunities based on the relative closeness of two nodes as opposed to all the other nodes.[50]

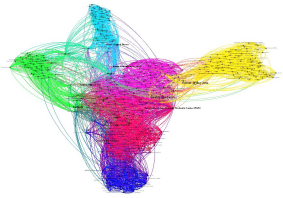

Fig. 1: Facebook page like network of Erowid Centre. [Krieg / Poerting 2019]

A qualitative, narrative exploration of the network[51] shows that the clusters relate to different topical domains, one cluster has a strong geographical affiliation. The green peripheral cluster on the left contains nodes relating to festivals, dancing, and electronic music. This is a field that our ethnographers were intimately familiar with, as several of them conducted fieldwork on festivals in Germany and the Netherlands, and knew about this scene.[52] The nodes connecting the festival cluster to other clusters were particularly interesting: the ethnographers knew some of these organisations, but others were new and interesting to them. One team member conducted research on peer-support in the context of drug consumption on festivals. The location of the node »Dancesafe«, a peer-based harm-reduction organisation, points out the significance of this issue and how it is embedded. The light blue cluster on top circles around spiritually inspired art and music. Our team is familiar with this visual and artistic style, as it is used as a kind of *branding* by many organizations and communities in the context of psychedelic culture, but no research has been carried out in our team on this topic specifically. Potentially, new research questions could be developed on this ground, resonating with research on the relation between psychoactive drugs and creativity.[53] The yellow cluster on the right relates to social and ecological activism in the San Francisco Bay Area, a region that our team knows to be a hub of psychedelic culture. The tight connection to social and ecological issues was however surprising to the ethnographers, but confirmed their impression that psychedelic culture is not based on social isolation as some studies argue is the ground for drug consumption.[54] The dark blue cluster at the bottom contains institutions and organisations dealing with drug policies: from a legal point of view, in monitoring or advocating a policy change.

The central clusters circle around research, information, and activism. The pink cluster, center top, contains a variety of different nodes on psychedelics, spirituality, research, alternative research institutes, and information dissemination. One of our team's researcher's work focuses on the use of psychedelics in medical research and work environments,[55] and she was familiar with many nodes in this cluster. Seeing them contextualized and arranged spatially was interesting for her as an exploratory tool. The red central cluster has two parts: The upper one is rather heterogeneous, with every node being clearly related to psychedelics information. The lower part of the red cluster turns more towards psychedelics and policy, and drug policy more generally, including nodes of initiatives demanding policy changes. Erowid Center is located exactly at the border between the two red clusters, between psychedelic information and policy.

The ethnographers in our team, who work in ethnographic fields related to festivals, electronic music, spirituality, and medical drug research were familiar with many of these clusters, nodes, and connections. Being able to explore the network like a map proved to be a valuable tool for contextualizing the field. One can zoom in on clusters and ask what the nodes in a cluster share; one can focus on edges, and ask which nodes and clusters are connected and which are separated, which are close, and which are distant, and what is in between; one can focus on the center or on the periphery and the nodes that are shared with several

[49] Blondel et al. 2008, passim.
[50] Blondel et al. 2008.
[51] Bounegru et al. 2017, passim; Venturini et al. 2017, passim.
[52] Van Schipstal et al. 2016, p. 201.
[53] Krippner 1985.
[54] Knight et al. 1999, p. 594.
[55] More about her work here Mishra 2018.

clusters or those that are unique to one cluster, on the well connected, important nodes, or on the mass of smaller nodes. Exploring this network caused us to discuss possible future research questions concerning the role of visual psychedelic art, or on the connections between psychedelic culture, ecological, and social movements. The *page like network*, read like a map and used as an exploratory research tool provides unparalleled overview and contextualisation of a field that is otherwise difficult to access from such a distant perspective.

4.3 Isloo Fresh – Circulating Organic Farming

Isloo Fresh is a home delivery service in Islamabad, Pakistan, for fresh vegetables, dairy products and meat. It was founded in 2013 by three vendors who sell their products on the weekly farmers' market in Islamabad to provide consumers with fresh produce on a daily basis. The Facebook page serves as the primary website to reach out to their customers. The self-description reads as follows:

> »Isloo Fresh started when Faisal, Ali, and, Qasim, sat down around a coffee table and spoke about eating healthy in Islamabad. Faisal has a dairy farm, Ali makes cheese, and, Qasim is an organic farmer. All of that happens right here in Islamabad, and, you are welcome to visit. They encourage you to face your farmer and find out where your food comes from! The three musketeers decided to join forces and provide their healthy foods through one delivery service – Isloo Fresh«.[56]

The demand for local, fresh organic produce in Pakistani cities is quite recent. Frequent food scandals, growing awareness over food-related diseases and flaws in the agro-food systems have urged consumers of the urban elite to seek alternate sources for grocery shopping. Farmers' markets that represent many parallels to the growing number of farmers' markets worldwide have sprung up in different cities since 2013. As the market in Islamabad only takes place once or twice a week, three producers set up Isloo Fresh as a daily delivery service. Facebook has been an important medium since the start. The Isloo Fresh page counts 8294 (26th June 2019) *likes* and regularly informs its customers about the available products and their prices, posts pictures of the farm life and informs about the practices and associated benefits of organic agriculture in general. Besides Facebook, telephone is the only other medium used for technology-mediated interaction. Though the page represents three farms, Qasim is the sole administrator. Other than informing customers about Isloo Fresh's produce, Qasim also uses the page to connect to like-minded projects, farmers' markets and lifestyle ideas. The Isloo Fresh page circulates knowledge in two ways. On one hand, it informs customers about the available products and organic farming practices. On the other hand, it acts as a tool for Qasim to connect to and receive information from like-minded pages on Facebook.

4.4 Isloo Fresh's page like network: methodology and results

We downloaded the like network for Isloo Fresh's Facebook page in January 2016, using the Netvizz application, and then following the same protocol as for Erowid's *page like network* specified above (chapter 4.2). Due to technical problems, the network of the node that was then called »Country Boy's Dream Spaces«[57] could not be downloaded and added to Isloo Fresh's Facebook *page like network*, so there was only data of the one depth dimension. The same steps of processing in Gephi were executed for this network, as for the Erowid network above: the less connected nodes were filtered out, the node size was adapted to the number of connections (degree), and the node colour was set to represent the modularity class. The colours do not carry any semantic information. The ForceAtlas2 layout was used to spatially arrange the nodes. This resulted in a clearly clustered network visualisation.

[56] See the Isloofresh: About Isloofresh Faccebook page.
[57] See the Countryspaces Facebook page. (The title of the page was changed to Country Girl's Dream Spaces).

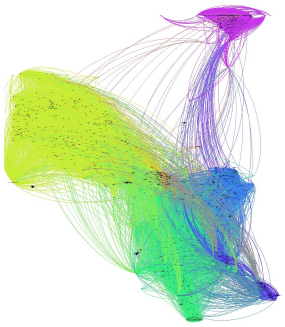

Fig. 2: Facebook page like network of Isloofresh. [Krieg / Poerting 2019]

The analysis of Isloo Fresh's Facebook *page like network* (Figure 2) reveals eight different clusters of which some are tightly clustered while others are clearly peripheral. Two of the clusters are distinctly geographical and based in Pakistan, while the rest is topically organized. It is notable though that the majority of the pages within the topical clusters are geographically based in the US.

The two small Pakistan-based clusters contain nodes from agriculture-related pages in Pakistan on the one hand and media-related pages in Pakistan on the other. Both clusters are very small; however, especially the media cluster is centrally located. Both clusters are tightly interconnected. However, their only connection to the rest of the network is the Isloo Fresh node, which is part of the central orange cluster. This central orange cluster consists of nodes relating to local production and local food markets. It is relatively small but centrally located and tightly interconnected and serves as a bridge between the green homestead farming cluster on the left and a rather lifestyle, commercially oriented blue cluster on the right. Isloo Fresh is located at the fringe of the orange and green cluster. The large green cluster, homestead farming, consists of nodes that represent individual farms but also overarching interests. Though some of the nodes in the cluster relate to political views against the power of large agribusinesses, the majority of nodes appear to relate to practical farming advice. This is noteworthy as it supports the second author's interaction with Qasim, who claims to use Facebook and social media in general as a knowledge source. The homestead farming cluster connects seamlessly with a turquoise cluster centering around (anti-corporation, anti-capitalism) activism for socio-ecological causes. Nodes of this cluster for example relate to concerns over pesticides, *Genetically Modified Organisms* (GMOs) and food safety. This cluster also accommodates a sub-cluster of international (research) organizations and NGOs.

The blue cluster on the right consists of nodes that relate to organic as a lifestyle and are generally more entrepreneurial and commercially oriented. For example, the US supermarket chain »Wholefoods« is represented here as well as different brands of so-called superfoods. The blue cluster connects to the peripheral purple cluster, bottom right, that centers around food and food-related policy. This cluster comprises nodes of individual healthy food initiatives as well as more generally food policy-oriented nodes. The least connected cluster is the pink cluster on the top, which mainly comprises US-based media and broadcasting stations. This cluster is almost exclusively connected to the blue cluster.

The visualization of the Isloo Fresh *page like network* helps identify issues that correspond with Qasim's perspective on organic agriculture and local farmers' markets. It also illustrates that farmers' markets and the delivery service are relatively recent phenomena in Pakistan as there are very few nodes from Pakistan. Qasim's knowledge network mostly comprises pages that are geographically located in the US. Qasim often mentioned in interviews that he was inspired by US farmers' markets, both through his stays abroad as well as through social media. The visualisation confirms this and also traces the knowledge on these issues accessible via Facebook.

The analysis of this visualisation also hints at other assumptions presented by critical research on organic food production and consumption. The blue cluster focusing on lifestyle and brands shows an interesting mix of rather anti-establishment initiatives, but also established supermarkets and brands. This corresponds with some of the concerns raised by Agro-food system scholars. For example, Friedmann[58] suggests that the global food system has reached a critical juncture. Social movements seem to play a crucial role in determining whether so-called green food and production are equally accessible for poorer and

[58] Friedmann 2005, passim.

richer consumers. She observes that big agrofood companies are (already) appropriating the green consumerism by wealthier consumers, consequently lowering the pressure on public standards and only increasing the quality of private (organic) food standards.

The interconnectedness of certain clusters as well as the disconnectedness of others also make for interesting insights. The almost exclusive link between the blue lifestyle cluster and the pink media cluster seems to depict the growing interest in food and health-related issues. The extent of the green homestead cluster probably owes to the centrality of the closely linked central orange cluster. The single nodes are less closely linked than other clusters, suggesting that these nodes are less interconnected than other clusters where tight sub-clusters form.

The Isloo Fresh *page like network* helps visualize how knowledge circulates online. With only little information on organic agriculture present in Pakistan and with Facebook only slowly becoming an important medium for information, Qasim has to turn to – to him familiar – pages of US-based initiatives. The emergent and dynamic knowledge flows, hardly visible and traceable with conventional ethnographic methods, become more obvious with the help of the *page like network's* visualisation.

5. Discussion: Knowledge, complex systems, and ethnography

5.1 Conceptually: Complex networks and knowledge flows

Erowid and many of the nodes in its Facebook *page like network* work in the fields of harm reduction and drug education. For example, the self-description on Facebook of »DanceSafe«, one of the bigger nodes connecting the festival cluster to the center, reads: »DanceSafe is a 501(c)3 public health nonprofit that promotes health and safety within the electronic music and nightlife communities«.[59]

The Facebook self-description of the *Multidisciplinary Association for Psychedelic Studies* (MAPS), a big node in the upper red cluster, reads: »The Multidisciplinary Association for Psychedelic Studies (MAPS) is a 501(c)(3) non-profit research and educational organization that develops medical, legal, and cultural contexts for people to benefit from the careful uses of psychedelics and marijuana«.[60]

The self-description of the biggest node in the lower part of the network, the Drug Policy Alliance, reads: »In our vision of tomorrow, people are not punished simply for what they put into their bodies but only for harm done to others. Our work spans issues from medical marijuana to youth drug education«.[61]

Online knowledge about drugs, especially in the context of harm reduction and health benefits, is created and circulated by organizations such as »DanceSafe«, »MAPS«, the »Drug Policy Alliance« , and by Erowid and many other organizations in Erowid's Facebook network. This is all the more important as knowledge about substances in legal grey zones is scarce, and the Internet is an important source of knowledge in this context[62]. Looking at the knowledge flows of a field site through the perspective of a Facebook *page like network* makes it possible to account for large scale and small-scale knowledge flows simultaneously.

The networks show the entanglements of connections between nodes and clusters. The practice of liking establishes connections on Facebook. Knowledge flows through these connections: posts of a liked page appear on each other's walls, and similar pages to those liked are recommended through Facebook's recommendation algorithms.[63] We thus approach the Facebook *page like network* as a knowledge network. Its visualisation is a means to explore connections through which knowledge is produced and circulated.

We also understand these networks of likes as a complex system through which ideas, information and ideologies flow. The complexity of the system becomes obvious through its constant mutability / changeability – of which however we can always only visualize a momentary snapshot. Resonating with complexity theory, a *page like network* is no essentialist whole, but rather an open ended assemblage, »a type of momentary association which is characterized by the way it gathers together into new shapes«.[64] Its boundaries are open, depending on where the researcher draws the line, its center depends on which node

[59] See the DanceSafe Facebook page.
[60] See the MAPS Facebook page.
[61] See the Drug Policy Alliance Facebook page.
[62] Berning / Hardon 2016, passim; Soussan / Kjellgren 2014, passim; Walsh 2011, p. 58.
[63] Sedhain et al. 2014, p. 345ff.
[64] Latour 2005, p. 65.

the researcher chooses as a starting point.[65] In Kwa's[66] understanding of complexity, this corresponds to a baroque notion of complexity: »the baroque looks down and [...] observes the mundane crawling and swarming of matter«.[67] The further one looks, the more connections and the more details become revealed. There is no direction towards a unifying principle or a framing structure, as *romantic* notions of complexity argue, according to Kwa.[68] In this sense, the like network is an assemblage. Its single parts exist in their own right, not necessarily being constituents of a larger whole.

For the knowledge flows in the network this means that there is no center of knowledge, and no centrally organized knowledge flow. No one is responsible for the knowledge that is produced and circulated, yet it is still shaped by the structure of and contributes to the network. It cannot be pinpointed, which does not mean that it is nowhere – there is still structure. Structured knowledge flows are a product of emergence, a key characteristic of complex networks. Emergent phenomena are the result of accumulated interactions on the small-scale that follow simple rules.[69] In our case, the existence of the like or the non-like lead to the emergence of clusters, of highly connected sub-communities and of separations between clusters. Micro-behavior shapes the macro-level, which can also be termed self-organisation. A complex system is more than the sum of its parts, meaning that it has new, emergent properties. Cumulative effects describe what ties the very small and the very large together. The advantage is that no external categories or structures need to be imposed on the data. While the researcher is involved in many decisions regarding the cleaning and filtering of data, and the parameters of algorithms, she does not decide about the large-scale structure of the network. These structures emerge from below, through cumulative effects contained in the complex relations between the small-scale elements. Considering knowledge networks as complex networks acknowledges their multiplicity and relationality. It accounts for the many influences, and many relationships, and is thus inherently anti-reductionist.

Understanding these page-like networks as complex systems also allows for a closer look at how knowledge flows through them. Knowledge is never a static product, but constantly shaped by the institutions it flows through before it is being *adapted* in a certain place.[70] We suggest that Facebook can be considered as a place of knowledge production and circulation. Visualizing these networks with the help of digital methods makes it possible to better understand specific, complex knowledge systems that otherwise escape the ethnographer's notice. Knowledge does not flow in one direction only. It is constantly shaped by the complex system that the vast network of pages creates.

5.2 Pragmatically: visualizations, digital methods, and ethnography

Pragmatically speaking, some particularities of network visualizations and digital methods need to be taken into account in the context of an otherwise largely ethnographic research. We want to offer here a beginning of such considerations, while conceding that much more thought and attention is required in this growing interdisciplinary field.

Network visualizations offer a distant picture, where particularities get lost. They provide an overview, a broad horizon, a digital satellite image of certain issues. They offer various levels of zooming in and zooming out, with larger and smaller structures appearing and disappearing. Nevertheless, they remain *binary* in the sense that a like connection either exists or it does not exist, they lack qualitative context. For making sense of the network visualization and filling in these gaps, ethnographic knowledge is indispensable. A *page like network* can be used at an advanced stage in research, to embed such ethnographic knowledge, or at an early stage, to get an overview. However, a kind of ground truth is necessary, a way to align the network with an existing ethnographic field, with knowledge about human behavior, intentions, values, and motivations, to make sense of the advantages of the digital method.[71] Whether such a field is online or offline, or both, is an entirely different question.[72]

Facebook *page like network* visualisations are no stand-alone research results. Instead, we suggest considering them as a research tool that can be explored. They unfold their greatest strength when triangulated with data of different scales, collected at different distances. Zooming in and out of the network, enriching it with and embedding it in deep ethnographic knowledge can lead a researcher to new questions, confirm observations, contextualize findings, and point to unknown phenomena.

[65] Byrne / Callaghan 2014, p. 32.
[66] Kwa 2002, passim.
[67] Kwa 2002, p. 26.
[68] Kwa 2002, p. 24.
[69] Byrne / Callaghan 2014, p. 21f.
[70] Goldman / Turner 2011, p. 15.
[71] See also Krieg et al. 2017 for a discussion of »field groundedness«.
[72] Burrell 2009, passim; Rogers 2013, p. 4.

From a geographical perspective, the Facebook *page like network* can be compared to a satellite image: it provides a view that cannot be seen from the ground. It uses a technology that is unavailable to the ethnographer involved in close contact with a limited number of interlocutors. However, it requires skill to be read and used wisely. Thus, what Turner says about the challenge for human ecologists to use satellite images is also true for the use of digital methods such as the Facebook *page like networks* by ethnographers:

> »The task is to find ways to utilize the power of these techniques and technologies without losing the dynamic, structured, multilayered, and subjective natures of socioecological interaction as conceptualized by different types of human ecologists«.[73]

6. Conclusion

The digital age has profoundly changed communication, information and knowledge flows in general. This has created challenges and opportunities for ethnographic fieldwork. While some knowledge flows seem harder to grasp, the digital sphere also provides access to sensitive topics and regions. Our two research examples, the Facebook *page like networks* of the online portal for knowledge about licit and illicit psychoactive drugs, Erowid, and the online portal for home delivery of organic products in Islamabad, Isloo Fresh, illustrate how a network visualisation helps to contextualize research questions and provoke new thoughts and insights about the respective topic.

We are convinced that an engagement with digital methods can complement ethnographic research projects. However, we do not consider digital methods as a panacea to understand complex questions regarding knowledge flows or digital social life. Rather, we suggest that an integration of digital methods is promising to bridge small- and large-scale phenomena, to understand complex knowledge networks and informant based semantics and to access the field from a different, open perspective. We are aware of the limitations of the method, which include technical issues and the need to combine it with deep ethnographic knowledge.

We also stress the fact that digital methods, exemplified by the analysis of Facebook *page like networks* in our paper, hold interesting insights about the dynamics and emergence of complex systems that are also interesting for ethnographers interested in connecting the small and the large, the local and the global, the specific and the universal.

[73] Turner 2003, p. 257.

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List of Figures with Captions

Abb. 1: Facebook page like network of Erowid Centre. [Krieg / Poerting 2019]

Abb. 2: Facebook page like network of Isloofresh. [Krieg / Poerting 2019]