Computational approaches to studying networks in text, language and society

5th November, Australian National University
Venue: Room 2175 Haydon-Allen Building #22

Workshop organiser: Robert Ackland
Hosted by the School of Sociology and ANU Centre for Social Research & Methods
Supported by College of Arts & Social Sciences grant "Obtaining new insight from big data: Humanities and social science research at scale"

Welcome (9.15 – 9.30)

Session 1 (9.30 – 11.00)

Mathieu O'Neil (University of Canberra) – *Why issues and actors connect on social media: The case for field/forces*

Tim Graham (University of Queensland) and Naomi Smith (Federation University) – *Old problems, new methods: Re-examining anti-vaccination communities with big data*

Chair: Robert Ackland (Australian National University)

Session 2 (11.15 – 12.45)

Bert Fraussen and Darren Halpin (Australian National University) – *From followers to the front page: Linking interest groups' online prominence with offline media appearances*

Haris Memic (Australian National University) – *Discussion on possibilities and challenges of dynamic network analysis illustrated on a Twitter advocacy network*

Chair: Mahin Raissi (Australian National University)

Lunch (12.45 – 1.30)

Session 3 (1.30 – 3.00)

Jack Elliott (University of Newcastle) – *Multifractal stylometry*

Rachel Hendery (Western Sydney University) – *Social networks, linguistic variation, and language change*

Chair: Haris Memic (Australian National University)

Session 4 (3.15 – 4.45)

Mahin Raissi (Australian National University) – *Actual friends on Facebook*

Robert Ackland (Australian National University) – *Social dynamics in eating disorder communities on Twitter*

Chair: Tim Graham (University of Queensland)

Wrap-up (4.45-5.15)

Why issues and actors connect on social media: The case for field/forces

Mathieu O'Neil (University of Canberra)

Analysts of online phenomena such as activism or controversies face an epistemological choice: [a] they can project an analytical layer onto reality by referring to overarching social structures with rules and properties, where a macro level derives from micro interactions: this is what an online 'field theory' would seek to achieve; [b] they can simply trace the movements and associations, or count the properties, of actor/networks, as Science and Technology Studies (STS), and in particular, Actor Network Theory (ANT) on the one hand, and Social Network Analysis, on the other, set out to do. We address this conundrum by referring to 'field/forces', the capacity to attract or repel connections between actors in specific subnetworks or 'fields'. Our framework mainly derives from [a], but we draw a number of elements from [b]. We argue that in the online environment, position, capital, and 'habitus' (in the case of human actors) are collapsed: the number of hyperlinks received or retweets/followers accrued by actors in the course of their trajectories across networks merge with their cultural status to constitute their field/force. We agree with STS scholars that attempts by actors to articulate issues, innovations and controversies change these issues, innovations and controversies. But we part with them in distinguishing levels of agency between actors, and in suggesting that actor attributes such as age, culture, etc., account for how actors connect with other actors and with issues, innovations and controversies: the 'radical empiricism' of STS/ANT does not explain the failure of an actor to engage with an issue, for example. Nor does it account for the differences in actor affordances allowed by field governance institutions such as algorithms. We illustrate this conceptual exploration by drawing on studies of Web 1.0 and 2.0 activist fields.

Old problems, new methods: Re-examining anti-vaccination communities with big data

Tim Graham (University of Queensland) and Naomi Smith (Federation University Australia)

Despite a ubiquity of discourse about 'big data' in the social sciences, the number of studies that actually use big data remains comparatively small. In this presentation we use a case study of a recent project to demonstrate one way in which big data collected from social media sources can be used to examine persistent and re-emergent social problems. This project examines anti-vaccination communities online, using data gathered from both Facebook and Twitter. Originating in the late 1800s (Blume 2006), the anti-vaccination movement appeared alongside the biopolitical technologies of government (Foucault 2007) and the emerging bureaucracy of nation-states but had seemingly disappeared by the early 20th century. However, over the past decade anti-vaccination rhetoric has re-emerged. These revitalised movements are now persistent and global in scope—utilising social media to create spaces that strengthen, popularise and align anti-vaccination discourses with sympathetic causes and compatible eco-systems of knowledge. Collecting big data from Facebook and Twitter allows us to create a broad and detailed picture of the network structure and composition of these online communities and how the discourses within them may change and evolve over time. At the same time, analysis of these data are not straightforward. A key challenge is to find and develop computational methods that are attuned to social theory, yet are also capable of engaging with and harnessing the scale and magnitude of big data sets that contain insights into the structures and dynamics of social movements in the 21st century. We report on some key directions, challenges, and successes at the nexus of the computational and social theoretical.

From followers to the front page: Linking interest groups' online prominence with offline media appearances

Bert Fraussen and Darren Halpin (Australian National University)

The literature on organized interests abounds with studies of when groups appear in the print media and subsequent explanations for 'getting in the news' (Binderkrantz 2012, Kriesi et al. 2007,

Grossman 2012, Tresch and Fischer 2015). Moreover, a new strand of research examines groups' usage of social media platforms like Twitter (Chalmers and Shotton 2015, Van der Graaf et al. 2015). In this paper, we develop the logic for a direct relationship between groups' position in online communities (e.g. website hyperlink networks and Twitter follower networks) with levels of appearances in traditional print media. We focus on the universe of national interest groups in Australia and draw on expansive new datasets of online networks to test our claims. [Research is joint with Herschel F. Thomas III, University of Texas at Arlington]

Discussion on possibilities and challenges of dynamic network analysis illustrated on a Twitter advocacy network

Haris Memic (Australian National University)

A large majority of statistical analyses of both offline and online social networks base their studies on statistical methods for static networks, even though most of social networks are dynamic. Online often social networks provide us with a unique opportunity to be able to access exact data of human online (inter)actions, including the precise times of those actions.

As opposed to using modelling approaches for static or panel network data, often the better way of studying online social networks is to analyse the exact behaviour of users and the network growth as it happened, by using dynamic/longitudinal methods. This presentation gives a short introduction to some of the possibilities of dynamic network analysis together with corresponding challenges in analysing longitudinal network data. More concretely, a very basic introduction to the tnet and relevent modelling frameworks will be provided. Dynamic network modelling will be illustrated on a Twitter Advocacy network, and results of the models will be discussed.

Multifractal stylometry

Jack Elliott (University of Newcastle)

A rank-order transformation from physical linguistics is used to model the changes between density and sparsity of vocabulary through out a text, generating a multifractal random walk on literary texts. This leads to the observation of vocabulary regimes: large-scale segments that correspond closely to literary features. Operation of these regimes varies widely, but changes in authorship are detected as are shifts in narrative mode and detection of plot structure. Deep parallels between music and language can be observed, modelling these pursuits as branches of the 'information arts'.

Social networks, linguistic variation, and language change

Rachel Hendery (Western Sydney University)

In this paper I will discuss implications of linguistic data I collected on Palmerston Island, a small, isolated island in the Cook Islands group, for the relationship between social networks and linguistic variation. Palmerston was settled in the 1860s by a small group of Polynesian settlers and the English sailor William Marsters and is inhabited today by the 54 descendants of this group. The islanders are monolingual speakers of their own dialect of English, which has a number of non-standard features. There is also a large amount of variation in how the islanders speak, both in terms of pronunciation and grammar.

In 2010 a PhD student from the University of Kent, Daniel Curran, collected social network data on Palmerston Island during a 9-month ethnographic fieldtrip. By examining this social network data to understand the relationships within the community and the connections the community members have to outsiders, we can gain a better understanding of why we find the patterns of linguistic variation that we do. We can also use this information to construct models for how linguistic change moves through the community.

In this talk I will describe the linguistic variation and social networks, and discuss the relationship between them. I will also present some preliminary agent-based modelling work I am undertaking with my Western Sydney University colleague Liam Magee, in which we use the Palmerston case study to consider the effects of social networks on language change.

Actual friends on Facebook

Mahin Raissi (Australian National University)

This paper has two aims. First, it studies the extent to which personal networks on Facebook are “actual". Second, it attempts to explain the closeness of Facebook relationships in real life, based on data collected from Facebook. The analysis involves the personal networks of 112 Australians aged 50 and over, collected from Facebook using an application called AuSON (Australian Seniors’ Online Networks). The findings from the first part of the analysis indicate that Facebook personal networks are to a large extent actual. More than 60 percent of participants reported that more than half of their family members and close friends are on Facebook. Participants could also identify closeness of relationship with almost all of their Facebook friends and on average, 50 percent of these relationships were close or very close. The second part of the analysis involves multi-level regression models, and it is found that the structural characteristics of personal networks have the largest explanatory power (in terms of whether a Facebook friendship is close in real life), compared with other variables such as social similarity based on socio-demographic characteristics, geographical proximity and type of relationship (kin/non-kin).

Social dynamics in eating disorder communities on Twitter

Robert Ackland (Australian National University)

This project involves the investigation of social tie dissolution (or “unfriending”), using a large-scale temporal dataset of people in eating disorder communities on Twitter (so-called pro-ana and pro-mia groups). The project involves the use of statistical event history (survival) analysis to examine the social factors that are associated with tie dissolution on Twitter. To date, the focus of our research has been on identifying particular attributes of the 'sender' or 'receiver' of an unfriending event that are significantly associated with hazard of unfriending. Preliminary evidence suggests that the duration of follower ties in this community is similar to what would be expected of real world friendships, namely: reciprocated follower ties last longer, ties between people with shared interests (use of common hashtags) last longer, and ties between people with friends in common last longer. However there are challenges to using standard survival analysis in this context, which I discuss. [Research is joint with Ian Wood, Australian National University]

Robert Ackland

Robert Ackland is an Associate Professor with a joint appointment in the School of Sociology and the Australian Centre for Social Research and Methods at the Australian National University. He has been researching online social and organisational networks since 2002, and he leads the Virtual Observatory for the Study of Online Networks (VOSON) Lab (http://voson.anu.edu.au) which was established in 2005 with the aim of advancing the social science of the Internet by conducting research, developing research tools, and providing research training. Robert established the Social Science of the Internet specialisation in the ANU's Master of Social Research in 2008, and his book *Web Social Science: Concepts, Data and Tools for Social Scientists in the Digital Age* (SAGE) was published in July 2013. He created the VOSON software for hyperlink network construction and analysis, which has been publicly available since 2006 and is used by researchers worldwide.

Jack Elliott

Jack has over ten years software design and development experience working at a high level across three continents. His interests include Romantic poetry of the early nineteenth century, contemporary romance fiction, statistical machine learning and massively parallel processing.

Bert Fraussen

Bert Fraussen is a Postdoctoral Fellow at the Research School of the Social Sciences and Honorary Research Fellow at the Antwerp Centre for Institutions and Multilevel Politics (ACIM). His research focuses on interest groups and lobbying, in particular the organizational development of interest groups as well as the interaction between organized interests and policymakers. His work has been published in journals such as *Public Administration, Political Studies, Interest Groups & Advocacy* and *The Journal of European Public Policy.*

Tim Graham

Tim Graham is a PhD candidate in sociology at the University of Queensland, Brisbane, Australia. His thesis examines the role of web technologies in shaping ‘choice’. His research interests are located at the intersection of computational sociology, social theory, social network analysis, and the philosophy of technology.

Darren Halpin

Darren Halpin is Professor, and Head of the School of Sociology, at the Research School of Social Sciences, the Australian National University. He is Co-editor of the journal Interest Groups and Advocacy and the Foundation Series Editor for the book series Interest Groups, Advocacy and Democracy (Palgrave, UK). Professor Halpin’s research agenda examines interest groups in the policy process, with specific emphasis on the political representation provided by groups, the level of (and necessity for) internal democracy within groups, and in assessing group organizational development/capacity.

Rachel Hendery

I am the Senior Lecturer in Digital Humanities at Western Sydney University. My research interests are primarily language change and linguistic typology, and I have worked on several large interdisciplinary projects using digital technologies to enable visualisation and correlation of patterns of linguistic and social change. I recently completed an ARC Discovery Project: "Change in language, culture and identity in a small isolated speech community: Palmerston Island English". I have conducted linguistic fieldwork in East Timor, Indonesia and the Cook Islands, and also have

carried out archival research on Australian Indigenous languages. I am the author of One man is an Island (Battlebridge 2015), *Relative clauses in time and space* (John Benjamins 2012) and co-editor of the volumes *Change in kinship systems* (University of Utah Press 2013) and *Grammatical change: theory and description* (Pacific Linguistics 2010).

Haris Memic

Haris Memic, PhD, is a Research Fellow in the Research School of Social Sciences at the Australian National University. His research is revolving around statistical social network analysis of online networks. Presently he is working on an Australian Research Council Discovery Project, focusing on longitudinal social network analysis of Twitter, Facebook and YouTube.

Mathieu O'Neil

Mathieu is an Associate Professor in the School of Communication at the University of Canberra. He is also a Visiting Research Fellow at the Australian National University's School of Sociology. Mathieu is a Graduate of the Ecole Normale Supérieure de Fontenay / St-Cloud. He previously lectured in American Society and Politics at the Université Stendhal - Grenoble 3, and has also worked as a magazine editor and exhibition curator. He joined the Australian National University's ACSPRI Centre for Social Research in 2005, where he contributed to the founding of the Virtual Observatory for the Study of Online Networks (VOSON). In 2008-2009 Mathieu worked as a researcher for the Department of Broadband, Communications and the Digital Economy on a project to survey digital identity management practices across the Australian Public Service. From October 2009 Mathieu lectured in sociology of communications at the Université Paris Sorbonne (Paris 4). In 2010 he founded and became the editor of the online Journal of Peer Production.

Mahin Raissi

Mahin is PhD candidate in the School of Demography at ANU and her thesis topic is: “online social networks and well-being of Australian seniors”. Mahin has degrees in social research (M.A.) and computer science (B.S.) from Iran and has an extensive experience in interdisciplinary research between these two fields. She has a special interest in doing social research using digital methods in particular, on online social networks.

Naomi Smith

Dr Naomi Smith is a digital sociologist at Federation University Australia. She is currently researching the intersection of health and wellness practices and social media. Her research interests also include methodological challenges and possibilities of big data, the role of algorithms in our social experiences and responding to the questions of spatiality that the internet poses.