

First Name	Surname	Email	Company/University	Title and Abstract
Massimo	Stella	massimo.stella@inbox.com	Institute for Complex System Simulations, University of Southampton, UK	<p data-bbox="1255 185 1940 245">MENTAL LEXICON NETWORK MODELING REVEALS THE MULTIPLEXITY OF WORD LEARNING IN ENGLISH</p> <p data-bbox="1255 280 1997 618">According to psycholinguistics, the human mind organises words in the so-called mental lexicon (ML), i.e. a dictionary where words are stored together with their linguistic correlations. In the last years, network theory has been used for investigating one type of interactions at a time, without providing cross-correlational information about semantic and non-semantic features. Our novel approach overcomes this limitation by adopting the paradigm of multiplex networks, i.e. multi-layered networks where the same set of nodes is connected according to a given interaction type, one per layer.</p> <p data-bbox="1255 654 2003 927">We model the ML of English-speaking children as a multiplex network, where words/nodes are connected according to those relationships empirically explored in previous small-scale, single-layer network studies, namely word associations (“A” makes one think of “B”), feature norms (“A” shares some features with “B”), co-occurrences (“A” and “B” are frequently adjacent in speech) and phonological similarities (“A” differs from “B” by the addition, deletion or substitution of one phoneme).</p> <p data-bbox="1255 963 2003 1300">We build this linguistic multiplex of 529 words/nodes and 4 layers from an empirical dataset retrieved by interviewing children at different months of their early language development phase. The multiplex network topology is an important proxy of the cognitive processes shaping the ML structure. In fact, we show that the multiplex topology is more powerful in predicting the ordering with which words are acquired rather than individual layer statistics. Also, the multiplex structure allows for a quantification of the most important layers (semantic vs. phonological) that dynamically determine word acquisition.</p>

Pu	Yan	pu.yan@oii.ox.ac.uk	Oxford Internet Institute	<p data-bbox="1255 103 1999 164">TWO ROADS DIVERGED: A SEMANTIC NETWORK ANALYSIS OF GUANXI ON TWITTER</p> <p data-bbox="1255 196 1999 1149">Guanxi, roughly translated as “social connection”, is a term commonly used in the Chinese language. In previous empirical research, guanxi was examined using conventional social science methods such as surveys, interviews, and participant observations. In our research, we employed a linguistic approach to explore popular discourses on Guanxi. Although sharing the same Confucian roots, Chinese communities inside and outside Mainland China have undergone different historical trajectories. In this research, we took a comparative approach to examine guanxi in Mainland China and in Taiwan, Hong Kong, and Macau (TW-HK-M). The data for this research were collected on Twitter over a three-week period by searching tweets containing guanxi written in Simplified Chinese characters (关系) and in Traditional Chinese characters (關係). After building, visualising, and conducting community detection on both semantic networks, two guanxi discourses were then compared in terms of their major concept sub-communities. This research aims at addressing two questions: Has the meaning of guanxi transformed in contemporary Chinese societies? And how do different socio-economic configurations affect the practice of guanxi? Results suggest that guanxi in interpersonal relationships has adapted to a new family structure in both Chinese societies. In addition, the practice of guanxi in business varies in Mainland China and in TW-HK-M. Network representations of the guanxi discourses enabled reification of the concept and shed lights on the understanding of social connections and social orders in contemporary China.</p>
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Valerio	Ciotti	da.apeiron@gmail.com	QMUL	<p>HOMOPHILY AND MISSING LINKS IN CITATION NETWORKS</p> <p>Citation networks have been widely used to study the evolution of science through the lenses of the underlying patterns of knowledge flows among academic papers, authors, research sub-fields, and scientific journals. Here we focus on citation networks to cast light on the salience of homophily for knowledge transfer between papers. To this end, we assess the degree to which citations tend to occur between papers that are concerned with seemingly related topics or research problems. Drawing on a large data set of articles published in the journals of the American Physical Society (APS), we propose a novel method for measuring the similarity between articles through the statistical validation of the overlap between their bibliographies. We define the probability $P_{i \rightarrow j}(p^*)$ that a citation between any two articles i and j whose similarity is validated at the threshold p^* exists as the ratio between the number of existing citations between pairs of articles validated at that threshold and the total number of validated pairs of articles in the APS citation network. Results suggest that the probability of a citation made by one article to another is indeed an increasing function of the similarity between the two articles. Our study also enables us to uncover missing citations, and may thus help identify barriers to effective knowledge flows. Findings indicate that knowledge transfer seems to be more effectively facilitated by journals of wide visibility than by lower-impact ones. Our study has important implications for authors, editors and reviewers of scientific journals, as well as public preprint repositories, as it provides a procedure for recommending relevant yet missing references and properly integrating bibliographies of papers.</p>
Tharsis T. P.	Souza	tharsis.souza.14@ucl.ac.uk	UCL	<p>MULTIPLEX STRUCTURE OF SOCIAL MEDIA AND FINANCIAL NETWORKS</p> <p>We analyse the multiplex structure of social media and financial networks via correlation-based graphs and network filtering tools. Analyses on social media messages and prices related to DJIA index stock components suggest that patterns of persistent in the multiplex structure may provide leading information on market volatility and events of market distress.</p>

Francesco	Caravelli	francesco.caravelli@gmail.com	ILAB/LIMS	<p>MY 2 CENTS PER MW: REDUCING FLUCTUATIONS OF POWER GRIDS AND OTHER TALES</p> <p>(from collaboration with C. Ududec, A. Ashtari, E. Haldane, L. Sindoni, F. Caccioli, T. Aste, T. Di Matteo, T. Mansour, S. Severini, J. Ben Geloun)</p> <p>Abstract We provide an overview of a collective endeavour currently taking place at Invenia Labs (Cambridge), in collaboration with several researchers across Europe, of studying, modelling and analyzing data of electricity prices of North American markets. After having discussed the property of the data and the notion of convergence bidding in these markets, we analyze and discuss strategies to reduce price fluctuations meanwhile being profitable. We also provide an account of more theoretical studies done at the lab and future research directions.</p>
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<p>Herve</p>	<p>Thevenon</p>	<p>herve@thevenon.net</p>	<p>UiT Arctic University of Norway</p>	<p>WHAT CAN BE LEARNED BY MODELLING THE NERVOUS SYSTEM AS A COMPLEX NETWORKS?</p> <p>Herve Thevenon, Gerit Pfuhl Department of Psychology, UiT Arctic University of Norway, Norway E-mail: herve@thevenon.net</p> <p>The concept that the neuron is the computational unit of the brain can be traced back to the 1940s, and has polarised both neuroscience and AI. Recent reports on animal-to-animal variability of the neuron's intrinsic characteristics and non-bijective relations between behaviour and neural activity led us to challenge the concept. Here we model the nervous system as a directed, sparsely connected, recurrent and temporal graph where the nodes eventually fill up to capacity, and mechanically empty themselves to contribute filling up other nodes. We embodied the model into a challenging simulated environment and used a stochastic optimisation process to evolve nervous systems that survived the environment longer. Through the optimisation process, we observed how the embodied artificial nervous system behaved in the environment. Like ethologists, we observed innate behaviours and quantified them. Subsequently we studied how behaviours were impacted as we varied the membrane resistance of the nodes, and the connectivity of the network. Our results are similar to in-vivo observations: up to five fold variations of the potentials do not impact the behaviours most critical to survival, while severing connections gradually impacts all the behaviours. This model complies with three key behavioural and biological observations that one may hold as common to all animal species. It also demonstrates that the structure of the network may be as important as the neurons in terms of computational power. Supplemental material available on Open Science Framework: osf.io/8dpnx</p>
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Federico	Battiston	battiston.federico@gmail.com	Queen Mary University of London	<p>RICH CORES IN MULTIPLEX BRAIN NETWORKS</p> <p>A core consists of a group of central and densely connected nodes which govern the overall behaviour of a network. It is recognised as one of the key meso-scale structures in complex networks, and it is typical of several real-world systems, such as the world trade web, many social and transportation networks and the brain.</p> <p>In many systems the basic constituents of a system might be connected through various kind of interactions, and are better described in terms of multiplex networks, i.e. networks where each node appears in a set of different layers, and each layer describes all the edges of a given type. We remark that a node which belongs to the core of one layer might still be of limited importance for the whole system if it is too peripheral in the remaining ones.</p> <p>Identifying the core-periphery structure of a network often relies on a limited number of methods which are complicated, relatively slow and usually parameter dependent. Here we develop a fast method to detect multilayer core-periphery structure by accounting for interactions of different nature, test it against null-models and apply it to extract such meso-scale structure in a number of multiplex networks from the real-world, with particular attention to the case of the human brain.</p>
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Martin	Dittus	eventbrite@dekstop.de	ICRI Cities at UCL	<p>BUILDING LARGE-SCALE CROWDSOURCING COMMUNITIES WITH THE HUMANITARIAN OPENSTREETMAP TEAM</p> <p>Since its inception in 2010, the Humanitarian OpenStreetMap Team (HOT) has coordinated thousands of volunteers in the creation of maps for humanitarian purposes. Contributors have traced satellite images and digitised field data in response to Typhoon Haiyan in the Philippines, the Nepal earthquake, and other disasters where aid teams require updated maps to coordinate their work. Despite these efforts, large parts of the world remain unmapped. In order to tackle the vast scale of their ambitions, HOT is now trying to understand how to grow one of the largest crowdsourcing communities on the planet.</p> <p>My research is focused on this growth challenge: I seek to develop a better understanding of how to recruit and retain an active contributor community. The initial contributor experience can play an important role in this, particularly when contributions require some expertise. The research involves large-scale quantitative studies based on the contribution history of thousands of participants. I also spend much time with the community to better understand their practices and their concerns. I frequently share my findings with the community, and the ensuing discussions with practitioners have shaped my research in important ways.</p> <p>My public research diary: https://www.openstreetmap.org/user/dekstop/diary</p>
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Jacopo	Iacovacci	j.iacovacci@qmul.ac.uk	Queen Mary University of London	<p>MESOSCOPIC STRUCTURES REVEAL THE NETWORK BETWEEN THE LAYERS OF MULTIPLEX DATASETS</p> <p>How to extract information from multiplex structures? Here we propose an information theory method to extract the network between the layers of multiplex datasets. We build an indicator function based on the entropy of network ensembles to characterize the meso-scopic similarities between layers of multiplex networks and we use clustering techniques to reveal the communities present in this network of networks. In particular we apply this measure to the characterization of the American Physical Society Collaboration Multiplex Network. The hierarchical organization of the Physics and Astronomy Classification Scheme (PACS) codes allow us to investigate the dataset at different levels of resolution with respect to the number of layers and to obtain a bottom-up approach to identify how the organization of knowledge in physics is reflected in the structure of collaboration networks.</p>
Federico	Botta	f.botta@warwick.ac.uk	University of Warwick	<p>MEASURING CROWDS USING INSTAGRAM PHOTOS</p> <p>Being able to infer the number of people in a specific area is of extreme importance for the avoidance of crowd disasters and to facilitate emergency evacuations. Here we find evidence of a strong relationship between the number of people in restricted areas and number of geo-localised photos posted on the social media platform Instagram.</p> <p>Our analysis uses football stadiums in two cities in Italy, Milan and Rome, as case studies. We analyse data for a time period of one year and we investigate the spatial and temporal relationship between number of people in the stadiums and photos posted on Instagram by users. Our findings suggest that data generated through our interactions with mobile phone networks and the Internet may allow us to gain valuable measurements of the current state of society.</p> <p>References: Botta F, Moat HS, Preis T. R Soc Open Sci 2, 150162 (2015) Botta F, Moat HS, Preis T. in preparation (2016)</p>

Julian	Vicens	julianvicens@gmail.com	URV	<p>LARGE SCALE PUBLIC EXPERIMENTS TO STUDY HUMAN BEHAVIOUR</p> <p>Experiments to study specific aspects of human behaviour generally are carried out in controlled scenarios such as research labs, however they are usually limited to a few dozens of particular participants. To increase and open the participation to hundreds of people we perform participatory collective experiments, moving the lab to open and dynamic scenarios. We have repeated this setting in three experiments focused on answering specific questions about human behaviour: (i) "Mr.Banks" to study how people take decisions in uncertain environments; (ii) "Dr.Brain" to explore cooperation profiles, and (iii) "The Climate Game" to shed some light on the negotiation against climate change.</p> <p>In particular, on the Dr.Brain experiment, we study the human behaviour facing social dilemmas grouped in four categories: Harmony, Stag-Hunt, Snowdrift and Prisoner's dilemma. We collect 8366 decisions that give an idea about the cooperation level of each individuals who take part in the experiment, 541 in total. From the data collected we carried out an unsupervised clustering analysis that allow us distinguish, without making any assumption, five types of behaviour or phenotypes. All these experiments generated relevant scientific outcomes, statistically consistent under different circumstances.</p>
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Linda	Urselmans	lursel@essex.ac.uk	University of Essex, Government	<p>COMBINING ETHNIC SEGREGATION AND MIGRATION: A SCHELLING MODEL WITH IMMIGRATION DYNAMICS</p> <p>The Schelling model of segregation since its first appearance in 1969 has enjoyed widespread popularity for its ability to generate patterns of segregation akin to those found in many cities all over the world to this day. My work builds on this model and tests in how far the rules can simulate patterns of migration in segregated cities to evaluate the effects of migration on segregation levels and segregating behaviour. In the wake of current political events such as the large-scale influx of refugees into Europe, I investigate how the scale of migration impacts the ethnic make-up of existing populations and how the overall satisfaction is affected. This working paper presents preliminary results based on a cross-section of several experiments using agent-based modelling. The conclusion is that until further analysis, smaller and more consistent influxes of migrants seem to result in more segregation compared to fewer (but larger) influxes.</p>
Francisco-Javi	Granados-Orti	gf13@gre.ac.uk	University of Greenwich	<p>WHAT CAN I DO WHEN DATA IS EXPENSIVE?</p> <p>Nowadays, Big Data problems are becoming more and more popular thanks to recent advances in the field. However, this is not all about industrial interesting challenges in data science: sometimes the number of data samples is very reduced due to high costs (computational or otherwise), leading to insufficient data to compute reliable statistical moments with classical approaches in principle or making Monte Carlo-like methods unaffordable.</p> <p>This talk is about popular methods (Polynomial Chaos, Stochastic Collocation, Kriging, etc), challenges and applications to manage the lack of data in mathematical models, as well as proper Design of Experiments (DoE) to generate the most appropriate data to compute Quantities of Interest (QoI).</p> <p>In order to not annoying the audience, the talk will be roughly 20% DoE, 30% methods and 50% applications.</p>

Sultan	Orazbayev	s.orazbayev@ucl.ac.uk	UCL and Nazarbayev University	INTERNATIONAL KNOWLEDGE FLOWS AND THE ADMINISTRATIVE BARRIERS TO MOBILITY The literature on diffusion of knowledge has shown the positive influence of physical and cultural proximity, common language and contiguity on the speed and magnitude of international knowledge flows. Knowledge diffusion is also facilitated by co-location, even temporary one, which helps researchers form personal ties and exchange tacit information through face-to-face contact. However, the ability of researchers to disseminate the results of their work, especially recent or on-going research, through international conferences, workshop and seminar visits will be affected by the administrative barriers to mobility, for example travel visas. This paper uses a gravity-style empirical model to examine the link between the administrative barriers to mobility, especially of the highly-skilled and students, and the magnitude and direction of international knowledge flows between 45 countries from 1990 to 2014. Additional calculations are made using information on travel visa requirements between 134 countries in year 2004. The results suggest that higher administrative barriers to mobility between countries are associated with reduced bilateral knowledge flows, especially of recent knowledge, and that this effect can persist for about 7 years.
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Garvin	Haslett	G.A.Haslett@soton.ac.uk	University of Southampton	<p data-bbox="1255 103 1976 131">GRAPHLET ANALYSIS OF GLOBAL CITY STREET NETWORKS</p> <p data-bbox="1255 167 1997 1029">Over the course of the last decade, methods from network science have been applied to the analysis of cities. Within this domain, a number of studies, for example, Cardillo et al. [1], have classified cities by considering topological features of the primal street network; that is, the network that is formed by considering intersections as nodes and the roads between them as edges. More recently, Louf & Barthélemy [2] clustered 131 world cities using the spatial features of their street networks (specifically, the face areas present in the street networks), finding that European cities tended to be grouped together and distinct from new world cities. To what extent does a topological partitioning of the same cities cluster them in the same manner? Here, we employ graphlet counting (a method that has been successfully applied to biological and economic data [3]) to partition the same dataset. Graphlet counting succinctly characterises each network in terms of a vector of induced sub-graph frequencies. A set of networks can then be clustered in the resulting vector space. We find that the resulting partition of the cities differs markedly from that of Louf & Barthelemy. Analysis of the clustering indicates that graphlet counting discriminates between cities primarily in terms of correlations of the densest sub-graphs. We further compare the usefulness of topological and spatial information in classifying cities and consider how graphlet counting extends existing topological findings concerning street networks.</p> <p data-bbox="1255 1065 1948 1182">[1] Alessio Cardillo, Salvatore Scellato, Vito Latora, and Sergio Porta. Structural properties of planar graphs of urban street patterns. <i>Physical Review E</i>, 73(6):066107, 2006.</p> <p data-bbox="1255 1190 1965 1279">[2] Remi Louf and Marc Barthelemy. A typology of street patterns. <i>Journal of The Royal Society Interface</i>, 11(101):20140924, 2014.</p> <p data-bbox="1255 1287 1997 1430">[3] Omer Nebil Yaveroglu, Noel Malod-Dognin, Darren Davis, Zoran Levnajic, Vuk Janjic, Rasa Karapandza, Aleksandar Stojmirovic, and Natasa Przulj. Revealing the hidden language of complex networks. <i>Scientific reports</i>, 4, 2014.</p>
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Albert	Barque-Duran	albert.barque-duran@city.ac.uk	City University London	<p>CONTEMPORARY MORALITY: MORAL JUDGMENTS IN DIGITAL CONTEXTS.</p> <p>Nowadays, several of the situations in which we have to make decisions are in digital form. In a first experiment we explored moral judgments in a large (N=1010) sample and showed that people's moral judgments depend on the Digital Context (Smartphone vs. PC) in which a dilemma is presented, becoming more utilitarian (vs. deontological) when using Smartphones. To provide additional evidence, we ran a second (N=250) and a third experiment (N=300), where we introduced time constraints and we manipulated whether instructions drew attention to the amount of time for processing a moral judgment; our key finding of the impact of digital context on moral judgments was replicated. Additionally, our results challenge one of the key assumptions in Dual-Process Models of Moral Judgment, as we showed that the (assumed) hurried, often surreptitious nature of using smartphones, that one would argue is consistent with gut-feeling reactions, decreased the likelihood of deontological responses and increased utilitarian ones. We suggest that the increased psychological distance of using a Smartphone induces utilitarianism. This is the first study to look at the impact of the digital age on moral judgments and the results presented have consequences for understanding moral choice in our increasingly virtualized world.</p> <p>Keywords: moral judgments, behavioural ethics, decision making, human-computer interaction.</p>
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Jess	Whittlestone	jess.whittlestone@gmail.com	Warwick Business School, Behavioural Insights Team	REDUCING CONFIRMATION BIAS IN POLITICAL BELIEFS Most of us tend to read more articles from sources we agree with than disagree with, and prefer surrounding ourselves with people who think similarly to us. However, this can mean we become overly fixed in our views - and in the extreme, can lead to ideological extremism and conflict between groups. My research focuses on understanding whether it's possible to counteract this tendency: ways to reduce this bias towards 'confirming' information, and to make it easier for people to seriously engage with alternative perspectives. My research so far has explored how people choose what information they pay attention to, and particularly whether presenting information as coming from specific groups (e.g. political parties) increases bias. I also have some studies ongoing exploring whether making people more uncertain about their current beliefs (for example, by asking questions which highlight gaps in understanding) can increase openness to alternative perspectives. Though my research is largely experimental, I am interested in whether there are other data sources - survey data and social media behaviour, for example - which could help me shed light on these questions, so would love the opportunity to present and discuss my research with an audience with more expertise in data science.
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Jon	Chambers	jon.chambers3001@gmail.com	UCL	<p>RAPID NON-INTRUSIVE THERMAL CHARACTERIZATION OF UK DWELLINGS AT SCALE USING SMART METER DATA</p> <p>Homes in the UK consume 26% of UK final energy and are responsible for 17% of UK CO2 emissions. Demand reduction through efficiency and curtailment has been identified as key to meeting emission, fuel poverty, and energy security goals in the UK. To achieve this, accurate measures of home energy performance are needed. Currently the most widespread assessment of dwelling thermal performance is done via a survey of the property to calculate the Energy Performance Certificate (EPC). This approach is costly, intrusive, and inaccurate.</p> <p>This research aims to characterise the thermal performance of dwellings using smart meter data cross-references with weather models. This allows measurements to be done rapidly and non-intrusively. Smart meters are being rapidly rolled out across the UK, with a goal of near total coverage by 2020, which would allow nearly all dwellings to be assessed using the proposed method. This would make it possible to rapidly identify at-risk households, enable low-risk retrofits with performance-based contracting, and enable epidemiological-scale research on energy performance.</p>
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Chanuki	Seresinhe	c.seresinhe@warwick.ac.uk	Data Science Lab, Warwick Business School, University of Warwick	<p>QUANTIFYING THE LINK BETWEEN ART AND PROPERTY PRICES IN URBAN NEIGHBOURHOODS</p> <p>Is there an association between art and changes in the economic conditions of urban neighbourhoods? While the popular media and policymakers commonly believe this to be the case, quantitative evidence remains lacking. Here, we use metadata of geotagged photographs uploaded to the popular image-sharing platform Flickr to quantify the presence of art in London neighbourhoods. We estimate the presence of art in neighbourhoods by determining the proportion of Flickr photographs that have the word "art" attached. We compare this to the relative gain in residential property prices for each Inner London neighbourhood. We find that neighbourhoods that have a higher proportion of "art" photographs also have greater relative gains in property prices. Our findings demonstrate how online data can be used to quantify aspects of the visual environment at scale and reveal new connections between the visual environment and crucial socioeconomic measurements.</p>
Paolo	Barucca	baruccap@gmail.com	LIMS	<p>CROSS-CORRELATIONS OF AMERICAN BABY NAMES</p> <p>Societal and cultural transformations are very general and debated topics, both by scientists (e.g., sociologists) and by public opinion (e.g., artists, music producers, brand manufacturers, and advertising agencies). Although almost everyone would be able to express a position on such arguments, it is much more difficult to support such an opinion based on scientific evidence. In this work we analyze the case of American baby names and describe the evolution of tastes of parents regarding the choice of the name during the years of the last century. Using quantitative methods we find that a deep transformation occurred at the end of the 20th century and suggest that this might be studied from a quantitative sociological point of view.</p> <p>[1] Barucca, Paolo, Jacopo Rocchi, Enzo Marinari, Giorgio Parisi, and Federico Ricci-Tersenghi. "Cross-correlations of American baby names." <i>Proceedings of the National Academy of Sciences</i> 112, no. 26 (2015): 7943-7947.</p>

Christian	Alis	c.alis@ucl.ac.uk	UCL	<p>QUANTIFYING THE CORRESPONDENCE BETWEEN ACTIVE TWITTER USER COUNTS AND CENSUS POPULATION COUNTS</p> <p>Discussions suggest that data from online services can be used to estimate demographics within geographical areas and, perhaps, eventually lead to the replacement of the Census. However, there are obvious biases in the demographics of users of such online services which may skew estimates. Here we investigate these biases by comparing active Twitter user counts with Census population counts aggregated according to different spatial and temporal levels of aggregation. We find that active Twitter user counts correlate most strongly with the population of residents in the 25-to-29 age group according to the Census, and are also most strongly correlated at night and during Sundays. The correlation holds most strongly when the spatial unit considered has median population of about 100,000 residents compared to smaller units with one or two orders of magnitude less residents. Even though our data is only about 1% of the total geotagged tweets posted in each spatial unit, we find that the correlation is getting stronger over time.</p>
Duccio	Piovani	duccio.piovani@gmail.com	C.A.S.A. UCL	<p>A RETAIL LOCATION CHOICE MODEL</p> <p>The rise of social media and the government movement are revolutionising data-driven research in social sciences. In this work we use passively collected datasets go human mobility and public records of economic activity to develop a shopping location choice model that considers internal and external economies of scale at the outlet level. Our findings highlight the impact of scale and agglomeration on shopping location choices and form a platform for further research.</p>

