



Minjin Lee, Hugo Barbosa, Hyejin Youn, Gourab Ghoshal, Petter Holme, “Urban socioeconomic patterns revealed through morphology of travel routes”, *Nature Communications* **8** 2229.

Paula L.W. Sabloff, Stefan Thurner, Rudolf Hanel, and Hyejin Youn, “Demographics and Democracy: A Network Analysis of Mongolians’ Political Cognition,” *Journal of Anthropological Research* **73**, no. 4: 617-646.

Xue-Mei Cui, Chang No Yoon, Hyejin Youn, Sang Hoon Lee, Jean S. Jung, Seung Kee Han, “Dynamic burstiness of word-occurrence and network modularity in textbook systems”, *Physica A: Statistical Mechanics and its Applications* **487**, 103-110.

Hyejin Youn, Sutton, Eric Smith, Bill Croft, Jon Wilkins, Tanmoy Bhattacharya, Ian Maddieson, Cris Moore “On universal structure of human lexical semantics”, *Proc. Natl. Acad. Sci USA* **113** (7) 1766–1771.

Daniel Kim, Dan Cerigo, Hawoong Jeong, Hyejin Youn, “Technological novelty profile and invention’s future impact”, *EPJ Data Science* 2016 **5**:8.

Hyejin Youn, José Lobo, Deborah Strumsky, Horacio Samaniego, Geoffrey B. West, Luís M. A. Bettencourt “Scaling and universality in urban economic diversification”, *J. R. Soc. Interface* **13**:20150937.

Marcus Hamilton, José Lobo, Eric Rupley, Hyejin Youn, and Geoffrey B. West “The ecological and evolutionary energetics of hunter-gatherer residential mobility”, *Evolutionary Anthropology* **25** 124–132.

Hyejin Youn, José Lobo, Luís M.A. Bettencourt, Debora Strumsky “Invention as a combinatorial process: Evidence from U.S. Patents”, *J. R. Soc. Interface* **12** 20150272.

Elsa Arcaute, Erez Hatna, Peter Ferguson, Hyejin Youn, Anders Johansson, and Michael Batty, “Constructing cities, deconstructing scaling laws”, *J. R. Soc. Interface* **12** 20140745.

Vsevolod Salnikov, Daniel Schien, Hyejin Youn, Renaud Lambiotte, and Michal Gastner “The geography and carbon footprint of mobile phone use in Cote d’Ivoire”, *EPJ Data Science* **3** 3.

Luís Bettencourt, Horacio Samaniego, Hyejin Youn “Professional diversity and the productivity of cities”, *Scientific Reports* **4** 5393.

Andres Gomez-Lievano, Hyejin Youn, Luís M. A. Bettencourt “The Statistics of Urban Scaling and Their Connection to Zipf’s Law” *PLoS ONE* **7**(7) e40393.

Hyejin Youn, Michael T. Gastner, Hawoong Jeong, “Inefficiency in Networks with Multiple Sources and Sinks”, *Complex* ‘2009 (USST, Shanghai, China, Feb. 23-25).

Hyejin Youn, Michael T. Gastner, Hawoong Jeong, “The Price of Anarchy in Transportation Networks: Efficiency and Optimality Control”, *Phys. Rev. Lett.* **101** 128701.

Hyejin Youn, Fabian Roth, Matthew Silver, Marie-Helene Cloutier, Peter Ittzes, and Hawoong Jeong, “Price of Anarchy on Boston Road Network”, *J. Korean Phys. Soc.* **48** 217

### **Book**

43 Visions for complexity *World Scientific* January, 2017

Edited by: Stefan Thurner (ISBN: 9789813206847)

### **In Review**

Tanmoy Bhattacharya et al, *Studying language evolution in the age of Big Data*, in review .

Luís M. A. Bettencourt, Jose Lobo, Geoffrey B. West, Hyejin Youn “The Hypothesis of Urban Scaling: formalization, implications, and challenges”, arXiv: 1301.5919 [physics.soc-ph] in review

### **In Preparation**

Hyunuk Kim, Marcus J. Hamilton, Woo-Sung Jung, Hyejin Youn, “The structure of mythologies and the humanexpansion out of Africa”

Hyejin Youn, “urban physics”, *EPJB* invited review paper

Hyejin Youn, Panjun Kim, Seungwoo Son, Hawoong Jeong, “Effective Population Density and Its Applications”, *in preparation*

Luís Bettencourt, Hyejin Youn, Anna Khasanova, Geoffrey B. West, “Citier: Bigger, Denser, Greener”, *in preparation*

Daniel Kim, Young-Ho Eom, and Hyejin Youn, “Quantifying the Stream of Technological Innovation” *in preparation*

Hyejin Youn, “Paradox of Taxation”, *in preparation*

## TALKS

### **Keynote, and Colloquium**

*Scaling in Physics, Biology, Cities, and Beyond*

Engineering Sciences & Applied Mathematics, Northwestern University Jan 22, 2018

*Scaling in Physics, Biology, Cities, and Beyond*

Civil & Environmental Engineering, Northwestern University Jan 26, 2018

*Lost and found in translation: linguistic universality*

Northwestern Institute on Complex Systems, Northwestern University Jan 24, 2018

*Scaling theory: from biology to society*

Korea Advanced Institute of Science and Technology, Korea Dec 5, 2017

*Urbanisation and Innovation,*

Institutions, Industry Structure, Evolution at CCS 17, Cancun, Mexico Sep 21, 2017

*Collective creativity,*

2017 KDD Workshop on Datadriven Discovery Halifax, Nova Scotia, Canada Aug 14, 2017

*Collective knowledge,*

Takeda: complex systems theory retreat Santa Fe Institute, Santa Fe, NM July 12, 2017

*Urban physics: scaling in physics, biology, society and beyond*

Indiana University Bloomington, Indiana, USA Apr 17, 2017

*Scaling in urban systems,*

Land & Housing Institute, Korea Jun 3, 2016

*Combinational inventions as nature of innovation,*

Merck KGaA, Darmstadt, Germany Sep 23, 2015

The nature of invention,

*The Future of Fund Management*, London, UK Mar 10, 2015

Invention as a combinatorial process of technological change

DISC (Daegu Gyeongbuk International Social Network Conference), Daegu, Korea Dec 11, 2014

### Invited Talks

Pathway of Technology Innovation: from Conventionality to Novelty <i>Next Generation Network Analytics</i> Royal Statistical Society, London	Jan 4, 2018
On universal structure of human lexical semantics <i>Conference on Complex Systems</i> , Cancun, Mexico	Sep 19, 2017
Lost and found in translations <i>Network Science Institute</i> , Northeastern University, Boston, MA	July 20, 2017
Diversification in urban economy <i>Updating the Production Function for the Algorithmic Economy</i> , Menlo Park, CA	Feb 28, 2017
Innovation and urbanisation <i>International Workshop: Frontiers of Physics</i> , Pohang, Korea	Dec 12, 2016
Scaling and universality in urban economic diversification <i>Cities as complex systems symposium (VW-Foundation)</i> , Hanover, Germany	July 13, 2016
Big Data in social physics <i>Grand open conference, Complexity Science HUB</i> , Vienna, Austria	May 23, 2016
Physics in urban systems: scaling, Zipf's law, fractality and beyond <i>City Analytics: Future Cities Catapult</i> , Urban Innovation Centre, London, UK	Sep 10, 2015
Understanding Innovation by Mapping Technology Space, <i>Complex Networks Network Seminar</i> , King's College, University of Cambridge, UK	Feb 17, 2015
Invention as a Combinatorial Process, <i>the 4<sup>th</sup> International Symposia: Green, Smart, Development &amp; Vision</i> , Seoul National University, Korea	Dec 22, 2014
Recipes and Inventions as Combinatorial Process, <i>Computational Gastronomy—Food in the Age of Data</i> Kavli Royal Society International Centre, UK	Sep 29, 2014
Cities: Emergence of Order, Erice International Seminars on Planetary Emergencies, <i>47th sessions, Energy, Cities, and the Control of Complex Systems Workshop</i> , the Ettore Majorana Centre, Erice, Italy	May 12, 2014
Understanding technological change as dynamics in ecosystem, <i>seminar of Center for International Development</i> , Harvard University, USA	Apr 2014
Cities as Complex Systems: Universal Structure of Urban Economic Diversity, <i>Quantitative &amp; Applied Spatial Economic Research Lab.</i> , UCL, London, UK	Mar 2014
Towards the Scientific Theory of Cities, Measuring Up Cities, <i>the Long Finance Symposium</i> , the Museum of London, UK	Jan 2014
Cities as Emergence of Order, London Mathematical Laboratory, UK	Dec 2013
Panel discussion in Women in Physics Session, <i>XXV IUPAP International Conference on Statistical Physics</i> , Seoul, Korea	Jul 2013
The Hidden Structure in Urban Economic Complexity, <i>International Workshop on Social Computing</i> , Seoul, Korea	Jul 2013
Cities: Emergence of Order, <i>seminar</i> at Los Alamos National Lab, US	Sep 2012

**MEDIA  
COVERAGES**

**New Scientist** “Automation will have a bigger impact on jobs in smaller cities,” May 15 2017  
**Nature** “Languages have common structure,” *Nature* **530**, 133, 2016  
**The Economist**:  
“The process of invention: Now and then,” April 25, 2015  
“Queuing conundrums,” September 13, 2008  
**Nature Physics** “Innovation Slowdown,” Mark Buchanan, **11**, 2, 2015  
**MIT Technology Review**:  
“In these small cities, AI advances could be costly,” Oct 23, 2017  
“Data Mining 200 Years of Patent Office Records To Reveal The Nature of Invention,” June 16, 2014  
**Forbes** “The hidden universal rule that helps govern the way businesses grow in a city, ” Feb 10, 2016  
**Smart Planet** “How will our cities grow?” July 27, 2011  
**NEXT CITY: Science of Cities** “When it comes to making money, Big Data reveals cities have a pattern” Jan 29, 2016  
**National Geographic** “Do languages ‘think’ alike?” Feb, 2016  
**QUARTZ** “Scientists say the ways humans describe nature transcends culture and geography” Feb 2016  
**Scientific American** “Detours by Design” January, 2009  
**Others**: Gizmodo, Phys.org, News and Tribune, Ars technica, SpringerOpen, National Geography, Mathematical Institute at the University of Oxford, News in Santa Fe Institute, Highlights in PNAS.

**PROFESSIONAL  
SERVICE**

**Workshops** (Organizer or co-organizer)  
*Frontiers of Physics: Push the Envelope of Statistical Physics*  
APCTP Headquarter, Pohang, Korea  
organised with W. Jung, S. Son, J. Jo Dec 12-14, 2016  
*Building an integrated framework for innovation, organizations, and society*  
Caucus session at Academy of Management (AOM), Anaheim, CA, USA  
organised with K. Kim Aug 8, 2016  
*Networks and technology evolution,*  
Satellite Workshop at NetSci16, Seoul, Korea  
organised with J. McNerney, I. Rahwan, and C. Hidalgo May 30, 2016  
*Technological change,*  
the satellite meeting at the Conference of Complex System (CCS’15)  
Arizona State University, USA  
organised with J. Alstott, B. Yan, F. Lafond, G. Triulzi Sep 30, 2015  
*Theory and practice of innovation: Different perspectives under the same name*  
University of Oxford, UK  
organised with L. Bloom (Oxford) and G. Zanella (Oxford) Feb 27, 2015

**Program Committees**  
*Social Informatics (SocInfo 2017)*, Oxford, UK Sep 13-15, 2017  
*The 3rd International Conference on Computational Social Science* Cologne, Germany Jul 10-13, 2017  
*Conference on Complex Systems (CCS’17)*, Cancun, Mexico Sep 19-23, 2017  
*International School and Conference on Network Science (NetSci-17)*  
Indianapolis, Indiana June 19-23, 2017  
*9th International Conference on Social Informatics (SocInfo2017)*  
Oxford, UK Sep 13-15, 2017  
*The 11th International AAI Conference on Web and Social Media (ICWSM-17)*  
Montreal, Canada May 15-18, 2017  
*The 10th International AAI Conference on Web and Social Media (ICWSM-16)*  
Germany May 17-20, 2016  
*The 9th International AAI Conference on Web and Social Media (ICWSM-15)*  
University of Oxford, UK May 26-29, 2015

**Institutional Committees**  
University of Oxford, Postdoc Fellow Search Committee 2015  
University of Oxford, Research Fellow Search Committee 2014  
University of Oxford, Research Fellow Search Committee 2013

<b>EDITORIAL WORK</b>	Review Editor, <i>Big Data</i> , special section of <i>Frontiers in ICT</i>	
<b>REFEREE WORKS</b>	<p><b>Funding Agencies:</b> U.S. National Science Foundation (NSF)</p> <p><b>General:</b> Science, PNAS, Scientific Reports, PLOS One, Journal of the Royal Society Interface</p> <p><b>Physics:</b> Physical Review Letter, Physical Review E, Physical A, European Physical Journal B, European Physical Letter, JSTAT</p> <p><b>Network Science:</b> Journal of Complex Networks</p> <p><b>Economics:</b> GECON 2015</p> <p><b>Computer Science:</b> ICWSM-15, ICWSM-16, ICWSM-17, Socinfo-17</p>	
<b>TEACHING &amp; ADVISING &amp; FUNDING</b>	<p><b>Advising</b></p> <p>Hyunuk Kim (Visiting Fellow of Santa Fe Institute), Postech 2016 – current</p> <p>Inho Hong (Visiting Fellow at Northwestern University), Postech 2016 – current</p> <p>Minjin Lee (Graduate in Energy Science), SKKU 2016 – current</p> <p>Alex McCormick (Undergraduate in Physics), University of Oxford 2015 – 2016</p> <p>Daniel Burkhardt Cerigo (Undergraduate in Physics), University of Oxford 2015 – 2016</p> <p>Daniel Kim (Graduate Fellow of Santa Fe Institute), KAIST 2013 – 2016</p> <p>Kelvin Carlson (NSF-REU), Indiana University 2011</p> <p><b>Funding</b></p> <p>Ross Richardson (Postdoc), University of Oxford 2015 – 2016</p> <p>Daniel Kim (Visiting Postdoc Fellow), University of Oxford 2016</p> <p><b>Tutoring</b></p> <p>Network Analysis of UK Patent Data, University of Oxford 2016</p> <p>Physics and Urban Scaling, University of Oxford 2014</p> <p><b>Lecture</b></p> <p>Guest lecture for econometrics, School of Future Strategy, KAIST June 2016</p> <p>Guest lecture for scalable cooperation, MIT Mar 2016</p> <p>Lecture for high school students at Hertford College, University of Oxford Oct 2015</p> <p>Lecture for undergraduate students, the Department of Mathematics and Statistics the University of New Mexico July 2012</p> <p><b>Teaching Assistant</b></p> <p>Statistical Mechanics, KAIST (best teaching award in the department) 2005</p> <p>Thermodynamics, KAIST 2005</p> <p>General Physics II, KAIST 2004</p> <p>General Physics I, KAIST 2004</p>	
<b>OTHER HONORS &amp; AWARDS</b>	<p>D4D (Data for Development) Challenge from Orange (Mobile phone data in Ivory Coast) 2012</p> <p>Congress Fellowship of XVI International Congress on Mathematical Physics 2009</p> <p>The Best prize of CYRAM Social Network Analysis competition 2008</p> <p>Springer Prize for the Best Presentation at APPC10 (The 10th Asia Pacific Physics Conference) 2007</p> <p>Distinguished Teaching Award, Dept. of Physics 2007</p> <p>The Best Student of the Year 2001, Dept. of Physics 2001</p>	