



Morgan R. Frank, Lijun Sun, Manuel Cebrian, HyeJin Youn, Iyad Rahwan, “Small cities face greater impact from automation”, *J. R. Soc. Interface* **15** 20170946.

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** 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**

- 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
- Towards the Scientific Theory of Cities, Measuring Up Cities,  
*the Long Finance Symposium*, the Museum of London, UK Jan 2014
- Invention as a combinatorial process of technological change  
*DISC (Daegu Gyeongbuk International Social Network Conference)*, Daegu, Korea Dec 11, 2014

### Invited Talks

Understanding Socio-Economic Structure using Big Data Industrial Engineering & Management Science, Northwestern University	May 22, 2018
Diversity That Makes Us Creative and Innovative <i>Complexity of Diversity Short Course</i> , Salesforce, San Francisco	Mar 23, 2018
Information created by patent activities <i>The Complexity of the Patent System</i> , Santa Fe Institute	Mar 14, 2018
<i>Scaling in Physics, Biology, Cities, and Beyond</i> Civil & Environmental Engineering, Northwestern University	Jan 26, 2018
<i>Scaling in Physics, Biology, Cities, and Beyond</i> Engineering Sciences & Applied Mathematics, Northwestern University	Jan 22, 2018
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
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.

<b>PROFESSIONAL SERVICE</b>	<b>Workshops</b> (Organizer or co-organizer)	
	<i>Frontiers of Physics: Push the Envelope of Statistical Physics</i>	
	APCTP Headquarter, Pohang, Korea	
	organised with W. Jung, S. Son, J. Jo	Dec 12-14, 2016
	<i>Building an integrated framework for innovation, organizations, and society</i>	
	Caucus session at Academy of Management (AOM), Anaheim, CA, USA	
	organised with K. Kim	Aug 8, 2016
	<i>Networks and technology evolution,</i>	
	Satellite Workshop at NetSci16, Seoul, Korea	
	organised with J. McNerney, I. Rahwan, and C. Hidalgo	May 30, 2016
	<i>Technological change,</i>	
	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
	<i>Theory and practice of innovation: Different perspectives under the same name</i>	
University of Oxford, UK		
organised with L. Bloom (Oxford) and G. Zanello (Oxford)	Feb 27, 2015	
<b>Program Committees</b>		
<i>Conference on Complex Systems</i> , Thessaloniki, Greece	Sep 23-28, 2018	
<i>Annual International Conference on Computational Social Science</i> , Evanston IL	July 12, 2018	
<i>Social Informatics (SocInfo 2017)</i> , Oxford, UK	Sep 13-15, 2017	
<i>The 3rd International Conference on Computational Social Science</i> Cologne, Germany	Jul 10-13, 2017	
<i>Conference on Complex Systems (CCS'17)</i> , Cancun, Mexico	Sep 19-23, 2017	
<i>International School and Conference on Network Science (NetSci-17)</i>		
Indianapolis, Indiana	June 19-23, 2017	
<i>9th International Conference on Social Informatics (SocInfo2017)</i>		
Oxford, UK	Sep 13-15, 2017	
<i>The 11th International AAI Conference on Web and Social Media (ICWSM-17)</i>		
Montreal, Canada	May 15-18, 2017	
<i>The 10th International AAI Conference on Web and Social Media (ICWSM-16)</i>		
Germany	May 17-20, 2016	
<i>The 9th International AAI Conference on Web and Social Media (ICWSM-15)</i>		
University of Oxford, UK	May 26-29, 2015	
<b>Institutional Committees</b>		
University of Oxford, Postdoc Fellow Search Committee	2015	
University of Oxford, Research Fellow Search Committee	2014	
University of Oxford, Research Fellow Search Committee	2013	

**EDITORIAL WORK** Editorial Board, Academic Editor at *PLOS One*.  
Review Editor, *Big Data*, special section of *Frontiers in ICT*.

**REFEREE WORKS** **Funding Agencies:** U.S. National Science Foundation (NSF)  
**General:** Science, PNAS, Nature Communication, Scientific Reports, PLOS One, Journal of the Royal Society Interface  
**Physics:** Physical Review Letter, Physical Review E, Physical A, European Physical Journal B, European Physical Letter, JSTAT  
**Network Science:** Journal of Complex Networks  
**Economics:** GECON 2015  
**Computer Science:** ICWSM, Socinfo

**TEACHING &  
ADVISING &  
FUNDING**

**Advising**

Hyunuk Kim (Visiting Fellow of Santa Fe Institute), Postech	2016 – 2018
Inho Hong (Visiting Fellow at Northwestern University), Postech	2016 – 2018
Minjin Lee (Graduate in Energy Science), SKKU	2016 – 2017
Alex McCormick (Undergraduate in Physics), University of Oxford	2015 – 2016
Daniel Burkhardt Cerigo (Undergraduate in Physics), University of Oxford	2015 – 2016
Daniel Kim (Visiting Postdoc Fellow), University of Oxford	2016
Ross Richardson (Postdoc), University of Oxford	2016
Kelvin Carlson (NSF-REU), Indiana University	2011

**Tutoring**

Network Analysis of UK Patent Data, University of Oxford	2016
Physics and Urban Scaling, University of Oxford	2014

**Lecture**

Social Dynamics Network Analysis, Kellogg School of Management at Northwestern	2018-2020
Guest lecture for econometrics, School of Future Strategy, KAIST	June 2016
Guest lecture for scalable cooperation, MIT	Mar 2016
Lecture for high school students at Hertford College, University of Oxford	Oct 2015
Lecture for undergraduate students, the Department of Mathematics and Statistics the University of New Mexico	July 2012

**Teaching Assistant**

Statistical Mechanics, KAIST (best teaching award in the department)	2005
Thermodynamics, KAIST	2005
General Physics II, KAIST	2004
General Physics I, KAIST	2004

**OTHER  
HONORS  
& AWARDS**

D4D (Data for Development) Challenge from Orange (Mobile phone data in Ivory Coast)	2012
Congress Fellowship of XVI International Congress on Mathematical Physics	2009
The Best prize of CYRAM Social Network Analysis competition	2008
Springer Prize for the Best Presentation at APPC10 (The 10th Asia Pacific Physics Conference)	2007
Distinguished Teaching Award, Dept. of Physics	2007
The Best Student of the Year 2001, Dept. of Physics	2001