

# Luyao Zhang

## Office Address

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## Citizenship and Visa Status

China (B1/B2 visa)

## Education

Ph.D. Economics, The Ohio State University, 2018  
(Defense Passed on Sep. 14, 2018, Degree to be awarded on Dec. 16, 2018)  
Dissertation: "Bounded Rationality and Mechanism Design"  
Committee: James Peck (chair), Dan Levin (Co-chair), Paul J. Healy  
M.A. Economics, The Ohio State University, 2013  
B.A. Economics, Peking University, First-class honors, 2012  
B.S. Mathematics, Peking University, First-class honors, 2012

## Teaching and Research Fields

Primary fields: Microeconomic Theory, Experimental and Behavioral Economics  
Secondary fields: Industrial Organization, Econometrics

## Publication

Zhang, Luyao and Dan Levin. 2017. "Bounded Rationality and Robust Mechanism Design: An Axiomatic Approach." *American Economics Review* 107 (5) Papers & Proceedings: 235–39.

We propose an axiomatic approach to study the superior performance of mechanisms with obviously dominant strategies to those with only dominant strategies. Guided by the psychological inability to reason state-by-state, we develop Obvious Preference as a weakening of Subjective Expected Utility Theory. We show that a strategy is obviously dominant if and only if any Obvious Preference prefers it to any deviating strategy at any reachable information set. Applying the concept of Nash Equilibrium to Obvious Preference, we propose Obvious Nash Equilibrium to identify a set of mechanisms that are more robust than mechanisms with only Nash Equilibria.

## Research Papers

Partition Obvious Preference and Mistrust in Mechanism Design: Theory and Experiment

**(Job Market Paper)** <https://ssrn.com/abstract=2927190> (with Dan Levin)

Substantial evidence in field, laboratory, and thought experiments in multiple disciplines shows that decision makers often choose a dominated strategy, which contradicts current economic theory. Moreover, experimental evidence shows that the choice of dominated strategies in some mechanisms are significantly reduced in their counterparts. To bridge this gap between theory and reality, we firstly propose two alternative axiomatic approaches: formalizing a distinct anomaly in human reasoning that agents fail to reason state-by-state and tying together a broad range of evidence for the choice of dominated strategies. Secondly, we extend the concept to game theory and mechanism design, where we identify a large class of mechanisms that successfully achieve desirable goals even with boundedly rational agents or agents who mistrust the market makers. Thirdly, we test and verify our theory and its implications in a laboratory experiment with a crossover design that enables pooled data, within-subject, and cross-subject comparisons in both decision problems and games. Finally, we address how our approach contributes to accomplishing two goals simultaneously in modelling bounded rationality: providing a unified framework that subsumes existing ones as limiting cases and

stimulating transdisciplinary conversations connecting the concepts of heuristics and emotions in psychology, the utilization of eye-tracking technology in neuroscience, and considerations of the moral foundation underlying a mechanism design in ethics.

### Bridging Level-K to Nash Equilibrium (submitted with Dan Levin)

<https://ssrn.com/abstract=2934696>

We propose a new solution concept, NLK that connects Nash Equilibrium (NE) and Level-K. It allows a player in a game to believe that the opponent may be either less- or as sophisticated as they—a view supported by various studies in psychology. We compare the performance of NLK to that of NE and some versions of Level-K by applying it to data from three experimental papers published in top economics journals and to data from a field study. These studies allow us to test NLK on: (1). A static game of complete information, (2). A static game of incomplete information, (3). A dynamic game of perfect information, and (4). On field data. NLK provides additional insights to those of NE and Level-K. Moreover, a simple version of it explains the experimental data better in many cases. As a new solution concept, NLK shares a similar foundation to NE but is also applicable to games with players of different cognitive or reasoning abilities. As an analytical tool, NLK exists and gives a sharp prediction in general, and therefore it can be applied to empirical analysis in a broad range of settings.

## Research in Progress

### Pay for Non-instrumental Information: An Experimental Study (Supported by NSF Dissertation Grant)

We investigate willingness to pay for information that is not beneficial to rational decision makers. We focus on a situation where decision makers might fail to form hypothetical scenarios or to reason state-by-state. In that situation, accounting for the cognitive cost of reasoning may explain why non-instrumental information, in theory, might nevertheless be important for bounded rational players. We design a new version of Prisoner's Dilemma games with incomplete information and compare the subjects' demand for extra information when there is either just a dominant strategy or a stronger solution concept, an obviously dominant strategy. We also incorporate three Cognitive tests from Psychology and SAT scores to further explore behavioral differences across subjects. Our design controls alternative explanations such as other-regarding preference, willingness to pay for confidence, and early resolution of uncertainty.

### Attention and Information Partitioning in Game Theory: An Eye-tracking Study (with James Wei Chen)

We propose an eye-tracking experiment to test a recent innovation in game theory and characterize different types of decision makers. This innovation captures decision makers' heterogeneous sub-optimal behaviors, by allowing different people to have varying levels of cognitive abilities with respect to the coarseness of their information-partitioning. Moreover, the theory suggests that presenting the same game in proper information-partitioning might help people who reason in coarser partitions figure out optimal choices. However, by observing subjects' choices alone, the theory cannot always distinguish between different types of decision makers. To solve this identification issue, we incorporate eye-tracking technology from Neuroscience into our design and complement choice data, using cascade- and fixation records. Meanwhile, we test whether varying the information-partitioning presenting the same game can affect subjects' information searching patterns, leading to desirable outcomes.

## Research Experience and Other Employment

Oct. 2018–Present	Saïd Business School, Oxford, UK, Oxford Blockchain Strategy Program
Aug. 2018–Present	PreScouter, Inc., Chicago, U.S.A., International Scholar
Mar. 2013–Nov. 2017	Dance Illumination, Inc., Founding President
Aug. 2012–May. 2017	The Ohio State University, Graduate Teaching Associate

May 2015–May 2017	Asian Festival, U.S.A., Committee Member of the Community Square Project
Aug.–Dec. 2016	Danse De L'Amour, Inc., Co-Founder and Development Director
Jan.–Apr. 2012	Accenture, Beijing, China, Consultant Intern
Aug.–Sep. 2011	MassMutual Asian, Hong Kong, The Financial Management Internship Program
Jan.–May 2011	Institute of Economics, Chinese Academy of Social Science, Research Assistant for Issues of Migrant Workers
May–Aug. 2010	Peking University, Research Assistant for Summer Field Study of Entrepreneurs Low-Carbon Consciousness
Feb.–May 2009	AISEIC, Beijing, China, Service and Philanthropy Chairperson for the Exchange Project of Foreign Interns for True Love Education
Aug. 2008–May 2009	US-China Business Communication Association, Beijing, China, Vice-President

### **Professional Activities**

Judge for Career Development Grant and Ray Travel Award for Service and Scholarship, The Ohio State University

#### *Conference, Seminar, and Program Presentations*

2018: Eu-China Vehicle Trading Summit, Berlin Germany, May 24th (present); China International Conference in Macroeconomics, Beijing, China, Jun. 23rd–24th (attend); HowTheLightGetsIn Philosophy and Idea Festival, Institute of Art and Ideas, London, U.K., Sep. 22nd–23rd (service); Seminar in Lincoln International Business School, Lincoln, U.K., Sep 26th (present); International Conference on Game Theory and the Fifth Microeconomics Workshop, Nanjing, China, Oct. 12th–14th. (present); Seminar in East China Normal University, Shanghai, China, Oct. 18<sup>th</sup> (present), Seminary in Selten Economics Experimental Lab, Nanjing Audit University, Nanjing, China, Nov. 6<sup>th</sup> (present).

2017: 4th International Multidisciplinary Scientific Conference for Social Science and Art SGEM, Albena Resort & Spa, Bulgaria, Aug. 22th –31st (attend); 32nd Annual Congress of the European Economic Association and 70th European Meeting of the Econometric Society, Lisbon, Portugal, Aug. 21st–25th (present); 28th International Conference on Game Theory: in Honor of Pradeep Dubey and Yair Tauman, New York, U.S.A., Jul. 17th–21st (present); I.S.E.O Summer School Featuring Three Nobel Laureates, Brescia, Italy, Jun. 17th–24th (attend); The ASSA Annual Meeting, Chicago, IL, U.S.A., Jan. 6th–8th (present).

2016: Economic Science Association Meetings, Tucson, AZ, U.S.A., Nov. 10th–12th (present); Asian Meeting of the Econometric Society, Kyoto, Japan, Aug. 14th (present); Summer School of the Econometric Society, Kyoto, Japan, Aug.4th–8th (attend).

2015: Summer School of the Econometric Society, Tokyo, Japan, Aug.3rd–7th (attend); Decision, Theory, Experiments and Applications (D-TEA), HEC, Paris, France, May 27th–29th (present); Midwest Economic Theory and International Trade Conference, Columbus, OH, U.S.A., April 10th–12th (present); Texas Experimental Economics Symposium, University of Texas at Dallas, TX, U.S.A., Mar. 28th (present).

2012: The 2nd National College Undergraduate Economic Conference, Shanghai University of Finance and Economics, Shanghai, China, May 18th–20th (present).

### **Scholarships, Fellowships, Honor, and Grants**

#### *Scholarships/Fellowships*

2017–2018	Presidential Fellowship, Ohio State University
Apr. 2017	Scholarship of I.S.E.O. Summer School Featuring Three Nobel Laureates
2012-2013	JMCB Fellowship, Department of Economics, The Ohio State University
Mar. 2012	Scholarship of the KoGuan Chinese Rule of Law and Principle Studies Center
2010–2011	China National Scholarship, Peking University
2009–2010	Scholarship of the Leo KoGuan Foundation, U.S.A, Peking University
2008-2009	The May 4th Scholarship, Peking University

#### *Honors*

Sep. 2016	L. Edwin Smart Graduate Associate Teaching Award, Department of Economics, The Ohio State University
Sep. 2015	L. Edwin Smart Departmental Citation for Excellence in Teaching, Department of Economics, The Ohio State University
May. 2013	Outstanding first-class Award for Undergraduate Dissertations, National School of Development and China Center for Economic Research
Jun. 2012	Outstanding Graduates, Beijing Municipal Commission of Education
May 2012	Outstanding Graduates, Peking University
2010–2011	A pacemaker to Merit Student, Peking University
2009–2010	Merit Student, Peking University

#### *Grants*

Dec. 2016	National Science Foundation Research Grant for Doctoral Dissertation (\$15,400)
Fall 2016	Career Development Grant, OSU Council of Graduate Student
Fall 2016	Decision Science Collaborative Research Grant (\$3000, with James Wei Chen)
Nov. 2016	JMCB Grant for Graduate Student Research (\$2,500), OSU Department of Economics

### **Teaching Experience**

#### *At the Ohio State University*

Summer 2015/2016	Econ 4400 (Elementary Econometrics), Independent Instructor
Spring 2015/2017	Econ 4001 (Intermediate Microeconomics), Independent Instructor
Autumn 2014/2015/2016	Econ 8711 (First Year Ph.D. Micro Sequence), Teaching Assistant for Prof. Dan Levin

Spring 2016	Econ 2002.01 (Principle of Macroeconomics), Administrative TA for Prof. Darcy Hartman
Spring 2014	Econ 2001.02 (Principle of Microeconomics), Teaching Assistant for Prof. Karen F Bernhardt-Walther
Spring 2014	Econ 2002.02 (Principle of Macroeconomics), Teaching Assistant for Prof. Jaroslav Horvath
Autumn 2013	Econ 2001.01 (Principle of Microeconomics), Teaching Assistant for Prof. Ida Mirzaie
<i>At Peking University</i>	
Autumn 2011	Theory of Dynamic Optimization, Teaching Assistant for Prof. Bo Zhang
Autumn 2011	<i>Tianming Ren</i> with the Framework of Scientific Outlook Rule of Law and Principle, Teaching Assistant by Prof. Leo KoGuan

## References

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 Changjiang Scholar Distinguished Professor  
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