

KAIST Summer Session 2018

Module 1. Research Design for Data Analytics

Introduction of Summer Session

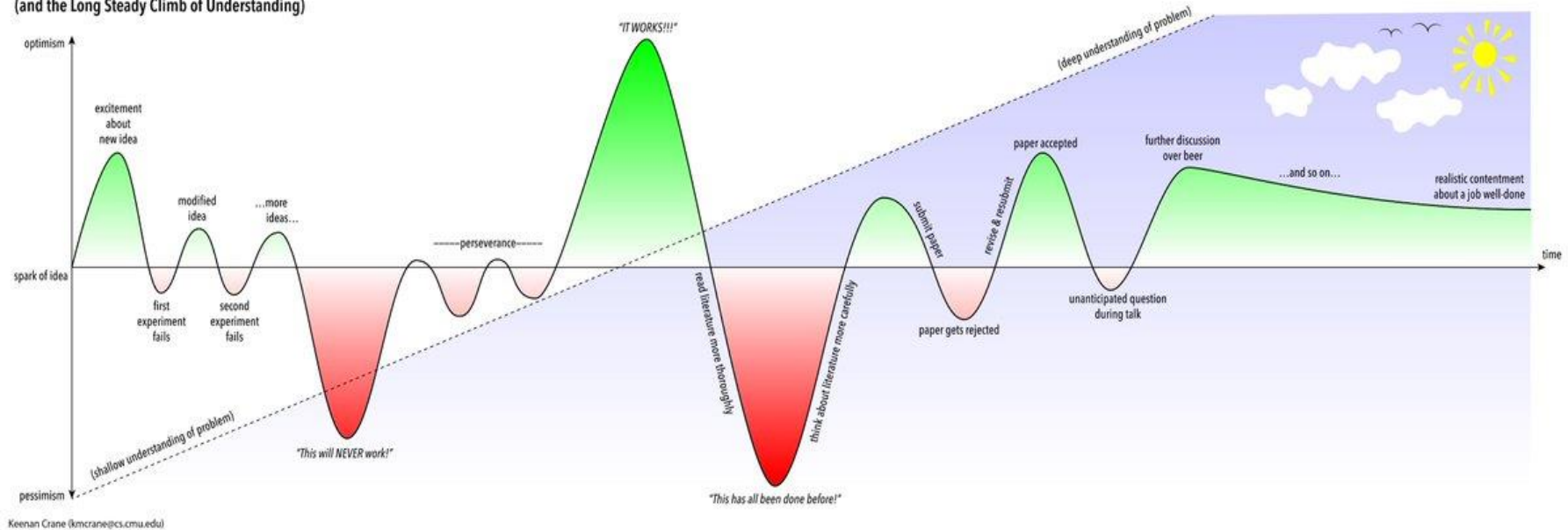
KAIST College of Business

Jiyong Park

25 June, 2018

What is Doing Research?

The Emotional Rollercoaster of Research
(and the Long Steady Climb of Understanding)



Motivation of This Session

Journal of Economic Perspectives—Volume 31, Number 2—Spring 2017—Pages 125–144

Undergraduate Econometrics Instruction: Through Our Classes, Darkly

Joshua D. Angrist and Jörn-Steffen Pischke
(MIT) (LSE)

“Our approach to instruction has evolved as we’ve confronted **the disturbing gap between what we do and what we teach**. The econometrics we use in our research is interesting, relevant, and satisfying. Why shouldn’t our students get some satisfaction too?” (Angrist and Pischke 2017, p. 142)

Angrist, J.D. and Pischke, J.S., 2017. Undergraduate Econometrics Instruction: Through our Classes, Darkly. *Journal of Economic Perspectives*, 31(2), pp.125-44.

Motivation of This Session

Advance Access publication April 22, 2015

Political Analysis (2015) 23:313–335
doi:10.1093/pan/mpv007

The Statistics of Causal Inference: A View from Political Methodology

Luke Keele

Department of Political Science, 211 Pond Lab, Penn State University, University Park, PA 19130

“...the view of causality presented in this essay. Much of this view stands at odds with what might be called standard statistical practice. **It is certainly different from what I was taught in graduate school.**” (Keele 2015, p. 332)

Keele, L., 2015. The Statistics of Causal Inference: A View from Political Methodology. *Political Analysis*, 23(3), pp.313-335.

Why is (Data-based) Empirical Research Important?

- The rise of empirical research in social science
 - For example, the share of empirical papers in top economics journals has climbed to more than 70% (Hamermesh 2013).

PERCENT DISTRIBUTIONS OF METHODOLOGY OF PUBLISHED ARTICLES, 1963–2011*

Year	Type of study				
	Theory	Theory with simulation	Empirical: borrowed data	Empirical: own data	Experiment
1963	50.7	1.5	39.1	8.7	0
1973	54.6	4.2	37.0	4.2	0
1983	57.6	4.0	35.2	2.4	0.8
1993	32.4	7.3	47.8	8.8	3.7
2003	28.9	11.1	38.5	17.8	3.7
2011	19.1	8.8	29.9	34.0	8.2

* Among top economics journals (American Economic Review, Quarterly Journal of Economics, Journal of Political Economy)

Hamermesh, D.S., 2013. Six Decades of Top Economics Publishing: Who and How?. *Journal of Economic Literature*, 51(1), pp.162-72.

Why is not Methodology Important?

- No research methodology can save the poor research question.

AMJ Board Members' Reasons for Rating an Article as "Most Interesting"

Percent Giving Reason	Reason	General Domain of Reason	Illustrative Quotations
57%	Counterintuitive	Challenges established theory; is counterintuitive; goes against folk wisdom or consultant wisdom, etc; creates an "aha" moment.	"This paper flew in the face of conventional wisdom and demonstrated that 'conventional wisdom' was based on a very biased view of what had been done."
57	Quality	Includes at least one of the following: well-crafted theory; good technical or methods job; good fit of data and theory; sophisticated methodology; great sample; makes the complex look simple and elegant.	"The data are qualitative, collected by lengthy interviews and participant observation. Cluster analysis is used to identify different types. Extensive significance testing and rigorous quantitative validation procedures provide a template for any researcher employing this method. This is followed by the presentation of qualitative data in support of each type, providing further insight."
48	Good writing	Is well framed; builds momentum; provides good examples; is clear and engaging; has rich descriptions.	"The story is compelling, and it is written with such clarity and such drama that it is a good read all on its own."
46	New theory/finding	Creates new theory; synthesizes previous theories; integrates multiple perspectives; comes up with an important finding.	"The study provides insightful theory development to account specifically for nationality-based diversity effects which are then verified through three different studies."
31	Practical implications	Generates usable knowledge in the "real world"; addresses a subject that is very relevant to the real world.	"The article also seemed to have important implications for managers of any organization at or near the top."
28	Impact	Stimulates new empirical or theoretical work; has been cited or quoted a lot; has opened avenues for research in a new areas.	"This classic paper obviously made a huge impact on the field, stimulating hundreds of empirical papers and further theoretical development."

Bartunek, J.M., Rynes, S.L. and Ireland, R.D., 2006. What Makes Management Research Interesting, and Why Does it Matter?. *Academy of Management Journal*, 49(1), pp.9-15.

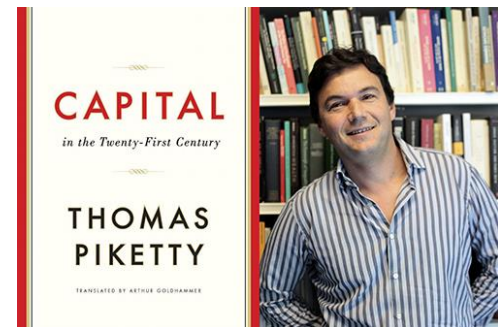
Why is not Methodology Important?

- No research methodology can save the poor research question.

“But by patiently searching for facts and patterns and calmly analyzing the economic, social, and political mechanisms that might explain them, it can inform democratic debate and **focus attention on the right questions...**

In my view, this is the role that intellectuals, including social scientists, should play ...”

- Introduction, <Capital in the Twenty-First Century>, Thomas Piketty (2014)



Why is Methodology Important?

- But, poor methodology can spoil the good research question.

“The group that is introducing new ideas and new topics to IS research that faces the most significant of challenges in publishing in top outlets (journals, conferences, etc.) because **the review process is designed to avoid type I errors (with the null hypothesis that the paper has no value or is wrong)** and in the process we make more type II errors where we fail to assess research that does make significant contributions as significant.” (p. 2)

- Alok Gupta, Editor-in-Chief of *Information Systems Research*

Gupta, A., 2017. Editorial Thoughts: What and How ISR Publishes. *Information Systems Research*, 28(1), pp.1-4.

Why is Methodology Important?

- Being rigorous with appropriate methodology is crucially important not to raise false alarms or misinform stakeholders.

“I like the type of impact such research has on social issues of our times. We expect IS research to make a difference. However, as the AE indicated, **we want to be sure that we are not raising false alarms...** Can you conclusively arrive at these causal relationship?”

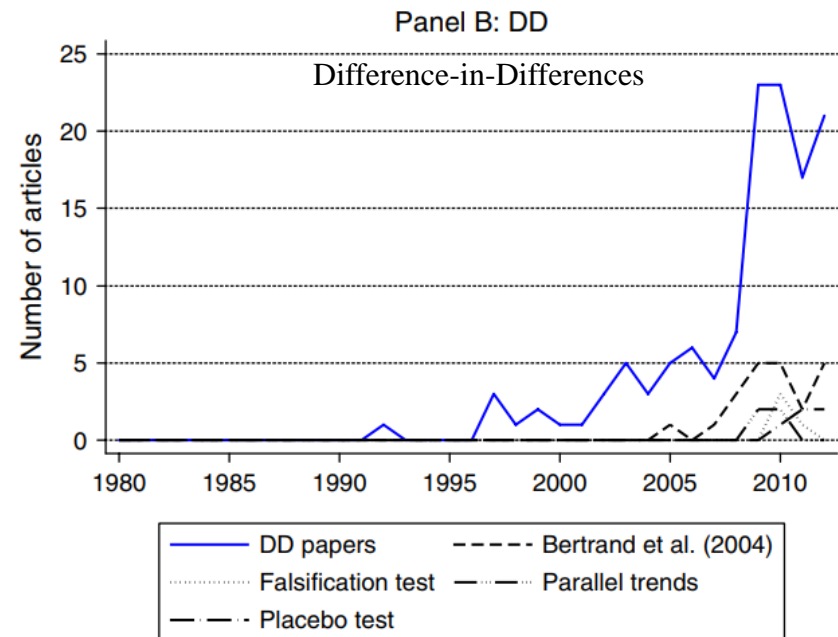
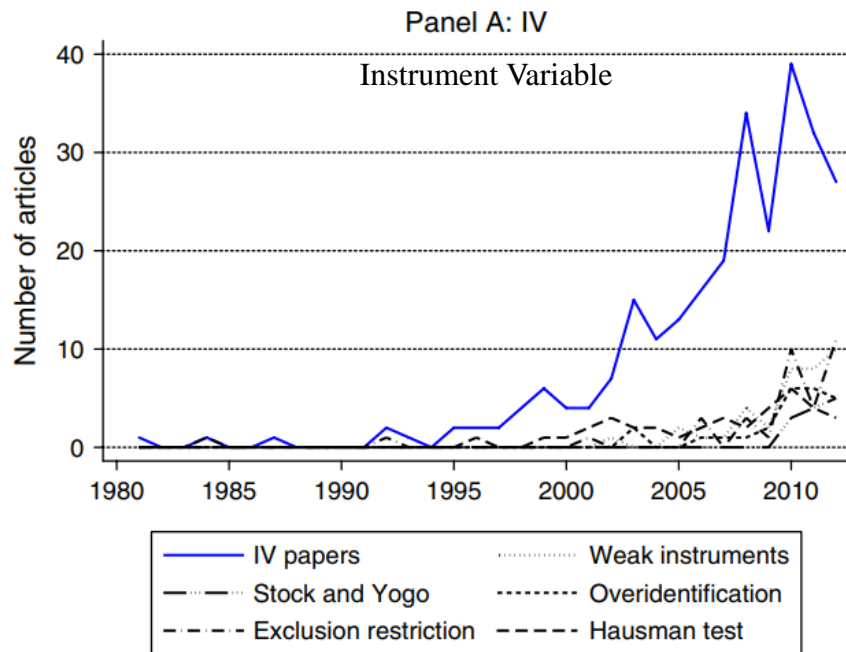
- A review from the SE of *Information Systems Research*

“The “interesting” topic on sexual assault is a double-edged sword. On one hand, I think studying it has high potential to make some impact and implications for a real social problem. On the other hand, **we have to be very sure about the findings, in order not to send a misleading message to the public.**”

- A review from the AE of *Information Systems Research*

Why is Methodology Important?

- Evolution of methodological refinements

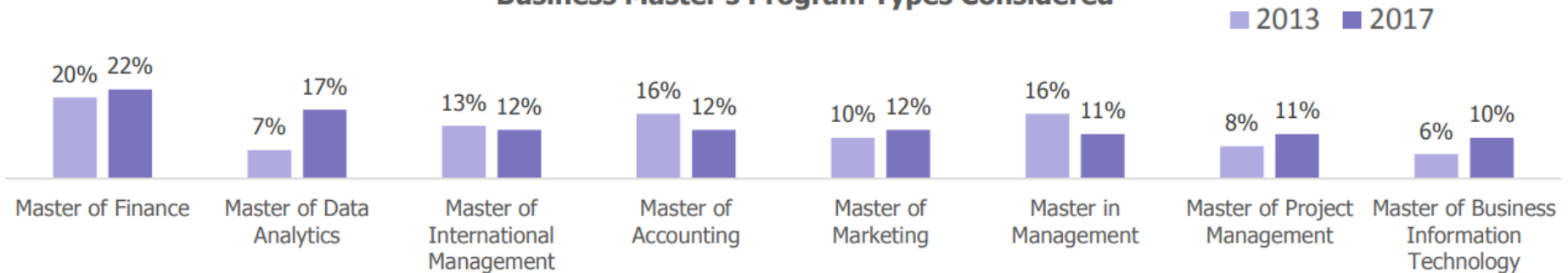


* Among top finance journals (Journal of Finance, Journal of Financial Economics, Review of Financial Studies)

Bowen III, D.E., Frésard, L. and Taillard, J.P., 2016. What's Your Identification Strategy? Innovation in Corporate Finance Research. *Management Science*, 63(8), pp.2529-2548.

The Rise of Data Analytics in Business School

Business Master's Program Types Considered



Graduate
Management
Admission
Council®

Business Master's Programs

Change in Application Volume Trends Over Time



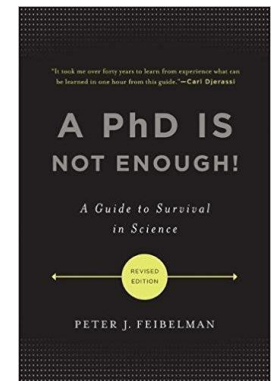
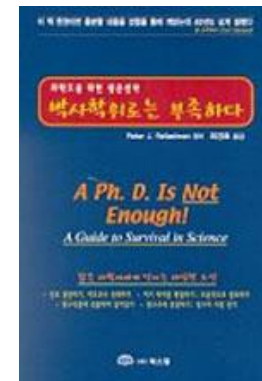
Scale: Relative change in application volume over time, where -3 indicates significant decline in volume compared to the previous year, 0 indicates no change from the previous year, and +3 indicates significant increase compared to the previous year.

Source: <https://www.gmac.com/market-intelligence-and-research/research-library/admissions-and-application-trends/2018-mbacom-prospective-students-survey-demand-for-mba-and-business-masters-programs.aspx?fromsearch=1>
<https://www.gmac.com/market-intelligence-and-research/research-library/admissions-and-application-trends/2017-application-trends-survey-report.aspx>

Motto of This Session

“신기술, 난해한 테크닉, 새로운 시약, 새로 동정한 미생물 등을 이용하여 연구를 수행하는 것도 좋지만, 장기적인 연구생산성이나 생존가능성을 고려한다면 기술 지향적 (technic-oriented)인 것보다는 문제 지향적 (problem-oriented)인 쪽이 훨씬 유리하다. ‘문제 지향적’이란 궁극적으로 해결하고자 하는 과학적 과제를 명확히 세운 다음, 때로는 기술을 새로 배우거나 개발해야 하더라도 그 과제를 해결하기 위해 꾸준히 노력하는 것을 의미한다. 특정 기술에만 관심을 쏟으며, 이 기술이 적용될 수 없는 과학적 문제는 쳐다보지도 않는 사람이 되어서는 안 된다. 기술 지향적 연구자는 학문적 리더로 오랫동안 살아남을 확률이 거의 없다. 문제 지향적이라고 해서, 문제해결에 필요한 모든 기술을 터득해야 하는 것은 아니다. 때로는 동료들에게 도움을 청하는 것이 더 바람직하다. 당신은 학문적 리더가 되고자 하는 것이지 기술적 리더가 되려는 것이 아니다.”

“대학원을 졸업할 때면 대부분의 학생들은 저마다 전문기술을 가지고 있다. 이 기술을 응용해서 연구를 시작해보고 싶은 마음은 충분히 이해가 된다. 하지만 이 때문에 우리는 곧잘 “내 기술로 이젠 또 뭘 손 대볼까?” 하는 식의 나쁜 사고방식을 갖게 된다는 점을 지적하고 싶다.”



Source: 연구와 장비병 (권창현 교수, 대학원생 때 알았더라면 좋았을 이야기들)

<http://gradschoolstory.net/changhyun/%EC%97%B0%EA%B5%AC%EC%99%80-%EC%9E%A5%EB%B9%84%EB%B3%91/>

Motto of This Session

Research Design for Applied Analytics

From Technique-Centric View Toward Question-Centric View

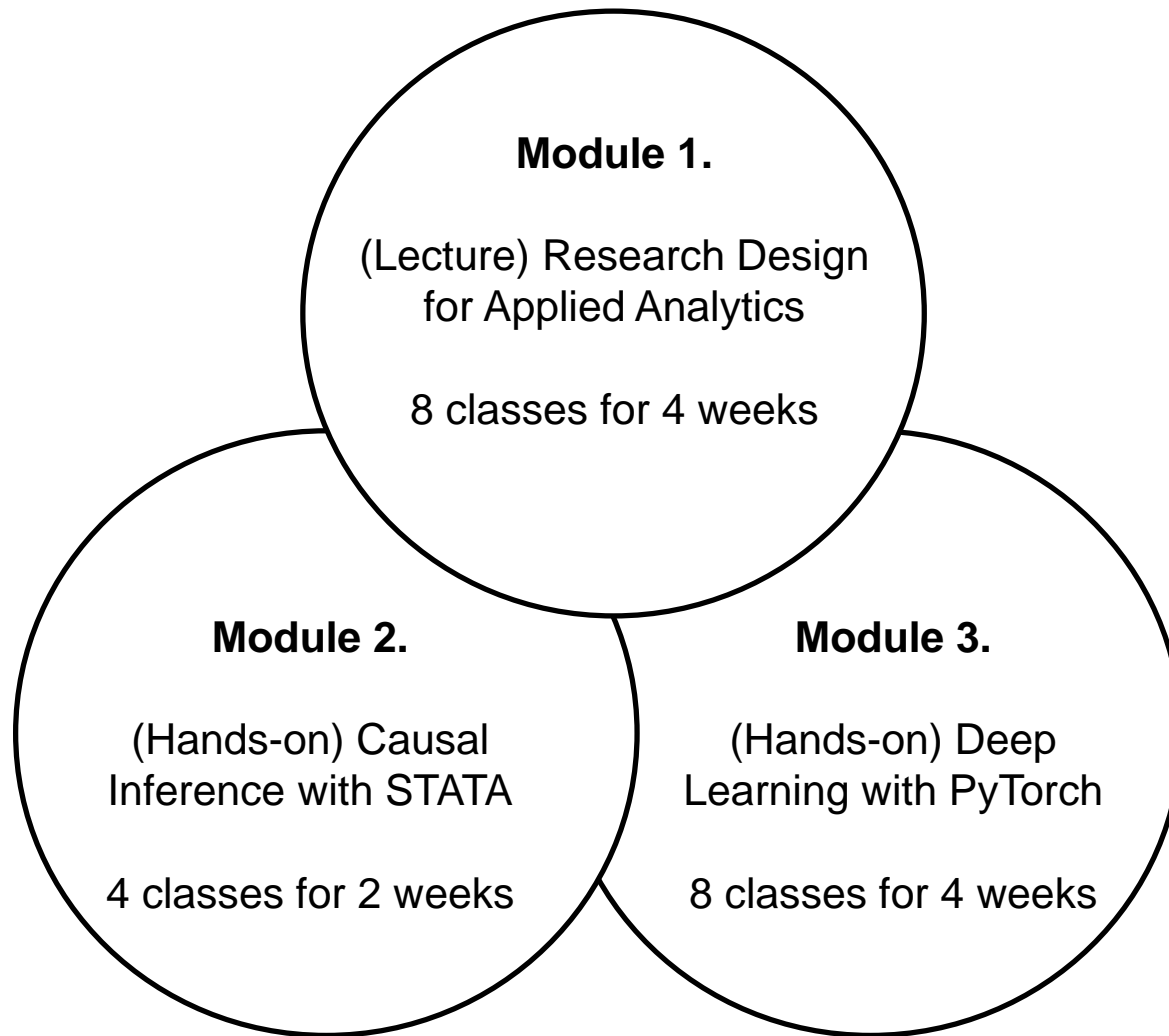
“Each methodology has its strengths and weaknesses. Each approach to data has its strengths and weaknesses. Each theoretical apparatus has its place in scholarship. And one of the biggest challenges in doing interdisciplinary work is being able to account for these differences, **to know what approach works best for what question**, to know what theories speak to what data and can be used in which ways.”

“Unfortunately, our disciplinary nature makes a mess out of this. Scholars aren’t trained to read in other fields, let alone make sense of the conditions in which that work was produced.”

- Danh Boyd, Principal Researcher at Microsoft

Source: <http://www.zephoria.org/thoughts/archives/2010/04/17/big-data-opportunities-for-computational-and-social-sciences.html>

Three Modules of Summer Session



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