

Business Statistics in Practice

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Motivation

- Statistics has great potential to impact the performance of a wide range of businesses
- And yet, many business statisticians feel they have
 - marginal influence on key business decisions, or
 - less intellectual stimulation than anticipated, or
 - both,
 - unless they are part of *research* teams (and these opportunities are becoming rarer)
- What can we do to attain job satisfaction?

Synopsis

- Some typical business statistics problems
- Thinking like a business person
 - Presenting analysis
 - Presenting data
- Knowing the business
 - Knowing the business, really
 - Recognising human psychology
- Seeking intellectual stimulation

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Business statistics problems

- Credit scoring models
- Risk management models
- Customer profiling and segmentation
- Predictive response models
- Marketing / industrial experiments
- Quality control, Six Sigma
- Survey research analysis
- Conjoint models
- Choice models

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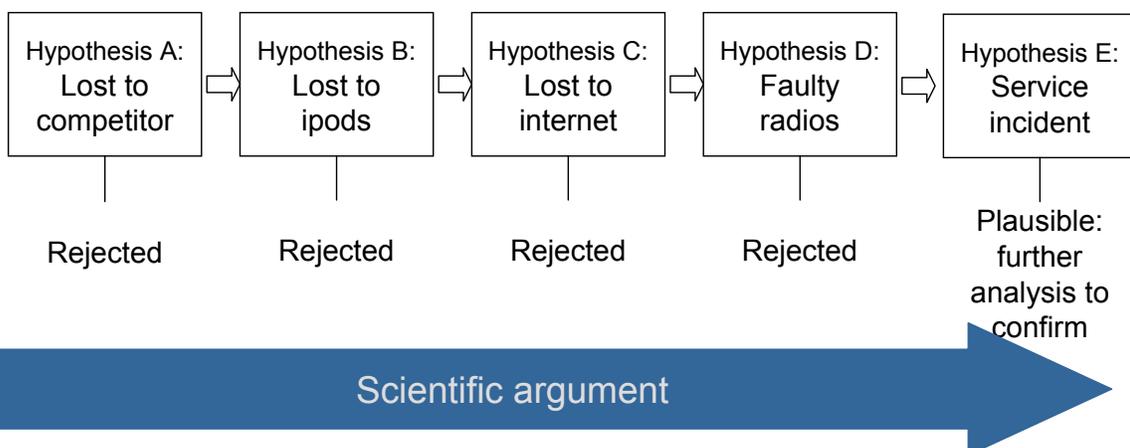
Thinking like a business person

- Presenting analysis
 - Focus on key takeaways, not process
 - Reverse scientific deduction
 - Eradicate jargon
 - Be parsimonious
- Presenting data
 - Use graphics
 - Use annotations

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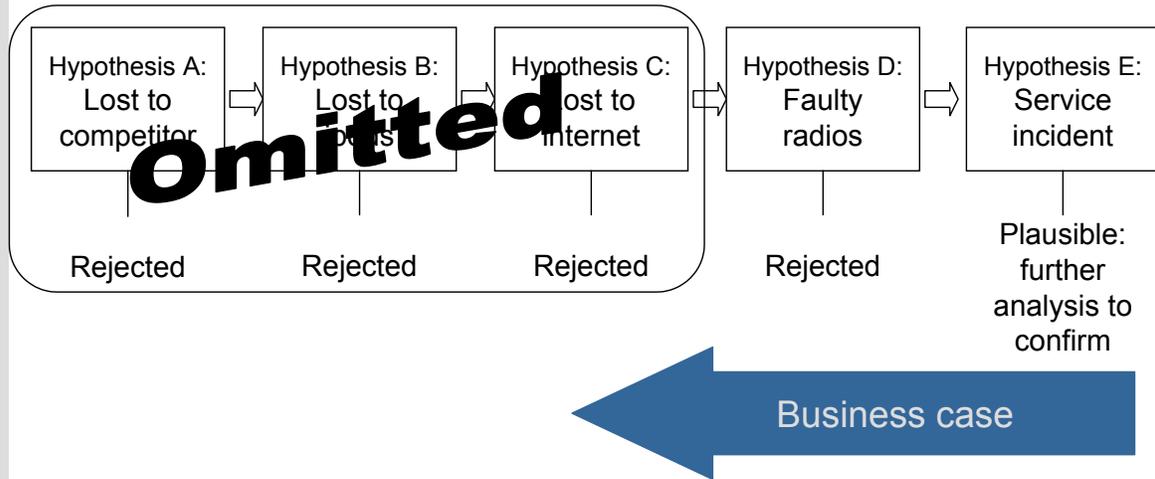
Presenting analysis like a scientist

- *Business problem*: Why do some customers leave the franchise?
- *Analysis*: Elimination of hypotheses



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Presenting analysis for a business audience



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Presenting data in science

Table 7
Stevens et al. 2006, table 2: Determinants of authoritarian aggression

Coefficient	Standard Error	Variable	Coefficient (Standard Error)
		Constant	.41 (.93)
		Countries	
		Argentina	1.31 (.33) ^{†††}
		Chile	.93 (.32) ^{†††}
		Colombia	1.46 (.32) ^{†††}
		Mexico	.07 (.32) ^{A,C,H,I,C0,V}
		Venezuela	.96 (.37) ^{†††}
		Threat	
		Retrospective egocentric economic perceptions	.20 (.13)
		Prospective egocentric economic perceptions	.22 (.12) [#]
		Retrospective sociotropic economic perceptions	-.21 (.12) [#]
		Prospective sociotropic economic perceptions	-.32 (.12) [*]
		Ideological distance from president	-.27 (.07) ^{**}
		Ideology	
		Ideology	.23 (.07) ^{**}
		Individual Differences	
		Age	.00 (.01)
		Female	-.03 (.21)
		Education	.13 (.14)
		Academic Sector	.15 (.29)
		Business Sector	.31 (.25)
		Government Sector	-.10 (.27)
		R ²	.15
		Adjusted R ²	.12
		N	500

†††p < .01, †p < .05, #p < .10 (two-tailed)

^ACoefficient is significantly different from Argentina's at p < .05;
^BCoefficient is significantly different from Brazil's at p < .05;
^CCoefficient is significantly different from Chile's at p < .05;
^{C0}Coefficient is significantly different from Colombia's at p < .05;
^MCoefficient is significantly different from Mexico's at p < .05;
^VCoefficient is significantly different from Venezuela's at p < .05.

Pairwise comparisons

P-values
Two-tailed
Star system

R-sq, adj

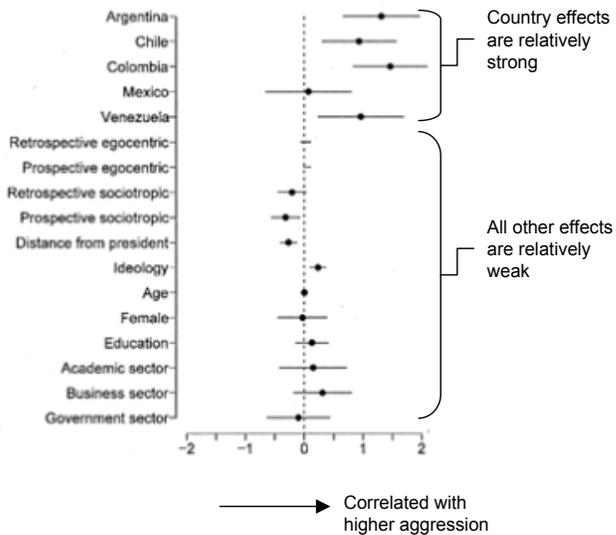
N

Scientific journal

- Primary concerns
 - Comprehensive
 - Precise
 - Technical

Presenting data in business

Country is most predictive of aggression



Adapted from Kastellec & Leoni (2007)

Business case

- Graph it
- Annotate it
- Draw attention to key message
- Get to the point
- Eradicate jargon

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Knowing the business

- Crucial to understand the business context
 - Finance: How does a company make money?
 - Psychology: How are decisions made? What incentives motivate the work force?
 - Marketing: What is the customer life cycle? What affects customer behavior?
- How to pick up the knowledge?
 - Nothing beats on-the-ground experience
 - Business news and magazines (Wall Street Journal, Financial Times, Economist, Business Week, Fortune, Forbes, CNBC, etc.)
 - MBA courses
 - Business books
 - Unconventional: Dilbert, The Office, etc.

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Recognising human psychology

- Trust intuition (experience) should data or logic fails to “make sense” Biased sample
- Inconclusive or negative results are a waste of time Publication bias
- When in doubt, search harder Multiple comparisons

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Intellectual stimulation

- If managed well, employees will have opportunity to pursue intellectually challenging projects
- Plenty of unsolved business problems
 - Reject inference
 - Missing data problems
 - Rare event prediction
 - Observational data
 - etc.
- Business impact is a bonus, not a given

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Reading

- Tufte, Wainer, Gelman, Junk Charts
- Kahneman, Tversky and associates
- Davenport & Harris: Competing on Analytics
- Ayres, Supercrunchers
- Lewis, Moneyball
- Heath & Heath: Made to Stick
- Fisher and Ury: Getting to Yes
- Higgins: Analysis for Financial Management
- Taleb, Fooled by Randomness or The Black Swan