

TED-type Talk

(The Keys to Success)

Sheldon H. Jacobson

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Life as an Academic

What do we do?

- *Teaching
- *Research
- *Service


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The Business of EDUCATION

- *Teaching
 - Classroom
 - Advising (UG & G)
- *Research
 - Publication & Scholarship
 - Grants (Government) & Contracts (Industry)
 - Seminars & Lectures
- *Service
 - Department, University, National
 - Professional
 - Consulting

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What do I do?


Areas of Research

Sequential Stochastic Assignment Problems

- * Basic Research
 - Applied probability
 - Optimal decision-making under uncertainty
- * Theory and Algorithms

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

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Aviation Security System Analysis

- * Aviation Baggage Screening Security System Design
 - * False Alarm / False Clear Tradeoffs
 - * Control Theory
 - * Markov Decision Processes
 - * Optimal Asset Allocation
 - * Optimal Decision-Making
- * Aviation Security National Policy Implications

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TRANSPORTATION SECURITY ADMINISTRATION**


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Vaccine Procurement and Delivery

- * Mathematical (Integer) Programming
- * Game Theory
- * Design OR Models for Purchasing, Pricing, & Stockpiling Pediatric Vaccines
- * Federal Pediatric Vaccine Procurement Policy Implications

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CENTERS FOR DISEASE CONTROL & PREVENTION**



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Political Redistricting and Gerrymandering

- * Mathematical Modeling for Designing Congressional Districts Equitably
- * Novel Graph Theory Concepts to Overcome Stringent Design Criteria
- * Implication on Which Political Party Controls Power in Congress

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Balance Optimization Subset Selection for Causal Inference Experimental Design

- * Novel Approach to Design Causal Inference Experiments in the Social Sciences and Medicine.
- * Exploit Discrete Optimization Structure within a Statistical Framework
- * Implications on Decision-Making Process within Numerous Industries (Pharm., FDA, EPA, ...)
- * BIG DATA

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Laws that Ban Cell Phones While Driving and Accident Rates

- * Controversial Public Issue
- * Novel Approaches to Analyze Data to Weed Out New Insights on this Issue.
- * Implications on Public Health Safety and Legislation

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Fuel Consumption, Energy, and Obesity

- * Engineering Economic Analysis
- * Public Health and Transportation Implications
- * Attracts Wide-Spread National Attention



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Can a treadmill help you save on gas? - The Driver's Seat - MSNBC.com

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SAVE 20% ON RESUME SEARCH
And find your next star employee for less.

msnbc

Can a treadmill help you save at the pump?

Experts see better ways than slimming to beat high gasoline prices

By Richard James
Associate editor
MSNBC
Updated: 10:01 a.m. CT Nov 1, 2008

A new study that received a lot of publicity last week contends that Americans are wasting billions of dollars every year on gasoline because of the growing size of their waistlines.

Yes, the laws of physics still apply when it comes to driving — the fatter you are, the fatter your fuel bills will be, as it takes more power to propel you and your car down the road. But before you jump onto a treadmill to

CHIC VIDEO

Dr. 21: Sheldon Jacobson, a researcher at the

<http://www.msnbc.com/id/1344760/>

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NCAA Basketball "March Madness" Bracket Analysis

- * Statistical analysis of seed trends
- * Probabilistic assessment of seed combinations

BracketOdds

<http://bracketodds.cs.illinois.edu>

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Forecasting The Presidential and Senates Elections

- * Statistical analysis based on polling data.
- * Probabilistic assessment win the elections.

<http://electionanalytics.cs.illinois.edu>

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Screening for Ebola at Airports

Similarity to aviation security screening.



2014-10-11, CBS, 541, hnm
CBC News, Toronto, Canada, 11 October 2014


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How Does One Begin to Do Research on a Topic?

Aviation Security

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Aviation Security

Thought it was an interesting problem that would lend itself to operations research methodologies

Started research in the area in 1994 (with JE Kobza)

Published first paper in the area in 1996

Kobza, J.E., Jacobson, S.H., 1996, "Addressing the Dependency Problem in Access Security System Architecture Design," *Risk Analysis*, 16(6), 801-812.

Awarded small contract from FAA in 1999

Awarded NSF grant (on Sept. 1, 2001, by R. Rardin)

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Then.... September 11th
happened.....



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Aviation Security

Became a known entity within the TSA (2001)

Quoted in Congressional briefing (2001)

Briefed the Office of Science and Technology, in the
Executive Office of (former) President George W.
Bush (2002)

Academic Activities:

Published 30 research papers on the topic

Directed three Ph.D. dissertations, three M.S.
theses

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Served on TSA internal review panels (2004, 2007)

Awarded *Aviation Security Research Award* from Aviation
Security International (2002)

Awarded a Guggenheim Fellowship (2003)

Awarded *Outstanding IIE Publication Award* from Institute of
Industrial Engineers (2009)

Produced video "Aviation Security: Researching the Risk" (2006)

Co-editing special issue of *IIE Transactions* (Homeland Sec.)
(2005-2006)

Awarded NSF grant (on August 1, 2009, by D. Wenger)

Invited to provide commentary featured in *Will Profiling Make a
Difference?* on the **New York Times** web site: Room for
Debate (2010)

Runner-up, 2010 Christopher Columbus Fellowship Foundation
Homeland Security Award (Transportation & Border Security)

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Multiply what
was just described by 3000+ faculty
and you
have what is the
University of Illinois



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Research

is what makes the

University of Illinois

an outstanding
Institution of Higher Learning!

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Research

is what will Allow the Degree
that you will earn from the

University of Illinois

Grow in Value!

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Recent Ph.D. Graduate Students

Doug King, Ph.D. '12 (IE)

- Congressional District Optimization using Graph Theory
- NCAA Basketball March Madness
- Fuel Obesity Analysis

2009, UofI College of Engineering Mavis Memorial Fund Scholarship,
2010 UofI College of Engineering Mavis Future Faculty Fellowship,
2012 Finalist, Best Paper Award, INFORMS Section on Public Policy, Services and Needs,
2012 Semi-Finalist, Advances in Analytics Award, INFORMS Analytics Society,
2013 IIE Pritsker Doctoral Dissertation Award Competition, 2nd Place.

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Recent Ph.D. Graduate Students

Banafsheh Behzad, Ph.D. '14 (IE)

- Sequential Stochastic Assignment
- Obesity and Transportation
- Pediatric Vaccine Pricing using
Game Theory

2013 Gilbreth Memorial Fellowship, Institute of Industrial Engineers (IIE).

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Current Ph.D. Graduate Students

Jason Sauppe (CS)	Balance Opt. Subset Selection Discrete Optimization Cyclic Best First Search Election Forecasting
Arash Khatibi (IE)	Sequential Stochastic Assignment NCAA Bracketology

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What I Tell my Graduate Students

Goal for My Students:

- Do the highest quality research
- Publish the highest quality papers
- Win the most prestigious national awards
- Get the best possible position

My Job: Help them achieve all these goals

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Some Awards Won by My Graduate Students

INFORMS George E. Nicholson Student Paper Competition (Honorable Mention)
 INFORMS College on Simulation Women and Minority Award
 INFORMS Computing Society Student Paper Competition (Runner-Up)
 INFORMS Transportation Science & Logistics Dissertation Prize (Honorable Mention)
 IIE Pritsker Doctoral Dissertation Award Competition (1st Place, 2nd Place, 3rd Place)
 IIE Graduate Research (Master's Thesis) Award Competition, (1st Place, 2nd Place)
 IIE Gilbreth Memorial Fellowship
 AAUW Postdoctoral Research Leave Fellowship (Runner-up)
 AFOSR Graduate Student Summer Research Fellowship Award.
 VT Paul E. Torgersen Graduate Student Research Excellence Award (Second Place)
 UI Ph.D. Thesis Initiation Fellowship, Program in Arms Control, Disarmament, & Int. Security
 UI M&IE Alumni Teaching Fellow (2)
 UI M&IE Harper Safety Award (2)
 Federal Aviation Admin. / USDOT Grad. Research Award on Public-Sector Aviation Issues
 UI COE Mavis Graduate Fellowship (2)
 National Science Foundation Graduate Fellowships (2)
 NDSEG Graduate Fellowships (2)
 UI CS Grad Expo Top Team Presentation

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Questions for my Graduate Students

What are we doing today to make our research group the best in the country?

How can I help you to facilitate this goal?


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What is Important to Me?

- My Career (*Research, Teaching, Service*) 
- Relationships with People (*My Wife, Friends, Students, Colleagues*) 
- Laughter!!!  
- Exercise (*Working out, Aerobics*)

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What Have I Learned in Life?

The
 “Ph”ive P’s
 to
 Personal
 “Ph”ul”Ph”illment
 and
 Progress


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Personal Relationships

Passion
 “Ph”ailure
 Persistence
 Priorities

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Service

Service

Service!

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**Important Question
to Ask Yourself:**

**How can I make the world
a better place today?**

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The Penultimate Secret

Just Show Up!



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The Final Secret

Pack People's Parachutes



Charles Plumb

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**Everything
that I just said
may be
wrong!**



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