People aren’t dumb.
The world is hard.

Michelle S. Segovia
Crop Management Conference
November 18th, 2018
Outline

- Behavioral Economics
- “Nudges”
- “Nudging” in the real world and agriculture
20-second quiz

A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball.

How much does the ball cost?
Did you think fast or slow?

System I
Automatic System

10 cents

System II
Rational System

5 cents
Neoclassical Econ

- People make rational decisions
- Choices are purely conscious
- Decisions based solely on self-interest
- People are fully informed

Behavioral Econ

- Choices are often based on unconscious processes and influences
- Emotions affect choices
- Decisions are not made under complete information

System I
Automatic System

System II
Rational System
But behavior can be changed!

“If you want to get people to do something, make it easy! Remove the barriers.”

“I would try to spend the prize money as irrationally as possible.”

Richard H. Thaler
What are nudges?

- Influence behavior without eliminating **freedom of choice**!
- Positive reinforcement, indirect suggestions, and default choices
  1. Timely
  2. Easy
  3. Attractive
  4. Social
Nudge examples

- **Ready, Aim, Fire! – Urinal flies**
  Urinal flies etched near the drains of the urinals
  Spillage on the bathroom floor was reduced by 80%
  Kieboom (1990s)

- **Retirement savings plans**
  Raise the default rate after getting a raise
  U.S. Saving rates increase from 3.5% to 13.6%
  Thaler & Benartzi (2004)

- **Organ donation**
  Opt-out system vs. opt-in system
  99.98% consent rate in Austria vs. 12% consent rate in Germany
  Thaler (2009)
What about agriculture?

Center for Behavioral and Experimental Agri-environmental Research

- Founded in 2014 with financial support from USDA-ERS
- Apply behavioral insights and experimental designs to:
  - improve programs related to agriculture and the environment
  - Determine how farmers and landowners make decisions
“Nudging” in the real world and agriculture

1. Loss aversion
2. Time biases
3. Social norms
4. Branding and prestige
5. Choice overload
6. Resource scarcity
1. Loss aversion
2. Time biases
3. Social norms
4. Branding and prestige
5. Choice overload
6. Resource scarcity
People hate to lose things! “Loss Aversion”
The Asian disease problem

An unusual disease is expected to kill 600 people.

Which would you choose?
A. 200 people will be saved
B. There is a 1/3 prob. that 600 people will be saved and 2/3 prob. that nobody will be saved

Which would you choose?
A. 400 people will die
B. There is a 1/3 prob. that nobody will die and a 2/3 prob. that 600 people will die
The behavioralist visits the factory

Hossain and List (2012)
Loss aversion in agriculture

- **Cotton farmers – China**
  Lower pesticide use by loss-averse farmers
  Liu & Huang (2013)

- **Dairy farmers – The Netherlands**
  More sensitive to penalties when adopting practices
  Hujips et al. (2010)

- **Crop production contracts**
  Two possible frames:
  High (low) base price along with penalties (rewards) for poor (good) performance
  Just & Wu (2005)
Leveraging loss aversion in conservation programs

**Gain frame** – current situation

<table>
<thead>
<tr>
<th>Missouri</th>
<th>Conservation Stewardship Program</th>
<th>Fiscal Year 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>Practice</td>
<td>Component</td>
</tr>
<tr>
<td>311</td>
<td>Alley Cropping</td>
<td>Single row container planting stock, 2 gallon and larger</td>
</tr>
<tr>
<td>311</td>
<td>Alley Cropping</td>
<td>Single row container planting stock, less than 2 gallons</td>
</tr>
<tr>
<td>311</td>
<td>Alley Cropping</td>
<td>Single row container planting stock, less than 2 gallon with tree shelters</td>
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</tbody>
</table>

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<tr>
<th>Missouri</th>
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<td>Code</td>
<td>Practice</td>
<td>Component</td>
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<tr>
<td>102</td>
<td>Comprehensive Nutrient Management Plan - Written</td>
<td>CNMP Greater Than 300 AU with Land Application (Minimal Engineer Assistance)</td>
</tr>
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<td>102</td>
<td>Comprehensive Nutrient Management Plan - Written</td>
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<td>102</td>
<td>Comprehensive Nutrient Management Plan - Written</td>
<td>CNMP Greater Than 300 AU without Land Application (Minimal Engineer Assistance)</td>
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**Loss frame**

Maximum payment *minus* loss for every practice not adopted or every ton of pollution not reduced
1. Loss aversion

2. Time biases

3. Social norms

4. Branding and prestige

5. Choice overload

6. Resource scarcity
Living for today at the expense of tomorrow! “Time biases”
Time biases in agriculture

- Farmers are present biased – 34% discount rate
- Timing of payments increase participation:
  - Conservation program in the U.S. - Duquette et al. (2012)
  - Tree planting program in Uganda – Clot and Stanton (2014)
  - Reforestation program in Costa Rica
What about fertilizer use?

69% of farmers are present-biased

- Postpone fertilizer purchase
- Small, time-limited discounts
- Consume savings instead of investing in fertilizer

Duflo et al. (2011)
1. Loss aversion
2. Time biases
3. Social norms
4. Branding and prestige
5. Choice overload
6. Resource scarcity
Which line is closest in length to I?

Control (Alone): <1% errors
Group: 36.8% errors

Asch (1955)
How to persuade hotel guests to reuse their towels

“Please reuse the towels”  →  Control

“Please reuse the towels. Most people reused their towels during their stay”  →  26% more likely

“Please reuse the towels. Most people who stayed in this room reused their towels during their stay”  →  33% more likely

Goldstein et al. (2008)
Do norms matter in agriculture?

- Non-point source pollution program
  Production and technology adoption information
  Wu et al. (2017)

- Land conservation program
  Neighbors’ behavior information
  Barnejee et al. (2014)

- Increase re-enrollment rates in the CRP
  Use of peer comparison and social norm messaging
  Wallander et al. (2017)

- Reduce the “late rate” in compliance with contracts
  Use of contract holders’ behavior information
  Ferraro et al. (2017)
Norms and environmental responsibility
1. Loss aversion
2. Time biases
3. Social norms
4. Branding and prestige
5. Choice overload
6. Resource scarcity
Would you pay $600 for a pair of Payless shoes?

“Branding and Prestige”

Plassman et al. (2008)
Branding agricultural commodities

**Producer** brands

**Varietal** brands

**Geographical** brands

**Certification** brands
1. Loss aversion
2. Time biases
3. Social norms
4. Branding and prestige
5. **Choice overload**
6. Resource scarcity
Is more always better?
More is NOT always better! “Choice Overload”

Iyengar and Lepper (2000)
### Choice overload in agriculture

#### Activity List For Participants

| Enhancement Code | Resource Concern | Resource Context | Crop/No Crop | Animal and Micro | Enhancements, At Land | Full Enhancement Name | Enhancement Description | Acres | Enhancements Needed | Years with condition
<table>
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</thead>
<tbody>
<tr>
<td>E314133Z</td>
<td>DEGRADED PLANT CONDITION</td>
<td>Inadequate Structure and Composition</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Brush management for improved structure and composition.</td>
<td>Enhancements are employed to create a desired plant community, consistent with the related ecological site, a steady state which will maintain or enhance the wildlife habitat desired for the identified wildlife species. It will be designed to provide plant structure, density and diversity needed to meet these habitat objectives. This enhancement does not apply to removal of woody vegetation by prescribed fire or removal of woody vegetation to facilitate a land use change.</td>
<td>1.0</td>
<td>10</td>
<td>up to 5</td>
</tr>
<tr>
<td>E314134Z</td>
<td>DEGRADED PLANT CONDITION</td>
<td>Excessive Plant Pest Pressure</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Brush management that maintains or enhances wildlife or fish habitat</td>
<td>Enhancements are employed to create a desired plant community, consistent with the related ecological site, a steady state which will maintain or enhance the wildlife habitat desired for the identified wildlife species. It will be designed to provide plant structure, density and diversity needed to meet these habitat objectives. This enhancement does not apply to removal of woody vegetation by prescribed fire or removal of woody vegetation to facilitate a land use change.</td>
<td>1.0</td>
<td>10</td>
<td>up to 5</td>
</tr>
<tr>
<td>E315132Z</td>
<td>Upland Productivity</td>
<td>Undesirable Productivity</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Herbaceous weed treatment that helps create the desired plant community and habitat consistent with the ecological site, a steady state.</td>
<td>Mechanical, chemical, or biological treatment will be employed to control the herbaceous weeds or pests, that are consistent with the desired plant community and habitat consistent with the ecological site, a steady state.</td>
<td>1.0</td>
<td>5</td>
<td>up to 5</td>
</tr>
<tr>
<td>E315133Z</td>
<td>INADEQUATE HABITAT</td>
<td>Inadequate Habitat</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Herbaceous weed treatment to enhance structure and habitat consistent with the ecological site, a steady state.</td>
<td>Mechanical, chemical, or biological treatment will be employed to control the herbaceous weeds or pests, that are consistent with the desired plant community and habitat consistent with the ecological site, a steady state.</td>
<td>1.0</td>
<td>5</td>
<td>up to 5</td>
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<tr>
<td>E315134Z</td>
<td>DEGRADED PLANT CONDITION</td>
<td>Inadequate Pest Pressure</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Herbaceous weed treatment for plant pests, pressures in order to create the desired plant community and habitat consistent with the ecological site, a steady state.</td>
<td>Mechanical, chemical, or biological treatment will be employed to control the herbaceous weeds or pests, that are consistent with the desired plant community and habitat consistent with the ecological site, a steady state.</td>
<td>1.0</td>
<td>5</td>
<td>up to 5</td>
</tr>
<tr>
<td>E317136Z</td>
<td>FISH and WILDLIFE INADEQUATE HABITAT</td>
<td>Inadequate Habitat - Food</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Conservation cover to provide food habitat for pollinators and beneficial insects</td>
<td>Seed or plug native and common plants in as non-cropped areas such as field borders, vegetative buffers, etc.</td>
<td>1.0</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>E327136Z</td>
<td>FISH and WILDLIFE INADEQUATE HABITAT</td>
<td>Inadequate Habitat - Food</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Establish Monarch butterfly habitat</td>
<td>Seed or plug milkweed (Asclepias spp.), and high value monarch butterfly plants on marginal cropland, field borders, etc.</td>
<td>1.0</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>E317137Z</td>
<td>FISH and WILDLIFE INADEQUATE HABITAT</td>
<td>Inadequate Habitat - Cover - Shelter</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Conservation cover to provide cover and shelter for pollinators and beneficial insects</td>
<td>Seed or plug native and common plants in as non-cropped areas such as field borders, vegetative buffers, etc.</td>
<td>1.0</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>E317138Z</td>
<td>FISH and WILDLIFE INADEQUATE HABITAT</td>
<td>Inadequate Habitat - Habitat Continuity (Space)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Conservation cover to provide habitat continuity for pollinators and beneficial insects</td>
<td>Seed or plug native and common plants in as non-cropped areas such as field borders, vegetative buffers, etc.</td>
<td>1.0</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>E32810I</td>
<td>SOIL EROSION</td>
<td>Sheet and Rill Erosion</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Improved resource conserving crop rotation to reduce water erosion.</td>
<td>Improve an existing Resource Conservation Crop Rotation. Must match an existing rotation which already includes AT LEAST one resource conserving crop as determined by the State Conservationist in a minimum three year crop rotation. The crop rotation will reduce soil erosion (water and wind), improve soil health, improve soil and moisture efficiency, and reduce plant pest pressures.</td>
<td>1.0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>E32810R</td>
<td>SOIL EROSION</td>
<td>Sheet and Rill Erosion</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Resource conserving crop rotation to reduce water erosion.</td>
<td>Establish a Resource Conserving Crop Rotation. Rotation must include AT LEAST one resource conserving crop as determined by the State Conservationist in a minimum three year crop rotation. The crop rotation will reduce soil erosion (water and wind), improve soil health, improve soil and moisture efficiency, and reduce plant pest pressures.</td>
<td>1.0</td>
<td>1</td>
<td>5</td>
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Resource scarcity

Ashton (2015); Radel & Clement-Guillotin (2012); Ward & Mann (2000)

Shah et al. (2012); Haisley et al. (2008); Bertrand et al. (2004)
Resource scarcity in Agriculture

- Sugarcane – India
  Cognitive function
  Mani et al. (2013)

- Coffee – Guatemala
  Cheating & favoritism
  Aksoy & Palma (2018)

- Rice – Thailand
  Cheating & social norms
  Boonmanunt et al. (2018)
Structuring policy with scarcity in mind

- Simple interventions: smart defaults, helping filling forms out, planning prompts and reminders

- Programs that impose cognitive demand on farmers (e.g. agricultural extension services) should be carefully timed

- Programs should be synchronized with the harvest cycle, with greater cognitive capacity available post-harvest (e.g. fertilizer)
In summary, why nudges should be used in agriculture

1. Potential for **high impact**
2. Maintains **freedom of choice**
3. Requires only **small adjustments** to programs
4. **Easily** tested in randomized controlled trials
Thank you!

Questions?

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Learn more about Behavioral Economics!

- **Books**
  - Misbehaving: The making of behavioral economics – Richard H. Thaler
  - Predictably irrational – Dan Ariely
  - Nudge: Improving decisions about health, wealth, and happiness – Richard H. Thaler & Cass R. Sustein
  - Thinking, fast and slow – Daniel Kahneman

- **Podcasts**
  - Freakonomics – NPR
  - Hidden brain – NPR
  - The brainy business

- **Shows**
  - (Dis)Honesty: the truth about lies. Dan Ariely – Netflix