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**Food Waste, Impulsivity and Risk:  
Heterogeneous Behavioral Responses**

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# Food Waste, Impulsivity and Risk: Heterogeneous Behavioral Responses

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## Motivation

- Consumers are the largest contributors of food waste.
- Consumer education campaigns (e.g. imperfect food acceptance) and standardized date labeling have been recognized as key solutions to reduce food waste.
- Food safety concerns and impulse purchases are anecdotally linked to food waste.
- Research Questions:
  1. How much do people reject foods with cosmetic deterioration such as shrinkage or wilting even though they are perfectly fit to consume?
  2. How do they react to different presentations of expiration dates?
  3. Are risk preferences and time inconsistencies relevant in food waste propensities?

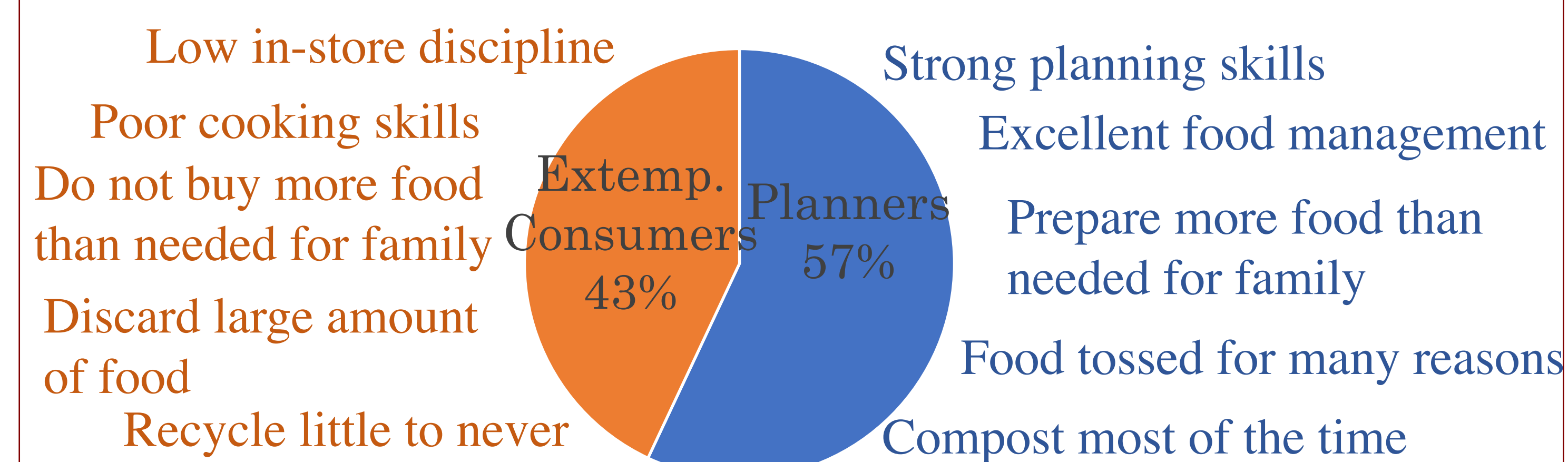
## Food Appearance

- Product profiles of ground beef and bagged spinach varied by: price purchased, expiration date (Best by, Use by & Best if Used by), days to expiration, package size, & appearance (3 levels).
- Perception on whether a product is fit to eat elicited by asking subjects to report the percentage of product they would consume (eating none to eating all) shown through 24 product profiles handouts.

Illustrated: survey interface for questions

## Types of Consumers

From latent class analysis, respondent fell into two, somewhat clichéd, classes: **Planners** and **Extemporaneous Consumers**



## Data and Methods

- Interactive survey administered at the 2016 Minnesota State Fair (N = 333)

### Conceptual Framework

Assume individuals purchase fruits, vegetables and other food products with the intent of making healthy nutritious meals at home,  $x_t$ . Come time to commit and cook the meals, there may be impulses to consume alternative food items ( $a_t$ ) in the form of unhealthier or faster meals at home such as snacks, take-out, ready-to-eat foods, and deli items. Consumption  $c_t = a_t + x_t$ .

- Three-period separable model of hyperbolic discounting assuming constant relative risk aversion risk preferences.

- Reduced form regressions. Model 1:  $Y = X\phi + Z\psi + \epsilon$  || Model 2:  $Y = X\phi + Z\psi + \phi rr + \gamma tp + \epsilon$

$Y$ : Percentage of product respondent is willing to eat;  $X$ : Vector of individual characteristics;  $Z$ : Vector of product attributes;  $rr$ : coefficient of risk aversion;  $tp$ : Categorical variables for time preference (present-bias, time consistent, future-biased)

Hypothesis 1: More risk averse individuals report being less likely to eat products overall.

Hypothesis 2: Present-biased individuals prefer consuming more “alternative” food rather than proposed “meals at home.” Future-biased individuals will consume more of “meals at home.” Time-consistent individuals fall in between.

## Time Inconsistencies

- Time inconsistencies elicited through double price list rewards (Olea & Strzalecki, 2014).
- $U(c) = V(a_1) + \beta\delta V(a_2) + \beta\delta^2 V(a_3) + \beta U(x_1) + \beta\delta V(x_2) + \beta\delta^2 V(x_3)$
- $\beta$ : Short run discount factor ||  $\delta$ : Long-run discount factor

Illustrated: One of 16 decisions in the price list

## Risk Preferences

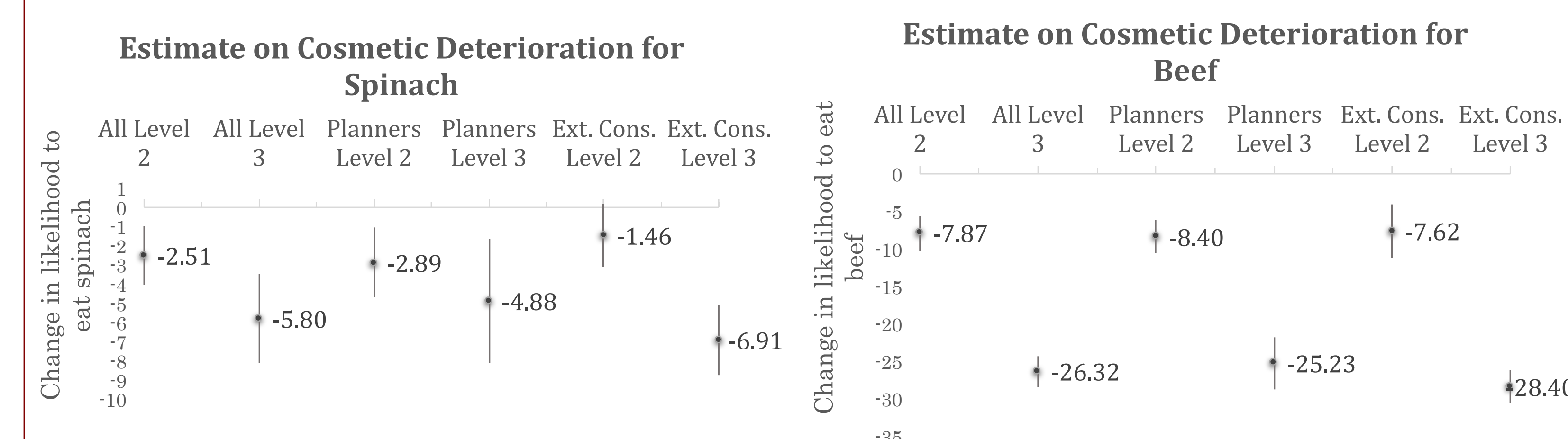
- Risk preferences collected through context-less lottery (Holt & Laury, 2002).
- $V(a_t) = \zeta \frac{a^{1-rr}}{1-rr}$ ;  $U(x_t) = \frac{x^{1-rr}}{1-rr}$

Illustrated: One of 10 decisions in the lottery

Game	Outcome 1	Outcome 2
Game 1	\$10	\$8
Game 2	\$19	\$1

## Main Results I

Model 1 highlights:



1. As appearance deteriorates people were likely to eat less spinach and substantially less of ground beef (up to 28 percentage point less).
2. “Use by” terminology motivate more rejection.
3. Bigger the size, larger the wastage propensities.
4. Further expiration dates yielded higher waste tendencies.

## Main Results II

Model 2 highlights:

### Impulsivity:

- Future-biased **Planners** were 14 percentage point more likely to eat proposed products. As predicted, they potentially delay gratification from alternative meals and consume more than time-consistent individuals.
- Present-biased people in the full sample were less likely to eat the products, potentially favoring alternatives.

### Risk:

- **Planners** who are risk averse ( $rr > 0$ ) rejected more of the product. Same results held for the entire sample but not the **Extemporaneous Consumers** group.
- Other results were not statistically significant at the 5% level but in hypothesized directions and magnitudes.