Chowing Down: Do Rats Eat Less When They Eat Slower?

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Slow Down!
You’ll get full quicker and you won’t eat as much!

General Overview
• Eating Slower Reduces Food Intake
  – Behavioral Weight Management (Stuart, 1967)
• 60% of Americans are Overweight or Obese
  – Serious Health Consequences
• Satiety – the condition of being full
  – Rats – good models for research

Hypothesis
If the rate of consumption is slowed down, the total amount of food intake will be lower.
Since satiety may be affected by the type of food consumed, we tested two foods.

Satiety Mechanisms
STOP
Satiety Signals Terminate the Meal

Macronutrient Content

<table>
<thead>
<tr>
<th></th>
<th>Fruit Rings</th>
<th>Peanut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Density – 3.75 kcal/g</td>
<td>Energy Density – 6.07 kcal/g</td>
<td></td>
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</tbody>
</table>

Energy Density

- Fruit Rings: 88%
- Peanut: 20%

Other Components:
- Fruit Rings: 9%
- Peanut: 8%
Subjects

- Naïve male Sprague-Dawley Rats
- Individually Housed
- 12:12 Light/Dark Cycle
- n = 9 for Fruit Rings study
- n = 14 for Peanuts study
- Rat Chow and Water, except once per week
- 24 hour food deprivation before trial
- Tested 2 hours into light period

Materials & Methods

Phase I
Unrestricted Trials
Establish Baseline Eating Speed

Phase II
Restricted Eating Speed Trials
Test Hypothesis
Using ½ and ¼ Baseline Eating Speed

Phase I: Baseline Eating Speed

Eating Speed (seconds per unit)
Number of Units Consumed
Grams & Calories Consumed
Meal Duration

10:00 minutes

Phase II Rates
R(1/2)=90 sec R(1/4)=180 sec

Phase II: Restricted Eating Speed
Methods

Average eating speed was 45 seconds per Fruit Ring

Average eating speed was 60 seconds per peanut

Phase II Rates
R(1/2)=120 sec R(1/4)=240 sec
Froot Loop Intake

Meal Duration: Froot Rings

Meal duration was adjusted to compensate for restricted access to Fruit Rings.

Fruit Rings Intake

Meal Duration; Froot Rings

Eating speed; Froot Rings

Peanut Intake

Meal duration is adjusted to compensate for restricted access to Peanuts.

Eating Speed; Peanuts

Meal Duration; Peanuts

Eating Speed; Froot Rings

Slowing the eating speed DOES NOT reduce intake of Fruit Rings.

Eating Speed; Peanuts

Slowing the eating speed DOES NOT reduce intake of Peanuts.

Meal duration (seconds)

Meal duration (seconds per Froot Loop)

Meal duration (seconds per peanut)

Calories consumed

Calories consumed

Calories consumed
Hypothesis

- The slower they eat, the less they will consume.

Contributions to the Literature

- Seeley et al., 1993
  - Intraoral glucose, liquid diet
- Present study
  - Solid foods of different macronutrient content
- Both Studies: Rats compensate for meal interruptions by increasing meal duration to maintain caloric intake.
- New Contribution: Caloric intake and eating speeds are not affected by macronutrient content of solid test foods.

Satiety Mechanisms

Satiety Signals Terminate the Meal

Stop

Human Studies

Slow Down! You' get full quicker, and you won’t eat so much.

- Eating speed \rightarrow Food intake in men, but not women (Martin et al. 2007)
- Eating speed \rightarrow Food intake (Yeomans et al. 1997)
- Eating speed \rightarrow Food intake in women (Andrade et al., 2006)

Acknowledgments

Students in Biology 104B and 250A conducted this research with guidance from Dr. Davis.

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Body Mass

Body mass (g)

Froot Loop rats
Peanut rats

Time

Wk 2  Wk 3  Wk 4  Wk 5  R(1/2)  R(1/4)  Wk 11