A psychological perspective on satiation and satiety

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Consumption of food triggers physiological signals associated with satiety and satiation.

From Yeo and Heisler 2012
But we only need to look at a food to know how much it will fill us up.
The same food can be more or less satiating depending on the eating context.
Cognitive processes

Learning and memory and attention

Context

Food intake and food choice
Overview

• Cognitive processes are integral to satiation and satiety

• We learn about the satiating effects of foods
  • Allow us to predict the fillingness of foods

• Amount of food eaten at any one time is the outcome of cognitive processing of a range of signals
  • Sensory cues (taste, texture, smell)
  • Bodily feelings
  • Beliefs
  • Context
  • Memory of recent eating
Eating decisions feel effortless but this does not mean they are “mindless”.

Other behaviours appear effortless but involve complex cognitive processing.
Cognitions
Underlie every-day food choices

Pre-meal Learning

Within-meal
Reward
Attention
Cognitive control

Between-meal Memory

Meal

Snack
Cognitions

Pre-meal

Within-meal

Between-meal

Meal

Snack
Learning leads to expectations

- We learn that foods have a particular taste

From Wardle et al. 2010
Learning leads to expectations

• We learn about the fillingness of foods

Brunstrom et al. 2008
Expectations are related to sensory characteristics

McCrickerd et al. 2012
Expected satiation and portion size

Expected satiation predicts the calories that we put on our plate!

\[ r = -0.80, \ p < 0.001 \]

How Many Calories Are on Our Plate? Expected Fullness, Not Liking, Determines Meal-size Selection

Jeffrey M. Brunstrom and Peter J. Rogers

Cognitions

Pre-meal

Within-meal

Between-meal

Meal

Snack
A common reason given for ending a meal was “food tasted less pleasant”
Hetherington 1996
What is happening in the brain when we get full?

Thomas, Higgs et al 2015, AJCN
What is happening in the brain when we get full?

Areas showing **reduced** activation to food stimuli when full

Areas showing **enhanced** activation to food stimuli when full

Thomas, Higgs et al 2015, AJCN
What is happening in the brain when we get full?

**Functional connectivity**

Post > Pre-meal - high caloric > low caloric pictures

$p < 0.05$ FWE-corrected

vmPFC seed – dlPFC

Spetter, Higgs et al 2018
Taste

Fullness sensations

Health concerns

Context

Dorsolateral prefrontal cortex

value
Watching TV is associated with increased food intake

Implications
Disruption of cognitive processes promotes overeating

Braude and Stevenson 2014
Cognitions

- Pre-meal
- Within-meal
- Between-meal

Meal

Snack
Eating behaviour in amnesic patients

Not being able to remember you have just eaten increases appetite

Sensory-Specific Satiety Is Intact in Amnesics Who Eat Multiple Meals

Suzanne Higgs, Amy C. Williamson, Pia Rotshtein, and Glyn W. Humphreys

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Research report

Television watching during lunch increases afternoon snack intake of young women

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Mean memory vividness rating for television condition = 66.2

Mean vividness rating for no TV condition = 77.4
The importance of context

Food memory constructed from parts of the sensory experience alongside emotions experienced during the eating episode and the situational experience.
With friends

Tasty

Makes me feel happy

Consumption

Memory
Alone

Makes me feel satisfied

Filling

Consumption

Memory
Implications for product development

• Products that are remembered as satiating are likely to be effective in maintaining satiety after a meal

• Satiating effects of food likely to depend upon the context in which they are usually eaten

• Testing of new products could incorporate measures of food memory
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