

# #09

## RATIONALITY

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It is not always easy to make a rational decision, as we are bounded by capacity and motivation.



# BOUNDED RATIONALITY

- Bounded rationality

- A conceptualization that takes into account the limitations of decision makers in terms of cognitive capacity, information, and attention (Simon, 1955)

## ■ Two systems

- There are two systems of thinking (Kahneman, 2011)
- System 1: fast, intuitive, automatic, heuristic-based (intuition)
- System 2: slow, analytical, effortful, rule-based (reasoning)

- Two systems
  - System 1 economizes our thinking and allows quick judgment, but is error-prone
  - System 2 monitors an intuitive judgment (corrects it if needed), but is bounded by capacity, knowledge, and motivation

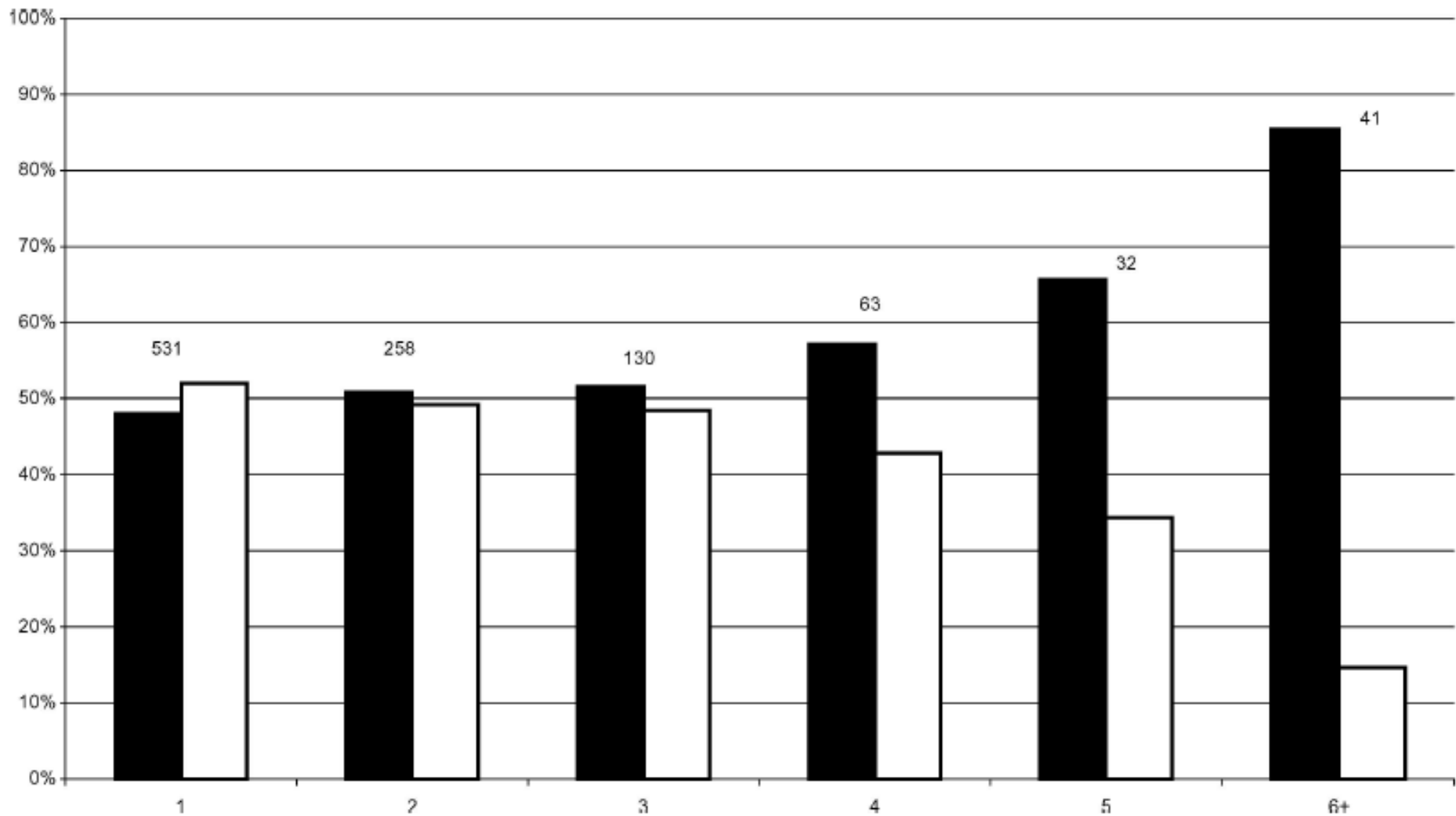
# DEVIATING FROM BASIC STATISTICAL RULES

- Judgment heuristics
  - “People rely on a limited number of heuristic principles which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations” (Tversky & Kahneman, 1974)
  - Heuristics sometimes lead to errors (violating basic statistical rules)

- Gambler's fallacy

- The belief that the odds of a purely chance event increase if the event has not occurred recently





Gamblers bet consistently with gambler's fallacy. After a streak of 5 (or more) of an outcome, gamblers are significantly more likely to bet against the streak (black) than bet with it (white) (Croson & Sundali, 2005).

- Conjunction fallacy
  - People estimate that the odds of two uncertain events happening together are greater than the odds of either event happening alone

- Availability heuristic
  - People assess the probability of an event based on how easy it comes to mind



Fischhoff et al. (1981) found that participants tended to overestimate the frequency of dramatic causes of death (e.g., flood, plane crash), and underestimate the frequency of less dramatic ones (e.g., heart disease, diabetes), and their estimates were highly correlated with the amount of coverage in recent newspapers.

- Representativeness heuristic
  - People assess the probability of an event based on how similar it is to the prototype of that event

Pattern	Long Sequence	Random	Non-Equilibrated
05 10 15 20 25 30	30 31 32 33 34 35	11 14 20 29 37 43	35 37 40 43 44 49

- Random:** rationalizations that refer to the numbers being spread out over the entire set of numbers from 1 to 49.  
e.g. The numbers have a wide range; the numbers are spread out; it has two in the tens, twenty, thirty, forty.
- Significant Numbers:** rationalizations that refer to a favorite, lucky, or important number.  
e.g. Eight has always been a good number for me; twenty-nine is my favorite number; my birthday is the sixth.
- Past Experience:** rationalizations that refer to previous lottery draws or previous gambling experience.  
e.g., The numbers 36 and 41 are chosen often in previous 6/49 drawings; the numbers are all low and sometimes they come out that way; I won with a combination like this before.

Participants disproportionately preferred the random sequence than the other sequences (with the long sequence and the non-equilibrated sequence least preferred). When asked to explain their choice, participants reported reasons that deviated from statistical principles (Hardoon et al., 2001).

- Framing effects

- The way an issue is posed or choices are structured can significantly affect decisions and judgments (Tversky & Kahneman, 1981)

Imagine that the government is preparing for a disease outbreak, which is expected to kill 600 people. Two alternatives to combat the disease have been proposed. Assume the scientific estimates of consequences of the programs are:

Program A: 200 people will be saved

Program B:  $\frac{1}{3}$  probability that all 600 will be saved and  $\frac{2}{3}$  probability that no one survive

Program C: 400 people will die

Program D:  $\frac{1}{3}$  probability that nobody will die and  $\frac{2}{3}$  probability that all 600 people will die

Framing affects people's decisions. When seeking gains (A and B above), people want sure bet; when cutting losses (C and D above), they tend to take risk (Kahneman & Tversky, 1984).



**At this single hospital, 10 per cent of the patients who have surgery die during the perioperative period. The patients who survive treatment have a life expectancy (e.g., average number of remaining years) of 6.8 years. The life expectancy of all patients who undergo surgery (including those who die in the postoperative period) is 6.1 years. With radiation therapy, nobody dies during treatment, and the life expectancy of the patients who undergo radiation therapy is 4.7 years.**

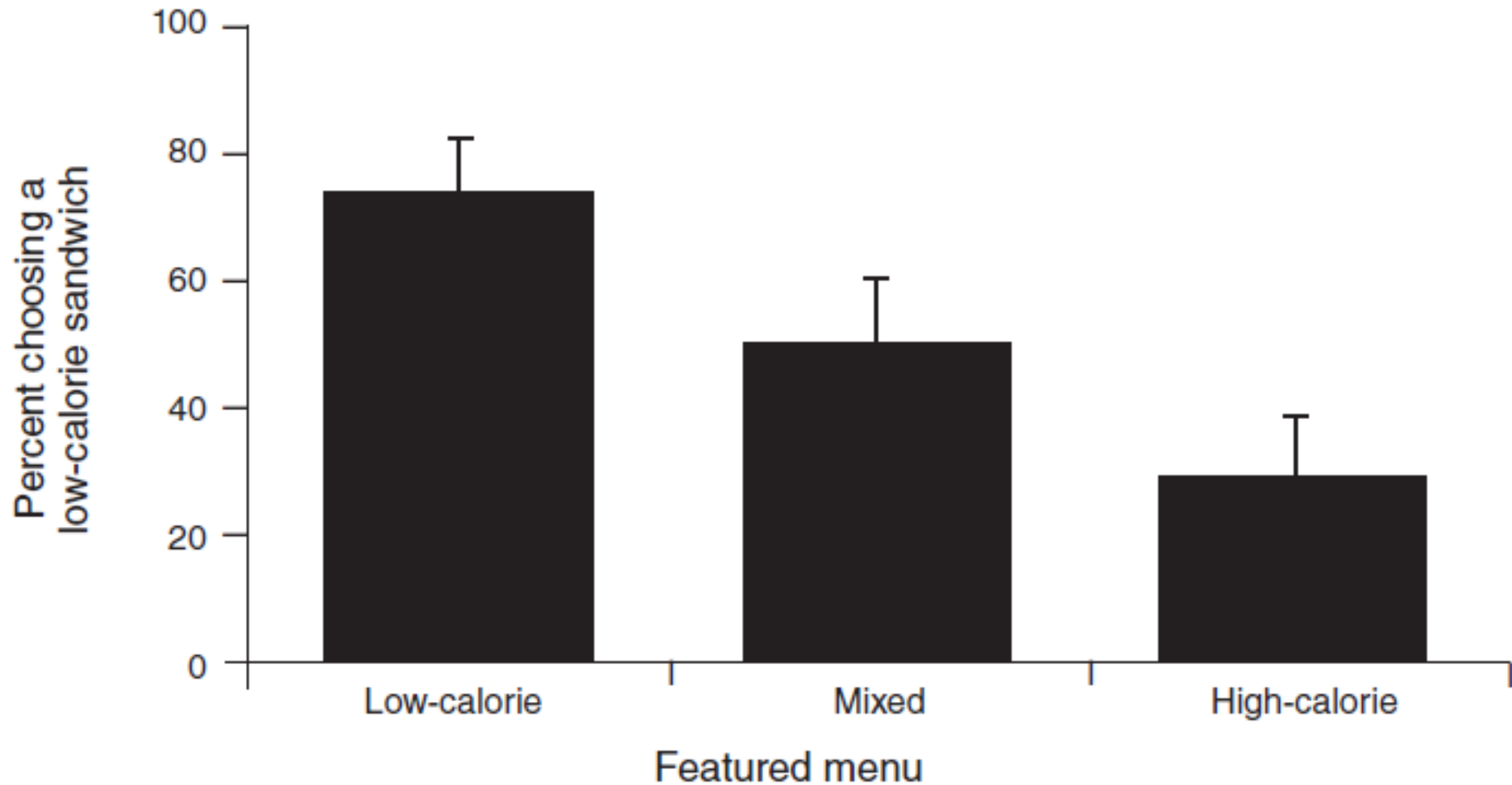
**Which treatment would you prefer?**

Participants were asked about their preference between surgery and radiation therapy. Patients as well as physicians showed a stronger preference for surgery when it was framed in terms of survival (90% of patients survived) than when it was framed in terms of death (10% of patients died) (McNeil et al., 1982).

# DEVIATING FROM PREFERENCES

## ■ Nudge

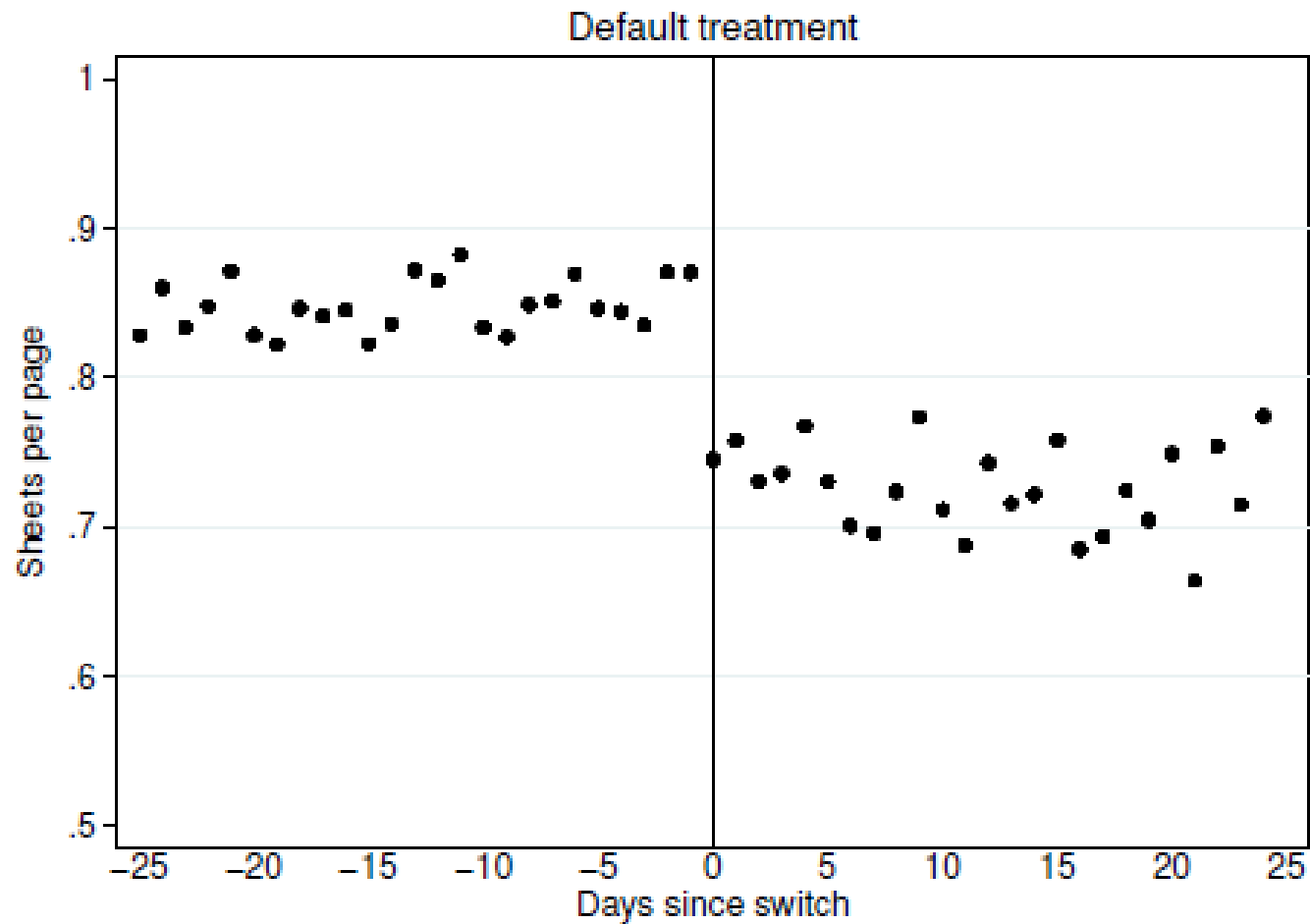
- Changes of choice architecture can affect people's decisions without changing economic incentives
- Decisions are determined by not only preference but also contextual factors, including even irrelevant ones



Merely re-arranging the presentation order in the menu (e.g., moving low-calorie options to the front) results in lower calorie intake (Downs et al., 2009).

## ■ Default options

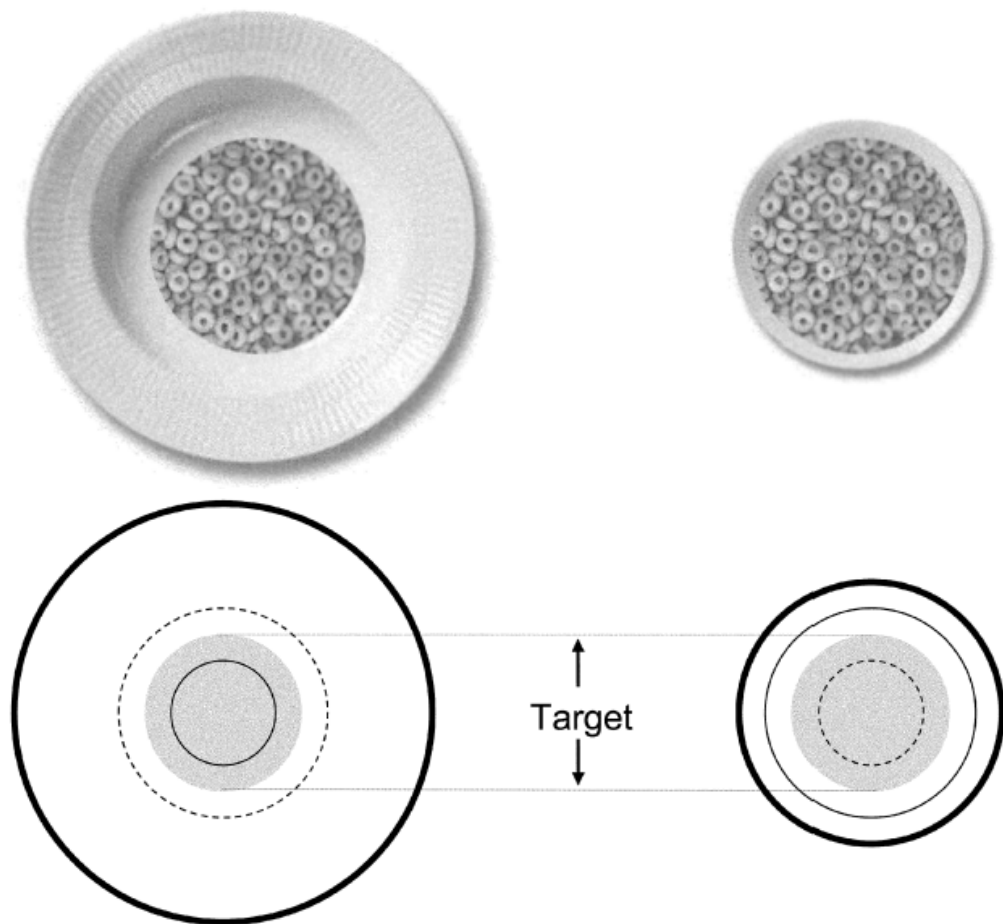
- Defaults are outcomes that stick when individuals do not take active steps to change them
- People tend to accept the default option rather than go through a reflective thinking process before making a choice



Researchers switched all printers' default settings, from simplex to duplex printing, at a university. More efficient printing (fewer sheets per page) was observed after the switch, and the effect persisted after 6 months. On average, daily paper consumption dropped by 15% after the switch (Egebark & Ekström, 2013).

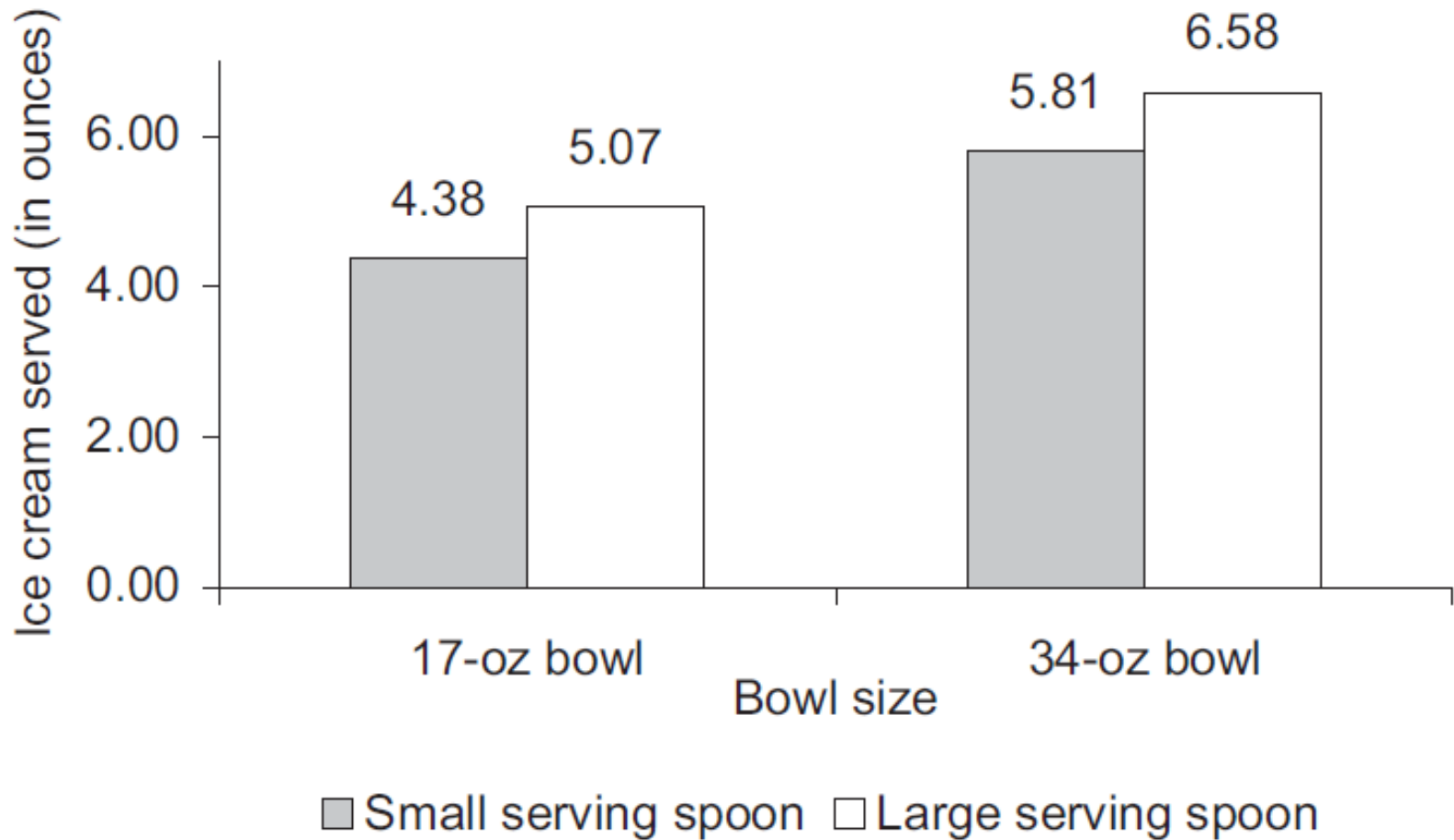
## ■ Mindless eating

- Many seemingly unrelated environmental factors (e.g., package size, plate shape, lighting, presence of others) consistently influence eating behavior far more than we realize (Wansink, 2006)



People pour greater amounts of a beverage into a wide cup than a tall one, and they consume more from wider containers. People also perceive smaller amounts of food and eat more from larger plates than smaller plates (Van Ittersum & Wansink, 2011).





Even nutrition experts are susceptible to mindless eating! 85 nutrition experts who were attending an ice cream social were randomly given either a small or large bowl and either a small or large scoop. After serving themselves, their ice cream was weighed (Wansink et al., 2006).



Researchers stockpiled participants homes with either large or moderate quantities of eight different foods, and then monitored each family's consumption of these foods for two weeks. Families consumed stockpiled foods at a rate doubling that of consumption of nonstockpiled foods (Chandon & Wansink, 2002).



Obesity is found to be positively associated with television viewing (e.g., Jeffrey & French, 1998). One explanation is that distraction such as reading and television viewing obscures the monitoring process (Wansink, 2004), a proposition that is in line with the two-system perspective.

# DEFYING LOGIC

- Magical thinking

- The intuitive belief that an object, action, or circumstance not logically related to a course of events can influence its outcome
- Superstitions

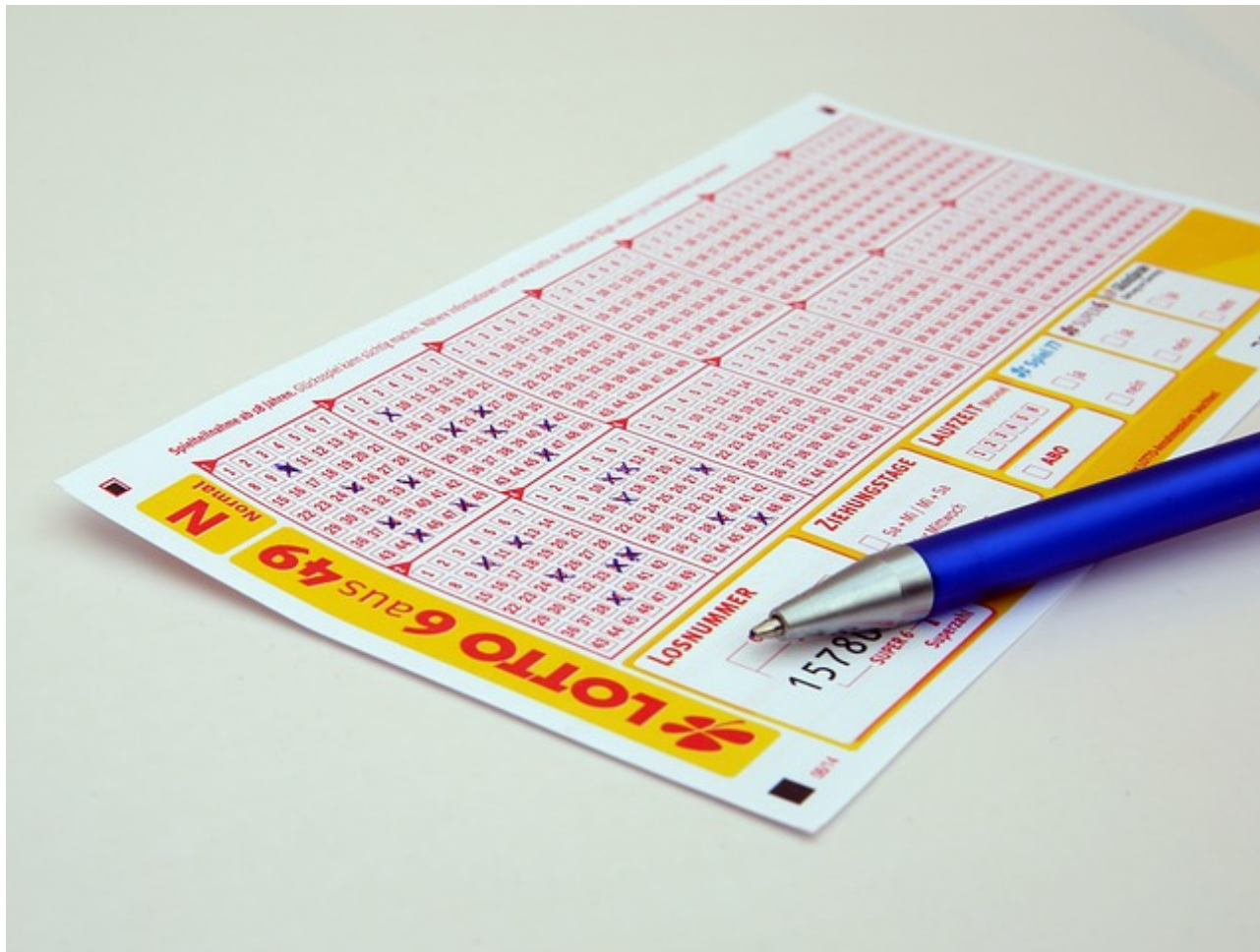
- Illusion of control

- The tendency to believe that the self can control or influence outcomes that they in fact have no control over (Langer, 1975)





Langer (1975) found that people are less willing to sell their lottery tickets or ask for a higher selling price if they sell when they have chosen the ticket vs. have been just given the ticket.



Wohl and Enzle (2002) found that participants preferred choosing a number over being given a number in a random draw game; those who chose a number reported a greater prospect of winning.



## ■ Personal luck

- Belief in a personal quality of luck that can be used to control uncontrollable events (Wohl & Enzle, 2002)
- Opportunity to deploy luck (e.g., touching a game ball) in games of chance inflates perceptions of control



Individuals who considered themselves lucky were more confident in their chance of winning the lottery than those who considered themselves unlucky. Also, regular players reported stronger beliefs that luck could influence outcomes than occasional players or non-players (Rogers, 1998).