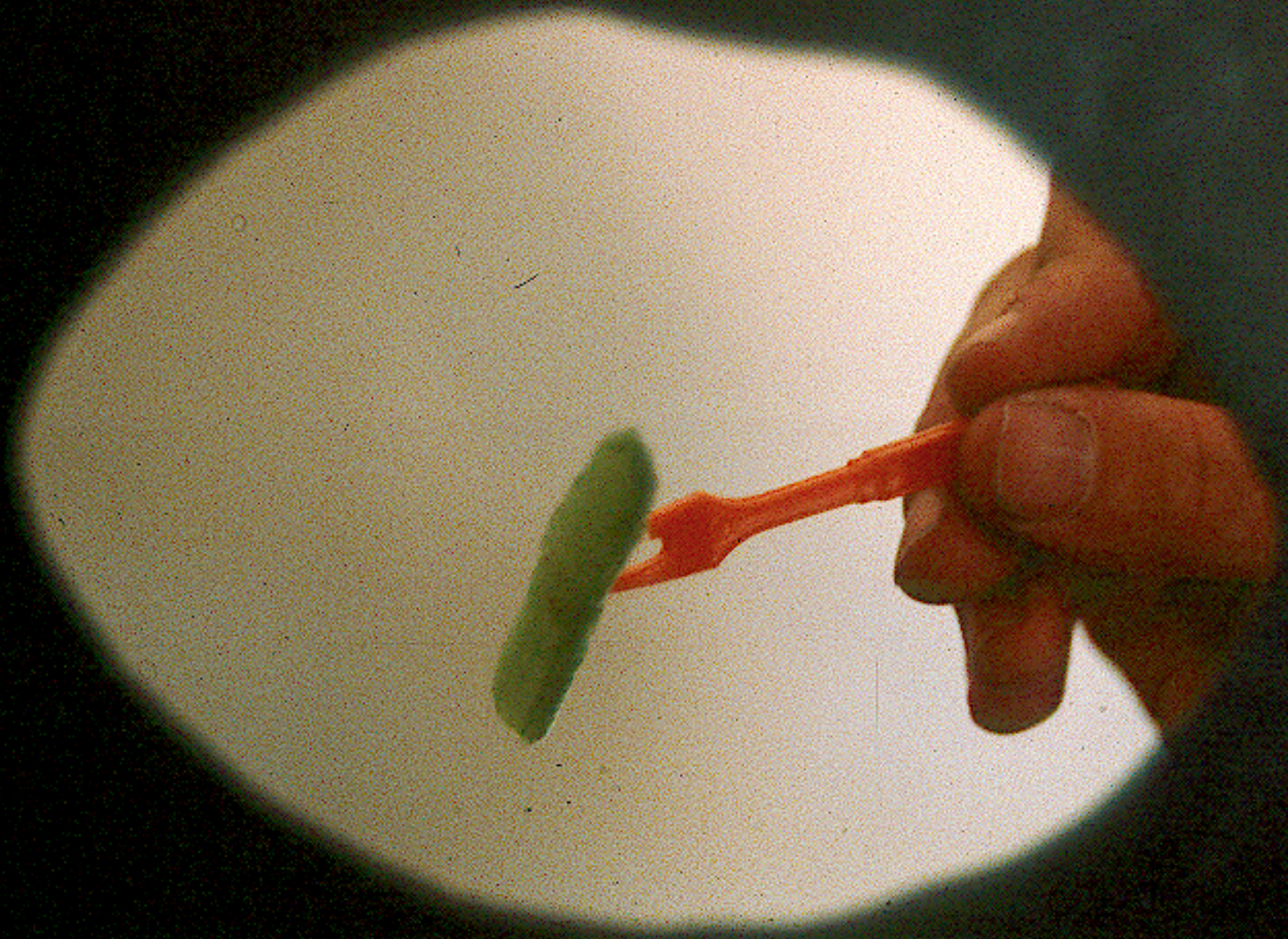


Food Intake and Food Choice:
Enjoying eating and being slim
and healthy in the 21st century
developed world

Paul Rozin

University of Pennsylvania



The human omnivore (generalist)

- Open system: risks and benefits
- Other successful generalists
- Learning about consequences of eating
- Neophilia and Neophobia
- Taste biases



Jacob Steiner

Face and Development

Fig. 18-1. Typical features of the Gurnilarial Response, recorded in neonate infants between birth and the first feeding. 1: Calm face. 2: Reaction to distilled water (control). 3: Response to sweet stimulus. 4: Lip-pursing, response to sweet. 5: Response to bitter stimulus.

Other adaptations of all animals that don't work now

- 1. Bias towards eating if food is present
- 2. Optimal foraging

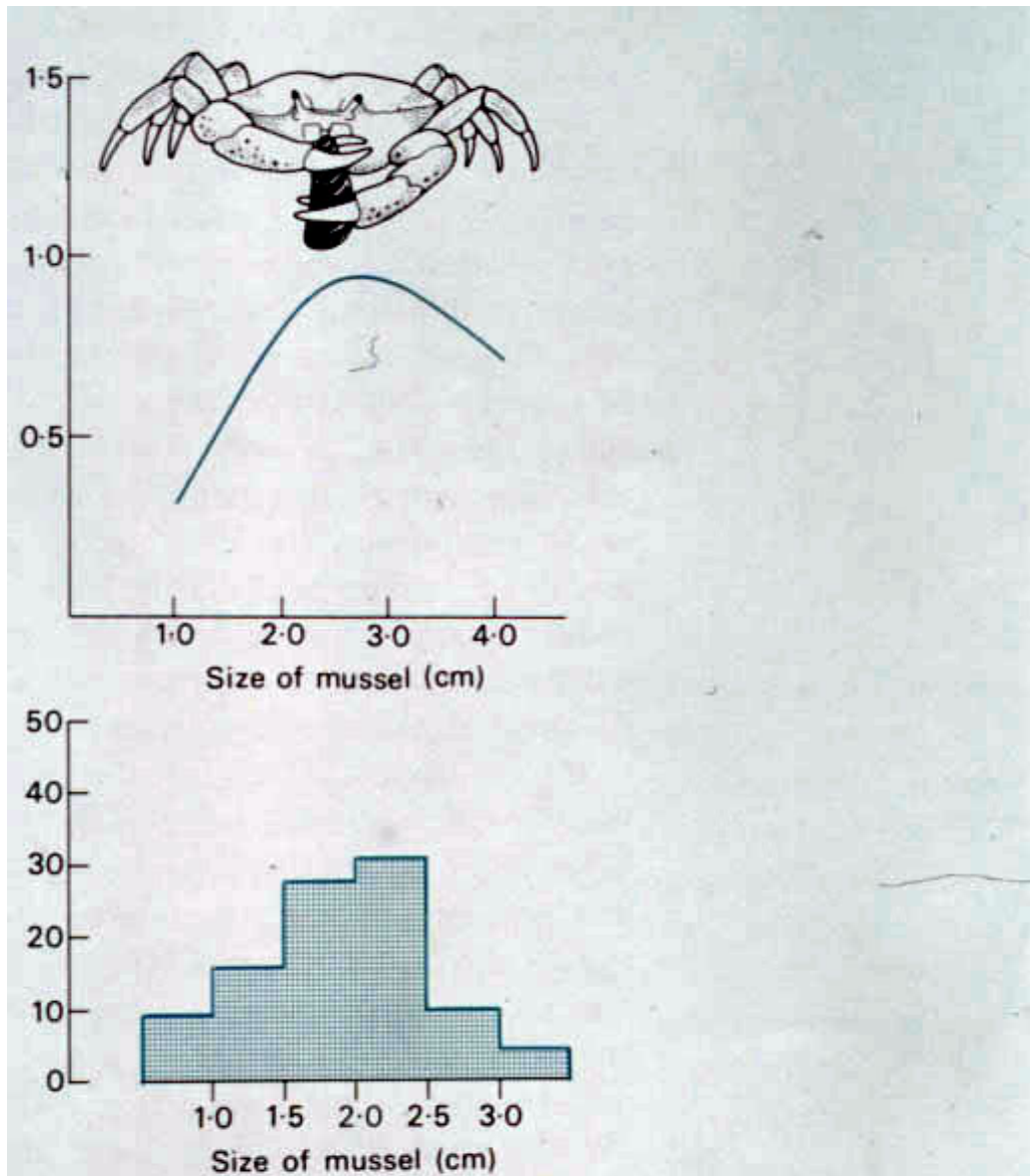


Fig. 3.5 Shore crabs (*Carcinus maenas*) prefer to eat the size of mussel which gives the highest rate of energy return. (a) The curve shows the calorie yield per second of time used by the crab in breaking open the shell and (b) the histogram shows the sizes eaten by crabs when offered a choice of equal numbers of each size in an aquarium. From Elner and Hughes (1978).

Major changes in the food world

- 1. Agriculture and domestication
- 2. 19th-early 20th century: transportation
- 3. first half of 20th century: refrigeration
- 4. late 20th century: major advances in food processing, freezing, transportation

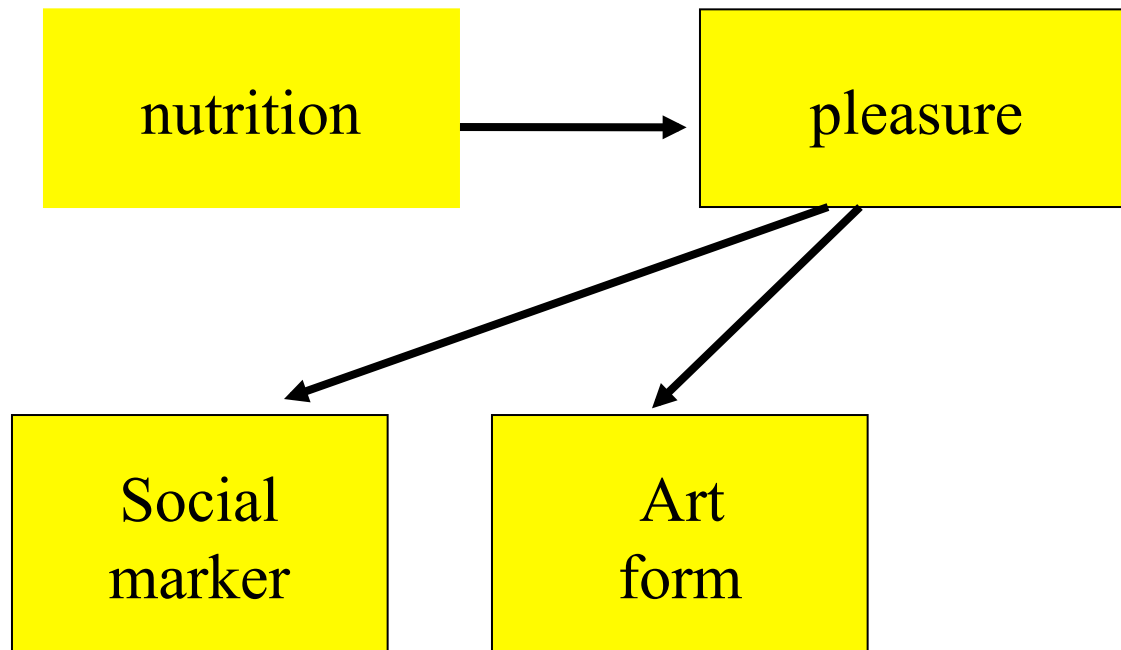
Determinants of food intake

- Energy deficit via hunger/satiety
- Palatability
- Amount served*
- Health concerns
- Cultural rules
- Perceived caloric load
- Memory for eating

Preadaptation

- Ernst Mayr
- The mouth: eating and speaking

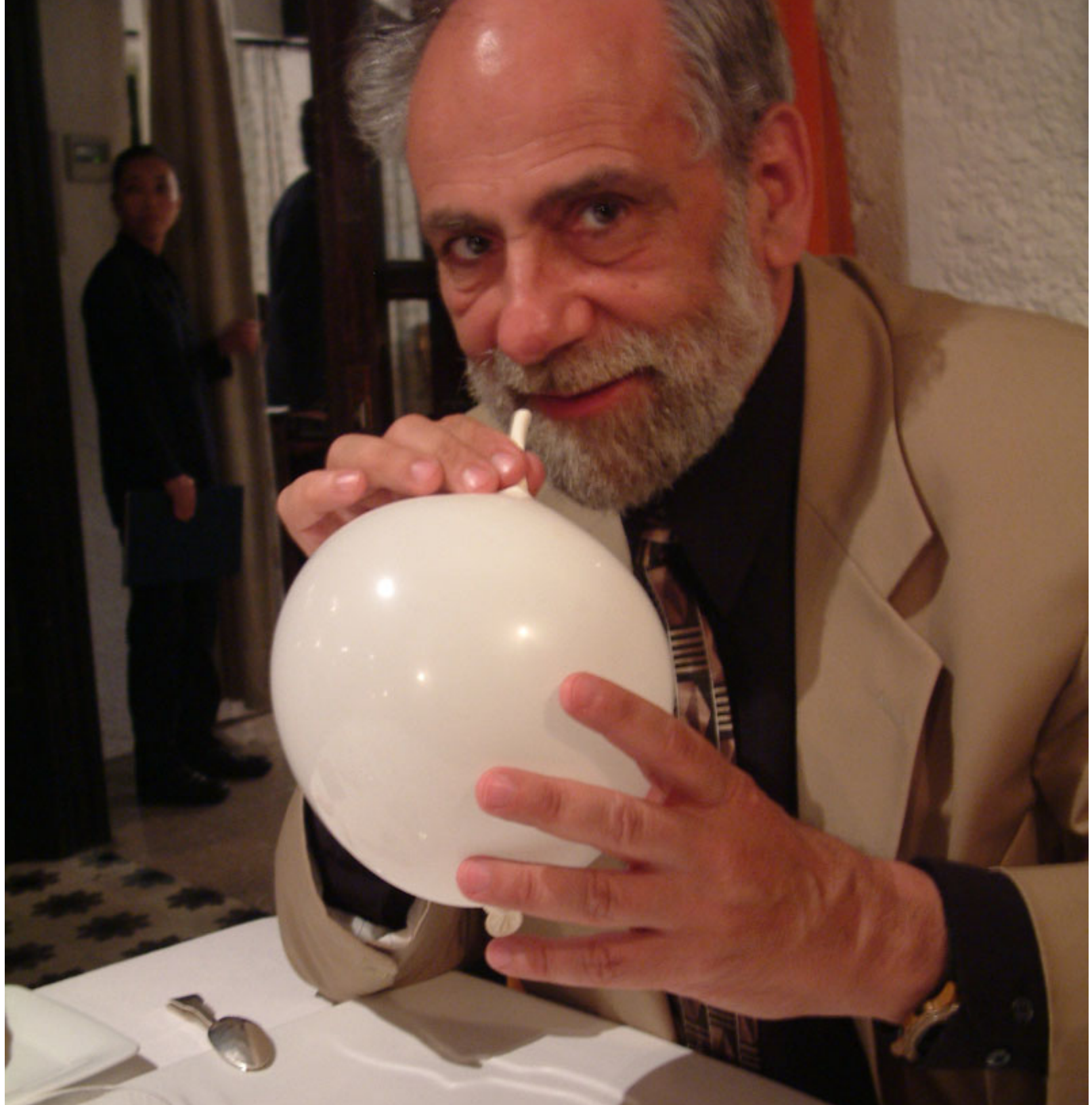
Preadaptation and Food





El Bulli





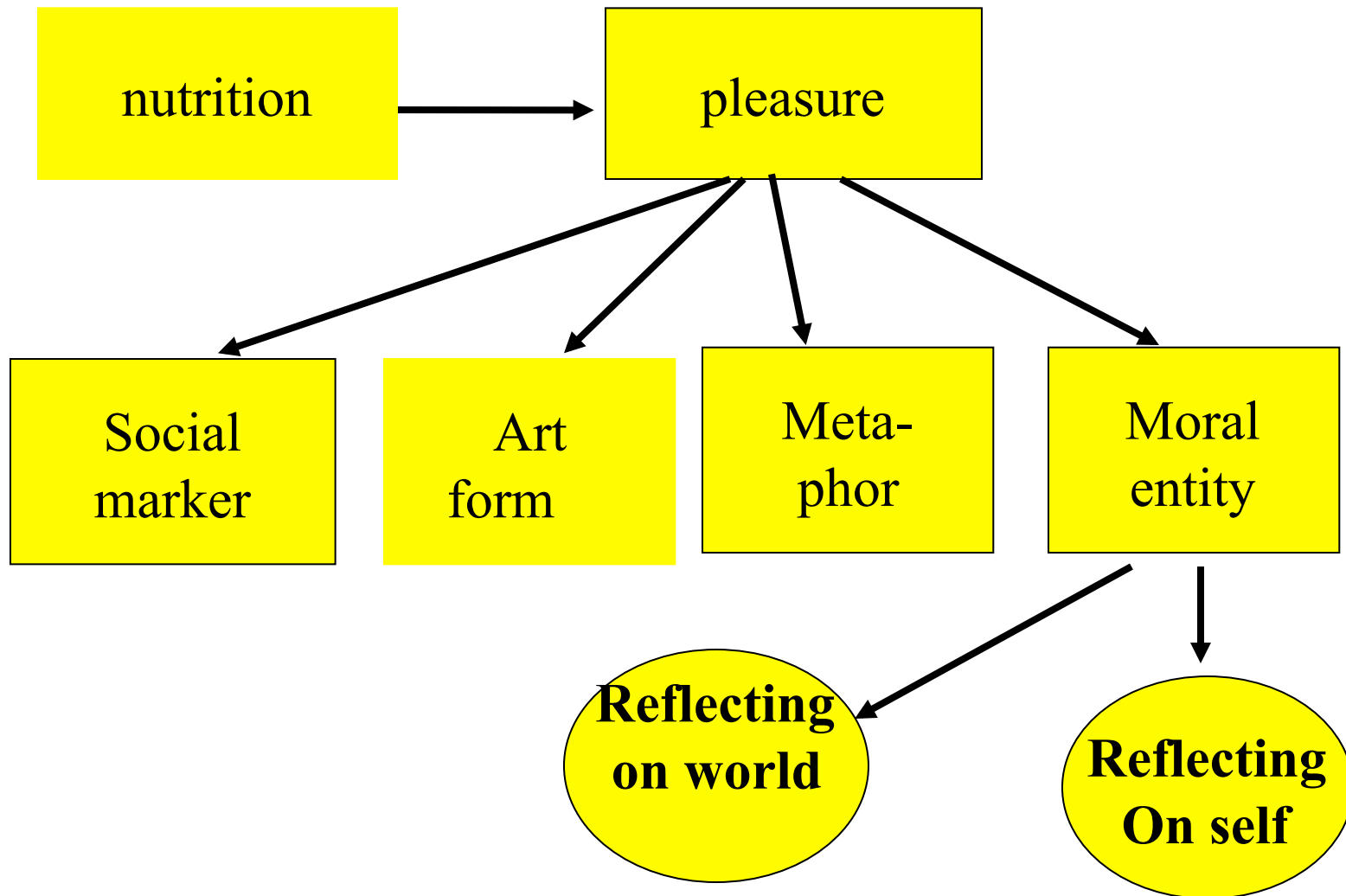




**Frank Mosca and
Alexander Rozin**



Preadaptation and Food



The Hungry Soul

EATING AND THE PERFECTING
OF OUR NATURE



LEON R. KASS, M.D.

“We eat as if we don’t have to, we exploit an animal
necessity, as a ballerina exploits gravity (P. 158).

Leon Kass (1994). The Hungry Soul

Phantom of Liberty (French film)



Late 20th Century developed world

- Epidemiological revolution: longer life and death from degenerative diseases: shift to long-term consequences
- food surplus
- extraordinary range of food choices
- development of super-foods (e.g. chocolate)
- no work needed to attain choices
- massive amounts of risk information
- no training in dealing with risks/benefits

The developed world

- Western Europe vs India
- 60% of all people live in Asia
- 50% of total expenditures on food in developing world

The Omnivore's Dilemma

Michael Pollan (first sentences)

- “What should we have for dinner? This book is a long and fairly involved answer to this seemingly simple question. Along the way, it also tries to figure out how such a simple question could ever have gotten so complicated.”

The combination of health and
beauty norms

“Concerned about being overweight”

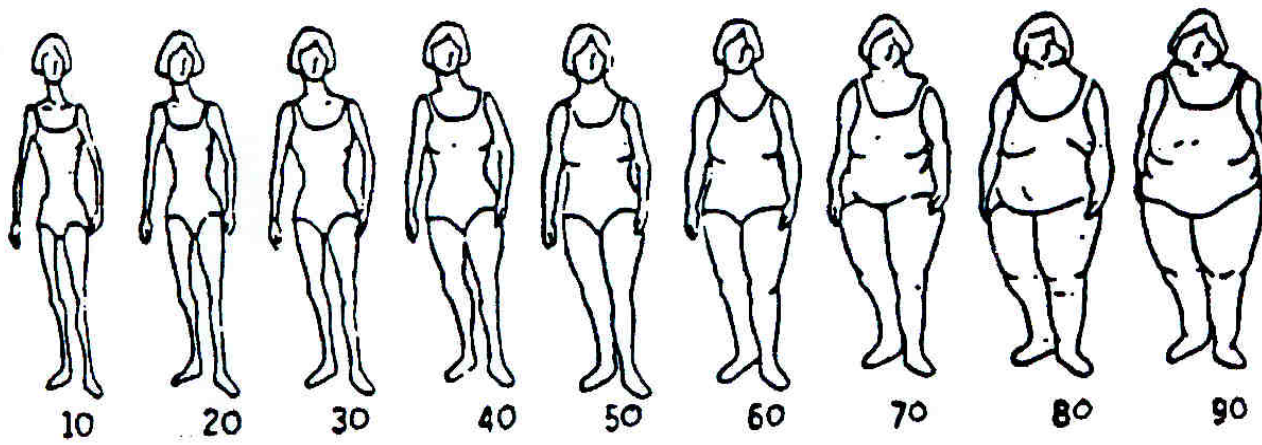
- % responding “often“ or “almost always”
- 57% females, 21% males
- US college students from 6 universities across the country

Rozin, Bauer & Catanese, 2003

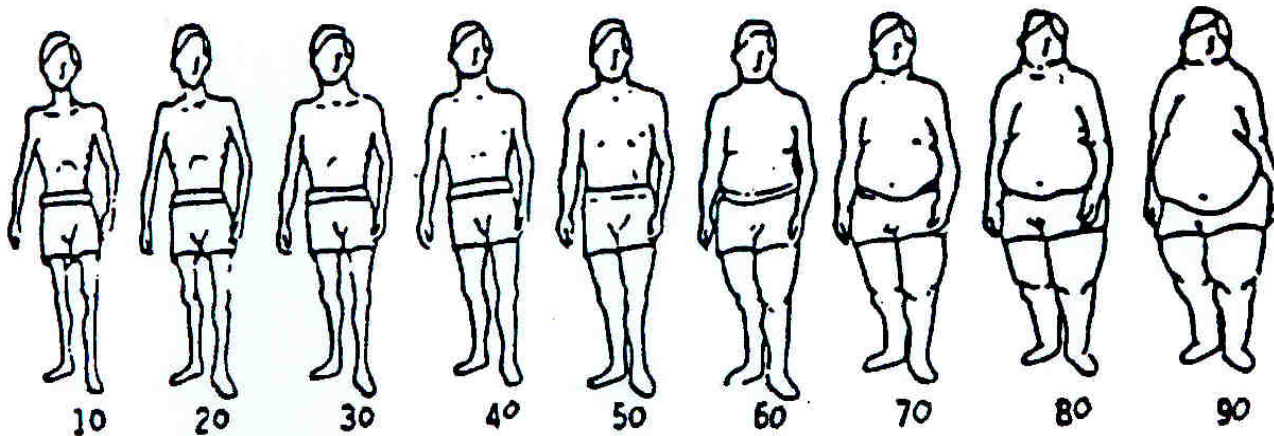
“I am embarrassed to buy a chocolate bar in the store”

- American college students from six campuses across the USA
- % Females: **13.5**
- % Males: **4**

FEMALE



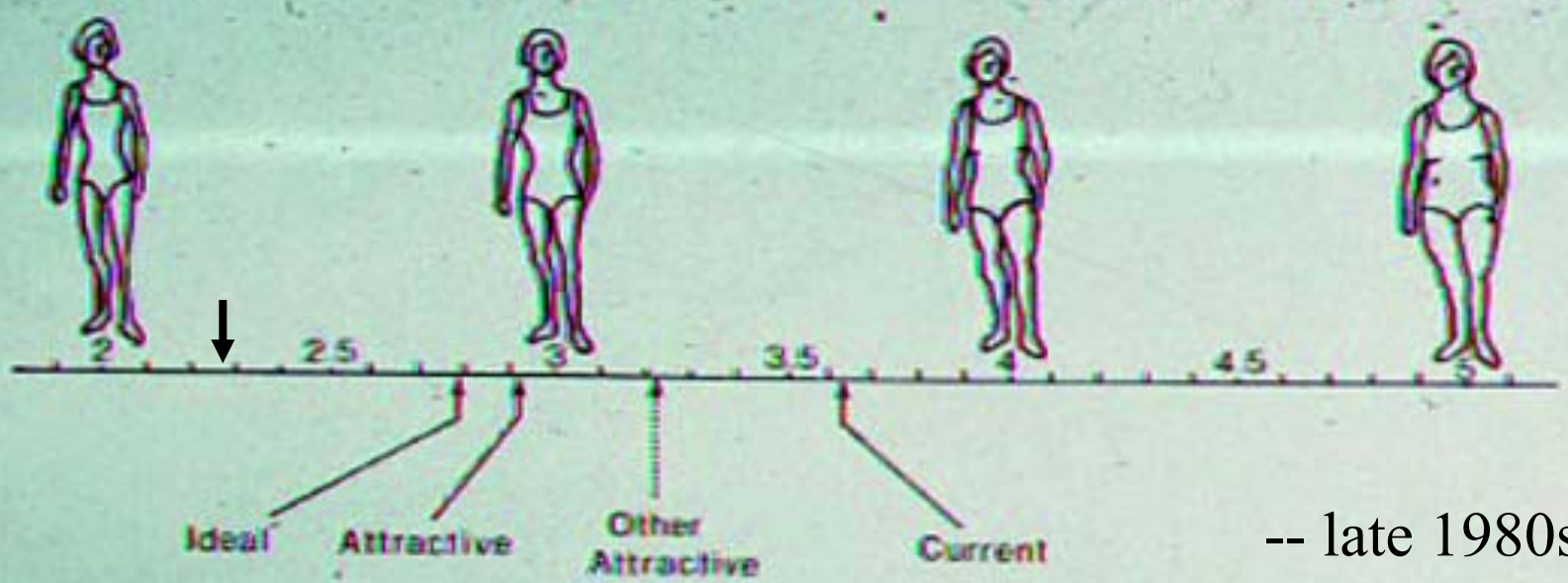
MALE



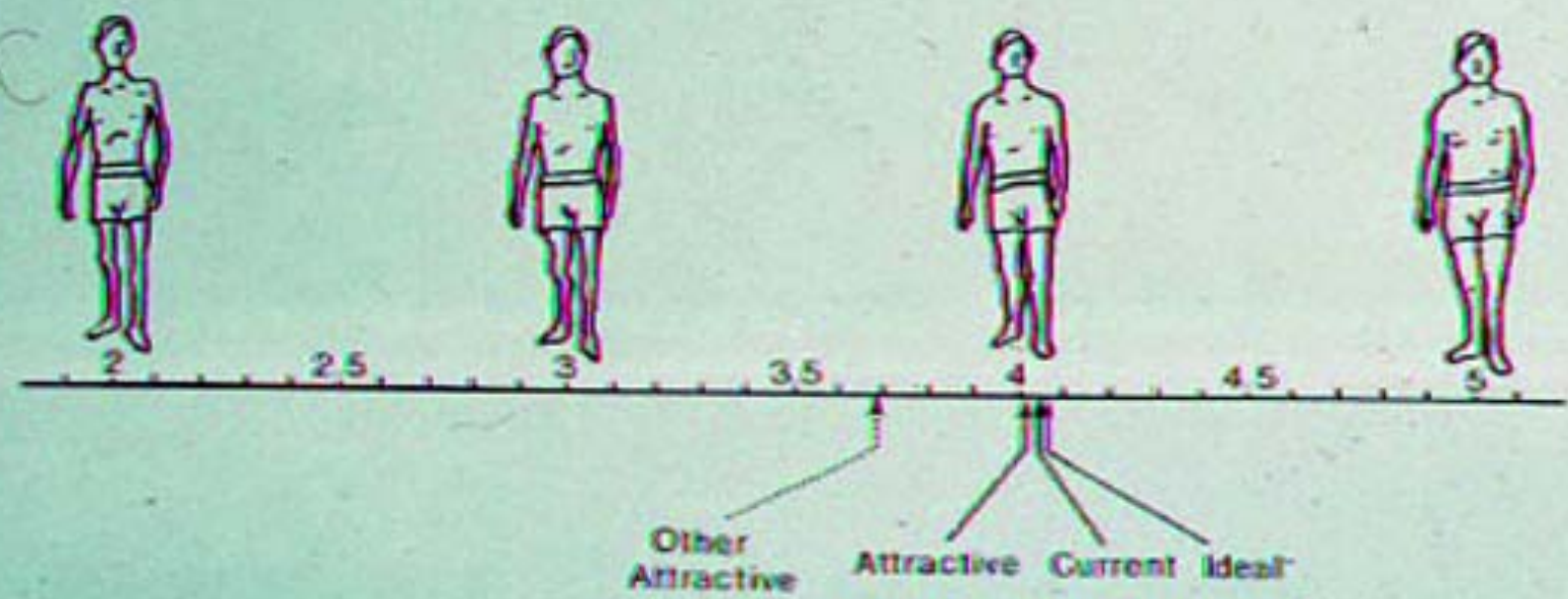
What is your current figure? _____

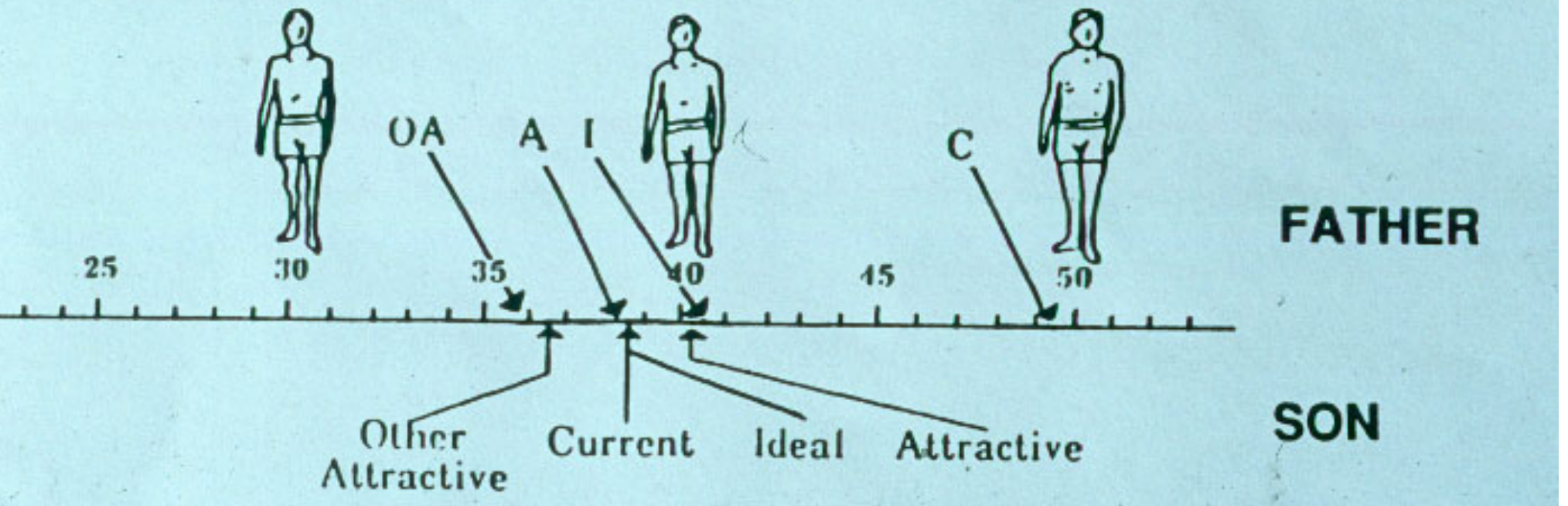
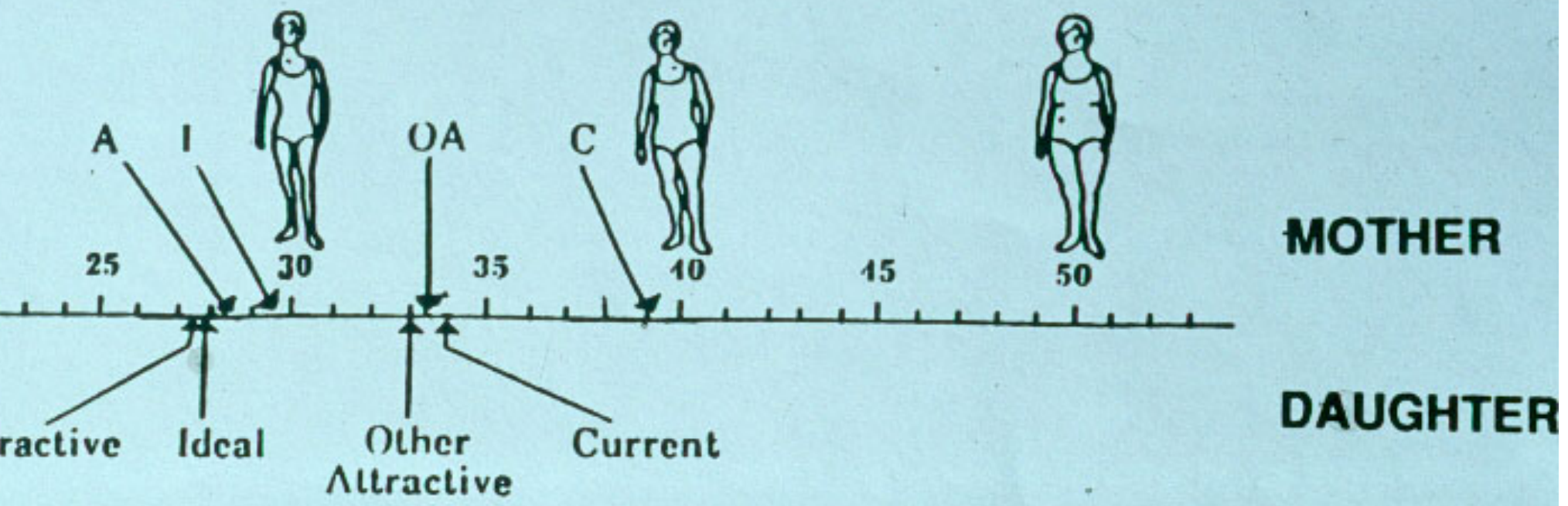
What is your ideal figure? _____

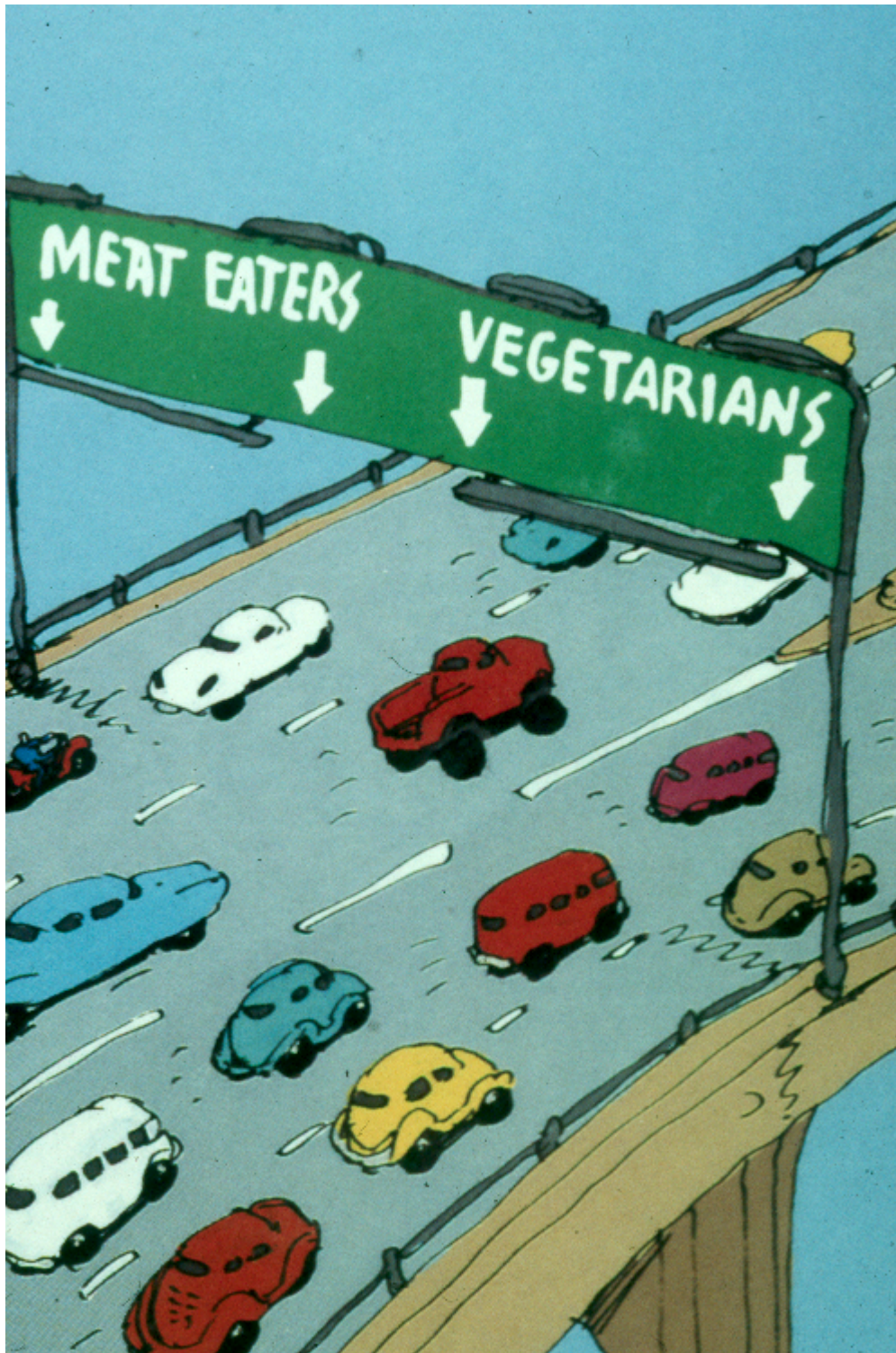
**What is the ideal female figure selected by
American women? _____**



-- late 1980s










Welcome to
UTAH
"The Fat-Free State"

An American flag is shown waving, with the stars and stripes clearly visible. The flag is the background for the text. The text is overlaid on a white stripe of the flag.

FAT FREE

SALT FREE

CALORIE FREE

The obesity “epidemic”

- Not an epidemic/ not contagious
- Not accelerating
- Adult Americans: 1.4 pounds a year over last 20 years
- <2 apples a week

Exaggeration of health risks

- Body Mass Index (BMI)
- Weight (kilograms)/height (meters²)
- Overweight >25
- Obese >30
- Continuum treated as categories
- Overweight NOT a significant risk

Cultural solutions

France

With Claude Fischler

Overweight: France vs USA

- **% BMI ≥ 25**
- France: 39%
- USA: 61%

Life expectancy at birth (2009, CIA)

	country	years	rank	country	years
1	Japan	82.2	11	Norway	80.1
2	Australia	81.7	12	Jordan	80.0
3	Canada	81.3	13	Greece	80.0
4	France	81.1	14	Austria	80.0
5	Sweden	81.0	15	Netherlands	80.0
6	Switzerland	81.0	16	Germany	79.4
7	Israel	81.0	17	Belgium	79.0
8	New Zealand	80.0	18	U. K.	79.2
9	Italy	80.3			
10	Spain	80.2	25	USA	78.2

Nutrition: France vs USA

Drewnowski et al., 1996; NHANES

	France	USA
Kcal/day	2,042	2,105
Dietary diversity % maximum	90	33
Sat. fat (g/day)	34.9	28.5
% sat. fat <10% cal	2.7	13.7

Age-standardized annual mortality from CHD and related risk factors

(males 35-64)

WHO/MONICA Renaud & de Logeril, 1992

Location	Mortality / 100,000	Serum chol- esterol (mg/dl)
Toulouse, France	78	230
Lille, France	105	252
Stanford, USA	182	209

Thinking about food

Percent of subjects preferring a week at a luxury (vs. gourmet) hotel at same price

	Females	Males
Paris, France	13	8
USA	83	70

Percent of subjects selecting “unhealthy” for choice:

What do you think of when you think of HEAVY CREAM?: **whipped or unhealthy**

	Females	Males
France	28	23
USA	68	48

Table 1: Summary of the data used in the study.

Variable	Mean	SD
Age	35.2	12.5
Gender	0.52	0.50
Education	12.8	1.5
Income	15000	5000
Health	0.75	0.25



Rotterdam, May 30, 2010: MASTER CHEF RUDI'S DOUBLE STRAWBERRY CHEESECAKE: A **luscious blend of low-fat cream cheese, fresh eggs and sugar, served with a shimmering fresh strawberry sauce.**

Percent of subjects agreeing that they eat a “healthy diet”

	Females	Males
France	76%	72%
USA	28%	38%

Food and medicine are fundamentally different

	% strongly agree	% agree
France	74	18
US	16	59

OCHA-CIDIL Total n = 340

Metaphor: Food and the body are like:

	USA	France
Tree	26	66
Car or factory	43	26
Temple	32	10

**Representative national samples
Fischler, Rozin et al., 2004**

The food environment

- Late 1990s

Eating time
(lunch, mean minutes)

Source	France	USA
McDonalds	22.3'	13.2'
Quick/ Burger King	16.5	15.3

Financial Statement for Indenture
Interest Payment Schedule

Year	Interest Payment	Principal Payment
2018		
2019		
2020		
2021		
2022		
2023		
2024		
2025		
2026		
2027		
2028		
2029		
2030		

Restaurant portion size

Restaurant	France	USA
McDonald's (7)	189g	256g
Quick/Bking(5)	207g	322g
Chinese (6)	244g	418g

Supermarket food portions

ITEM	Carrefour	Acme
Yogurt (modal)	125g	227g
Fresh fruit (mean,4 types)	431g	553g
Coca cola (modal)	330ml	500ml



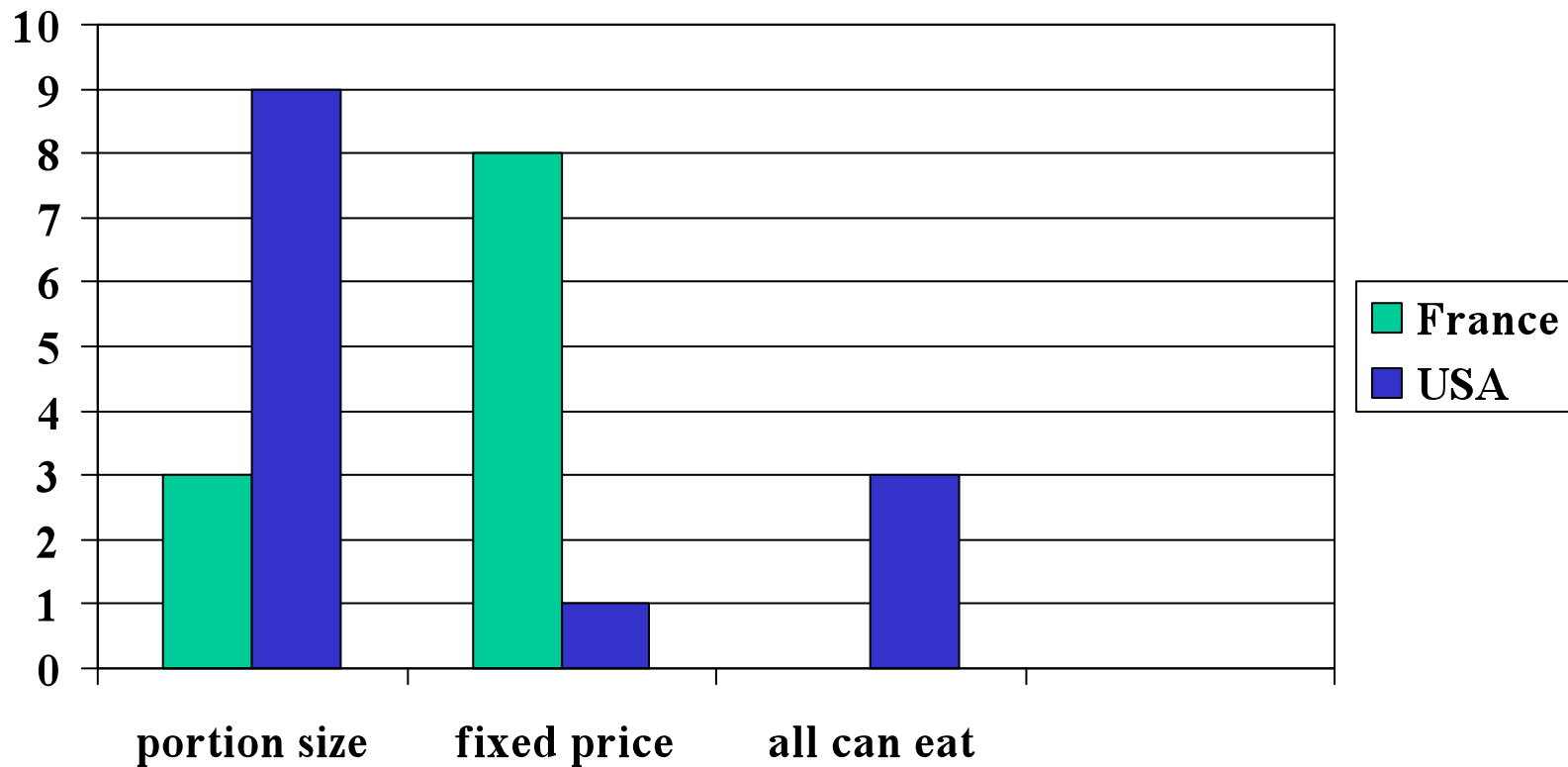
Supermarket non-food portions

ITEM	Carre- four	Acme
toothpaste (modal, ml)	75	170
toilet paper (mean, sq cm)	121	117
Cat food (modal, g)	100	85

Portions in cookbooks

- US and France standard cookbooks
- recipes for comparable meat dishes, by individual portion
- Ratio of meat portion size:
- US/France: (mean) 1.58

Mentions in Zagat (% total restaurants)



Portion size

In a student cafeteria, when students are served a 50% larger portion of macaroni and cheese (right) they eat more, and don't compensate by eating less of the rest of the meal

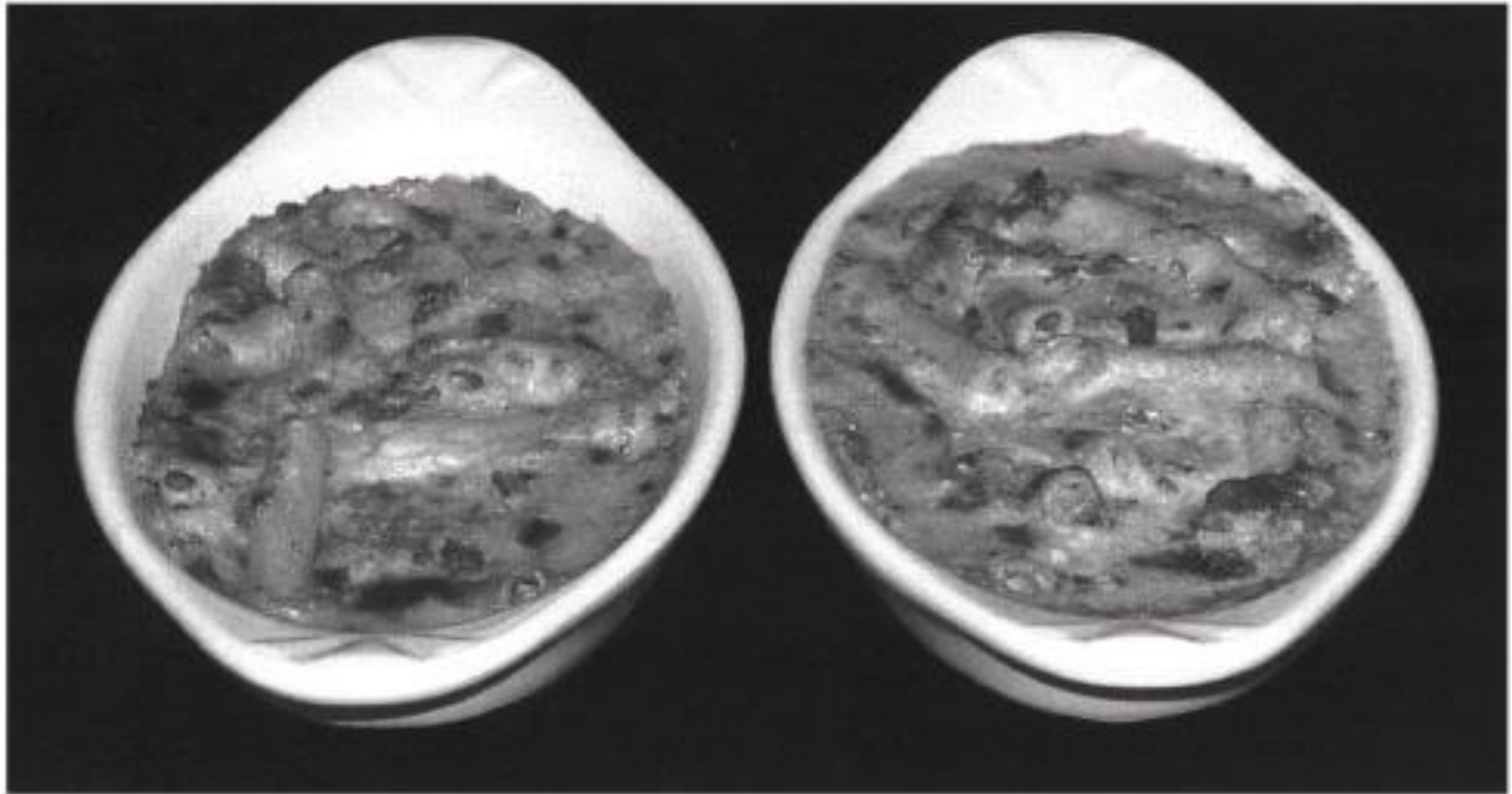


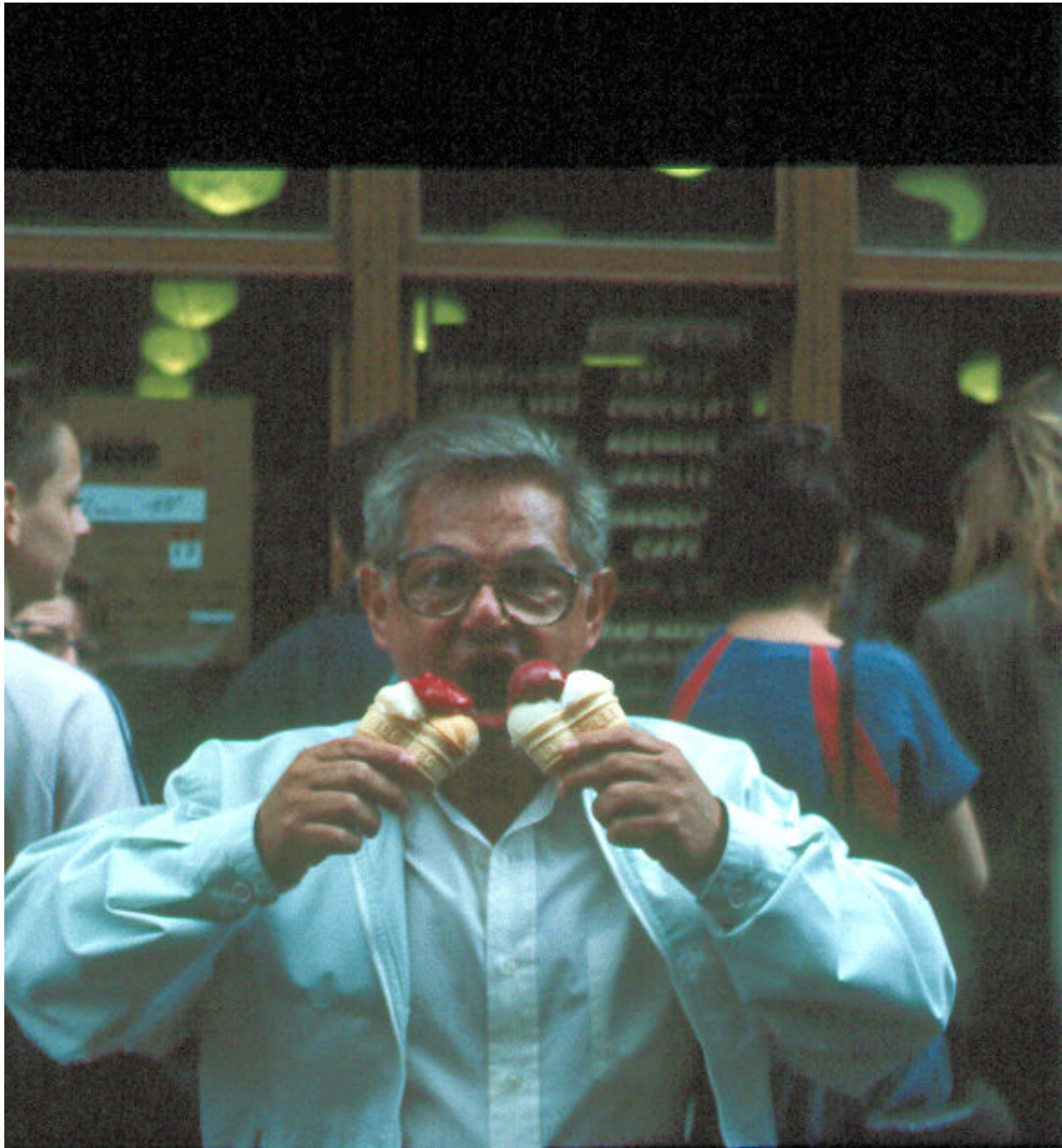
Figure 1: Standard (100%) and larger (150%) portion sizes of the baked pasta entrée are shown on the left and right, respectively, for comparison. The two portions were served on different days; therefore, customers never saw both of them simultaneously.

Diliberti, Rolls et al., 2004

Container size effects

Brian Wansink

Amount Cooked/poured	Single size container	Double size container
Crisco oil to fry chicken for two	99 ml	122 ml
Spaghetti for two people	234 g	302 g

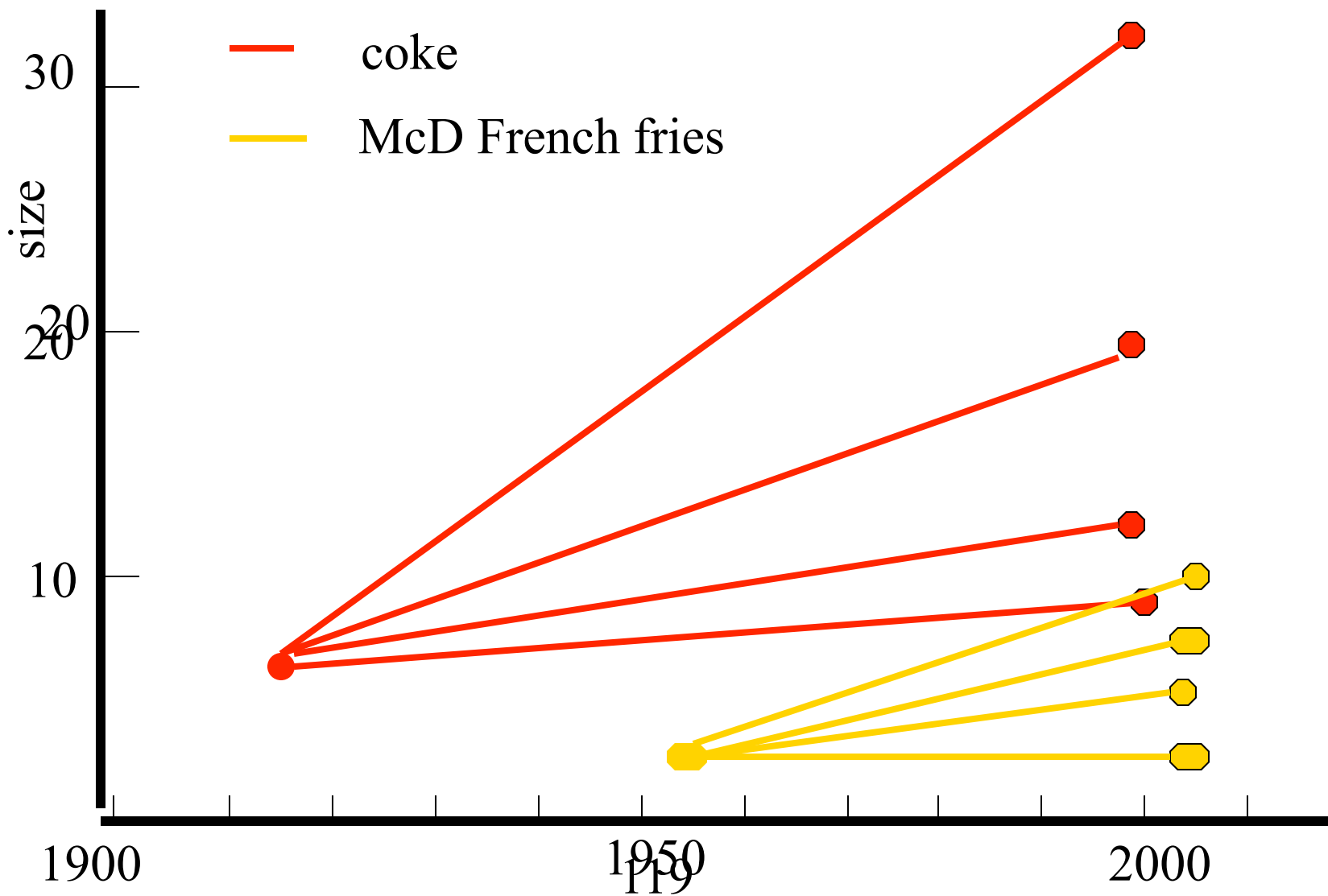


Cultural norms: Unit bias

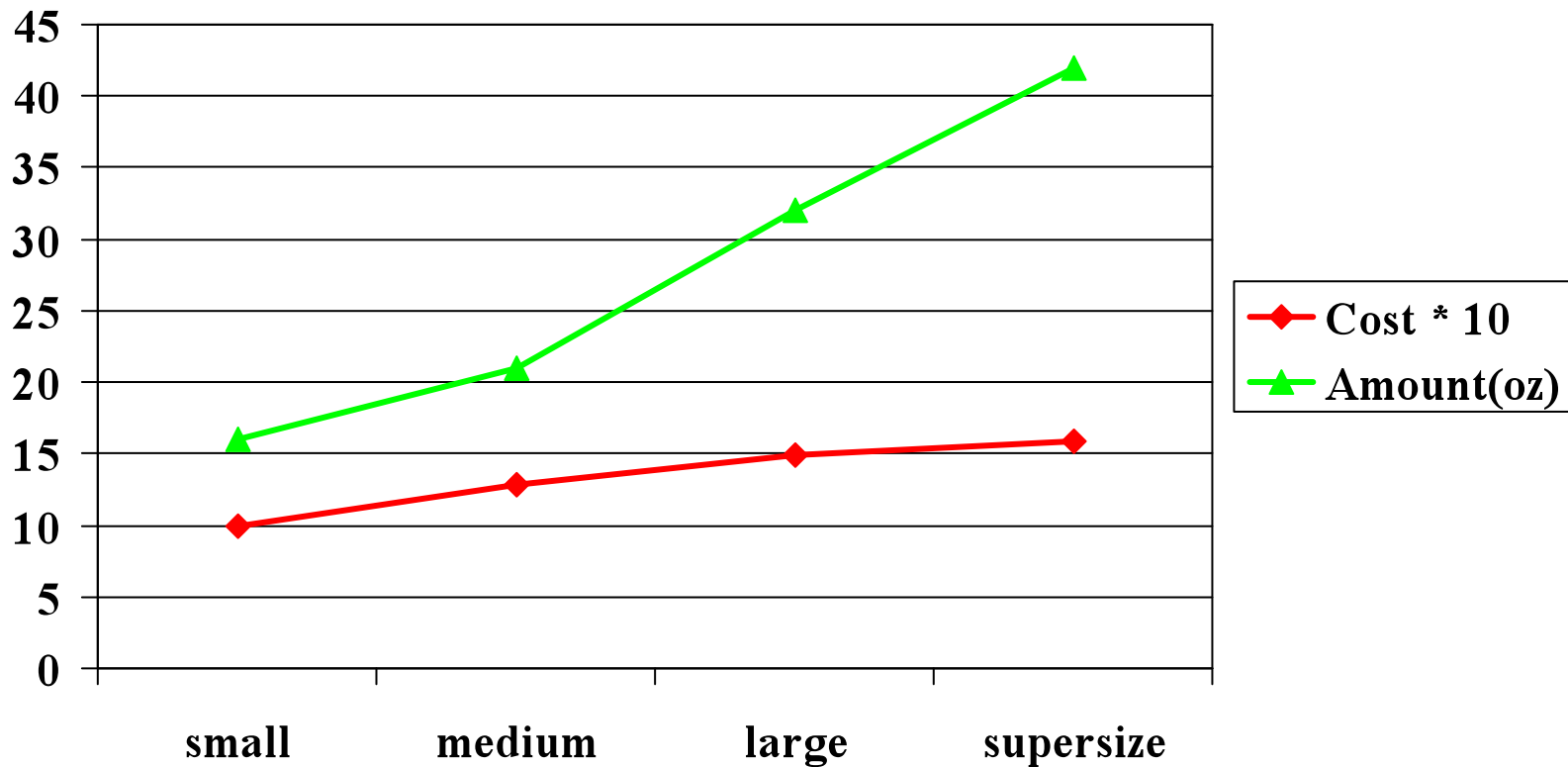
(Geier and Rozin, 2006)

- Free access in lobby to bowl of M&Ms, with either teaspoon or tablespoon
- Amount taken with tablespoon is 70% greater
- Similar effects with large or small tootsie rolls or pretzels

Evolving American Portion Size: Young and Nestle, 2003



McDonalds: sizes and prices of sodas (2004)



Changing the person

- The failure of dieting
- Losing is easy
- Maintenance is hard
- Sense of failure
- Keep trying, the nth diet
- The “toxic” environment

Environment Changes

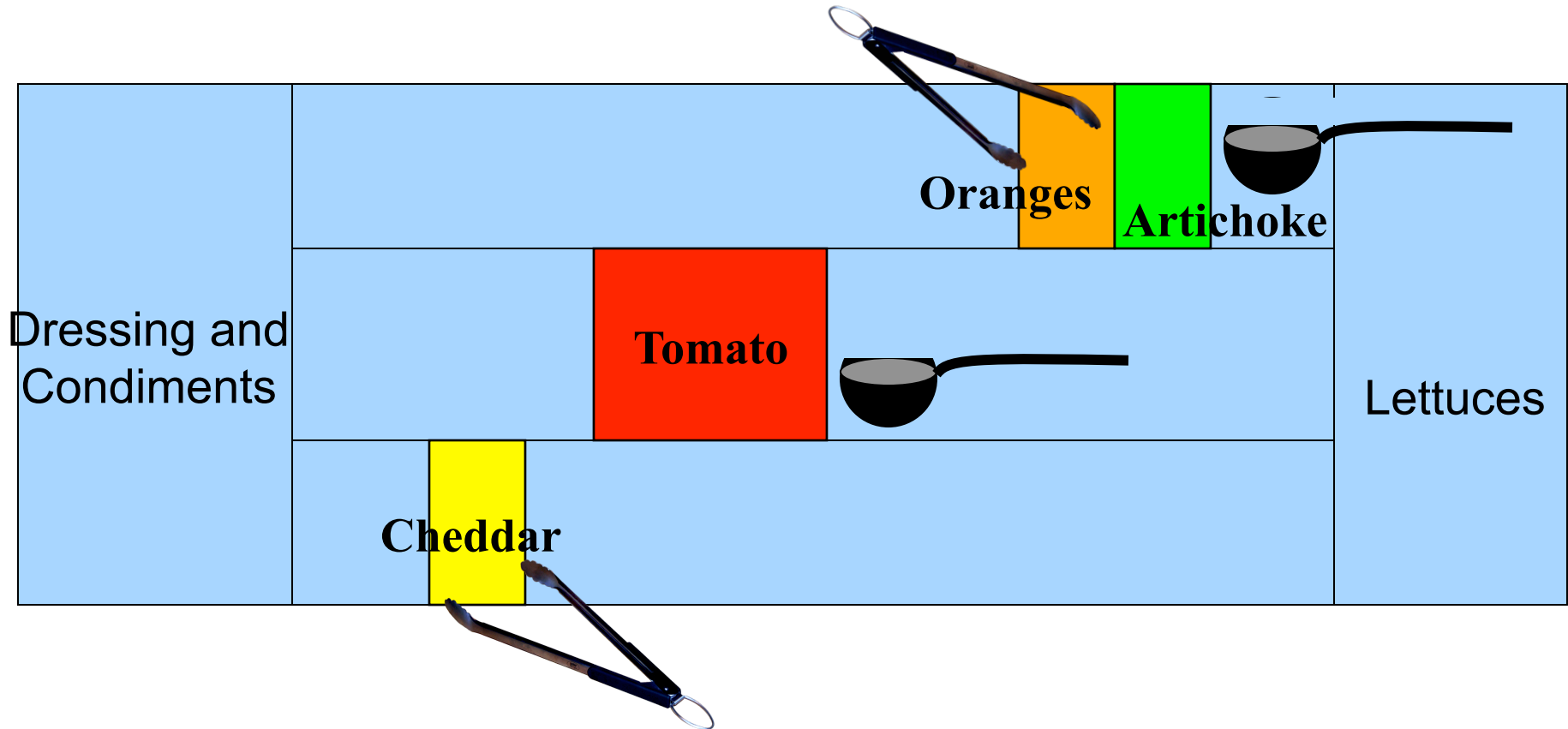
- Soda Glass size: 16 to 12 oz. reduction of 6%
 - (Geier, Rozin, Rineer, Schwartz)



Environment Changes

- Accessibility in salad bar; location
 - (Rozin, Urbanek, Dingley, Scott) -6%
- Accessibility in salad bar: Spoon-tongs
 - (Rozin, Scott, Dingley, Stein) -18%

Schematics: Spoons/Tongs, Manipulation A





- Isolates edge v. middle



Soda Cabinets, Manipulation A

 Pepsi
 Mountain Dew

 Sobe Lifewater
 Aquafina Flavored Water

Soda Cabinets, Manipulation B

 Mountain Dew
 Pepsi

 Aquafina Flavored Water
 Sobe Lifewater

- Eye to bottom shelf level: intake reduced 19%

Segmentation and consumption interrupts
About 50% reduction

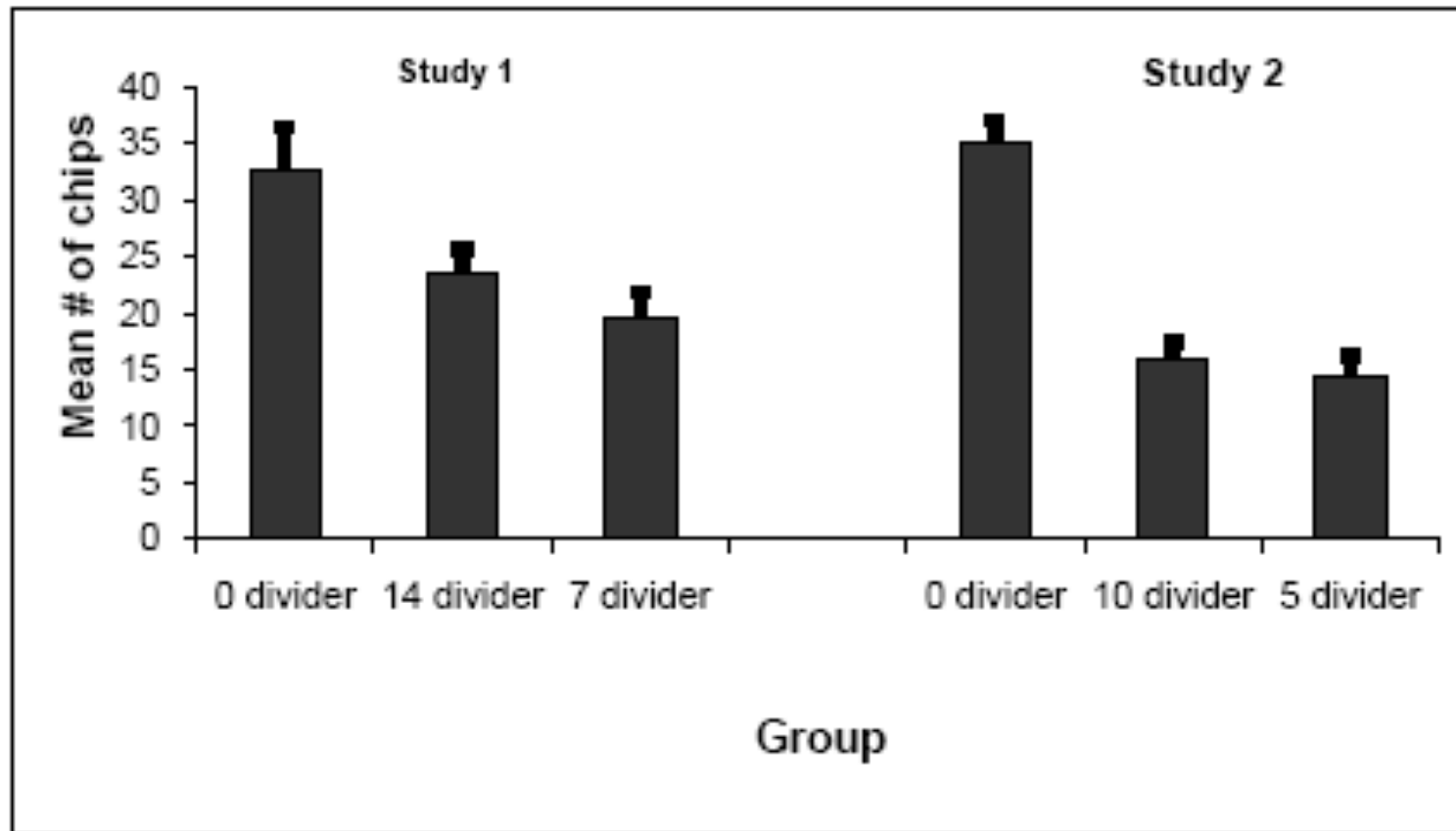


Geier, Wansink and Rozin

Ad lib potato chips for each student while watching a 35 minute movie

- Controls: All Lay's Original
- Lo Segment: All Lay's original except every 10th chip is Red Basil/tomato chip
- Hi Segment: All Lay's original except every 5th chip is Red Basil/tomato chip

Mean # chips eaten as a function of segmentation cues



$P < .001$ in both studies. Assume one chip can per year, and No adaptation, results in loss of about 3 pounds a year

Energy Expenditure

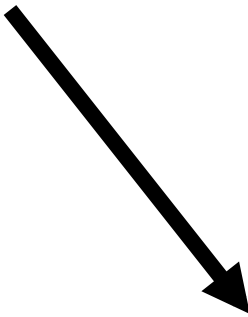
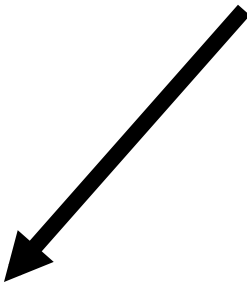
- Suburban Life
- Malls
- The car culture

**NEW YORK
SUBURB**

MANHATTAN

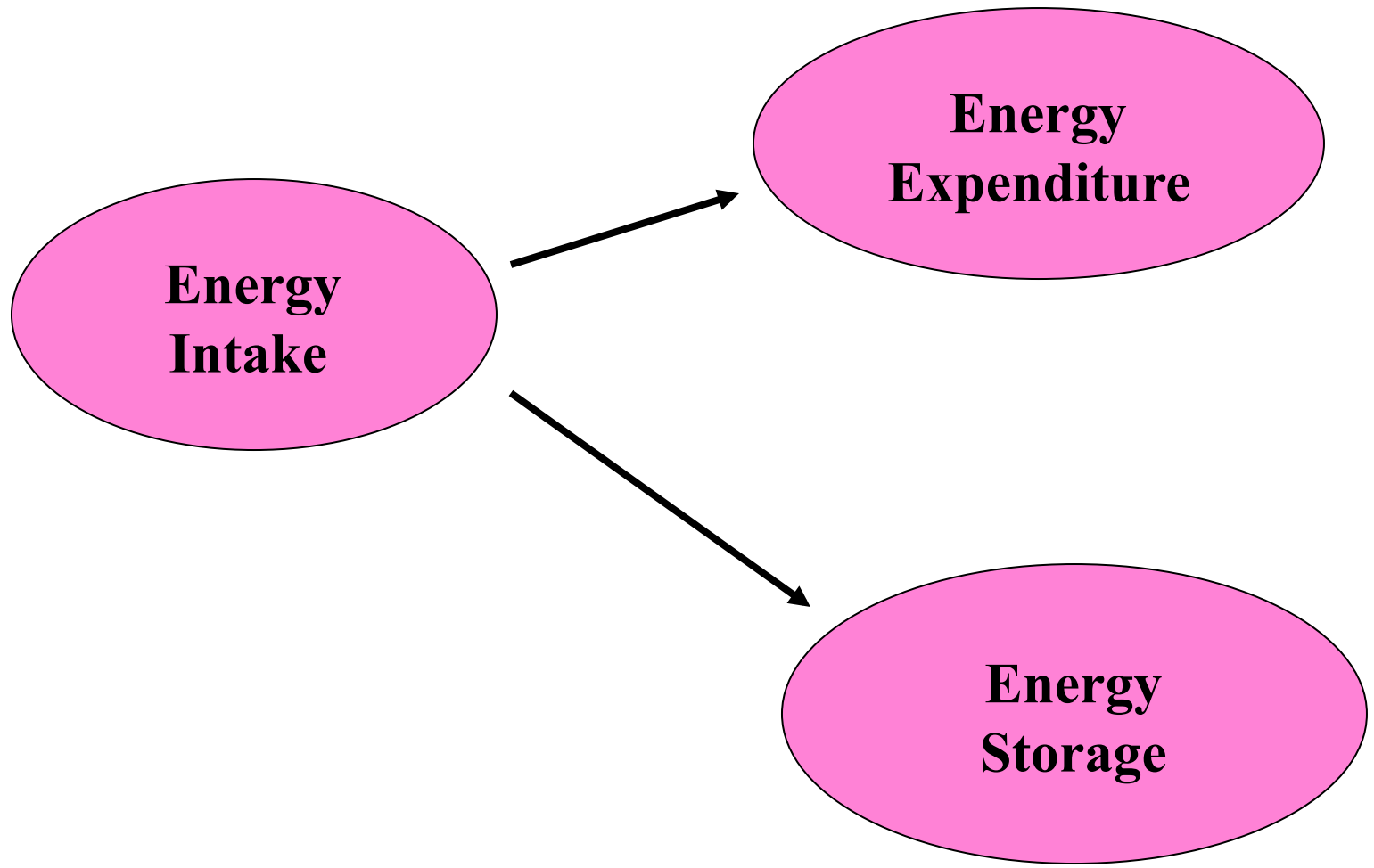
PARIS

**Energy
Intake**

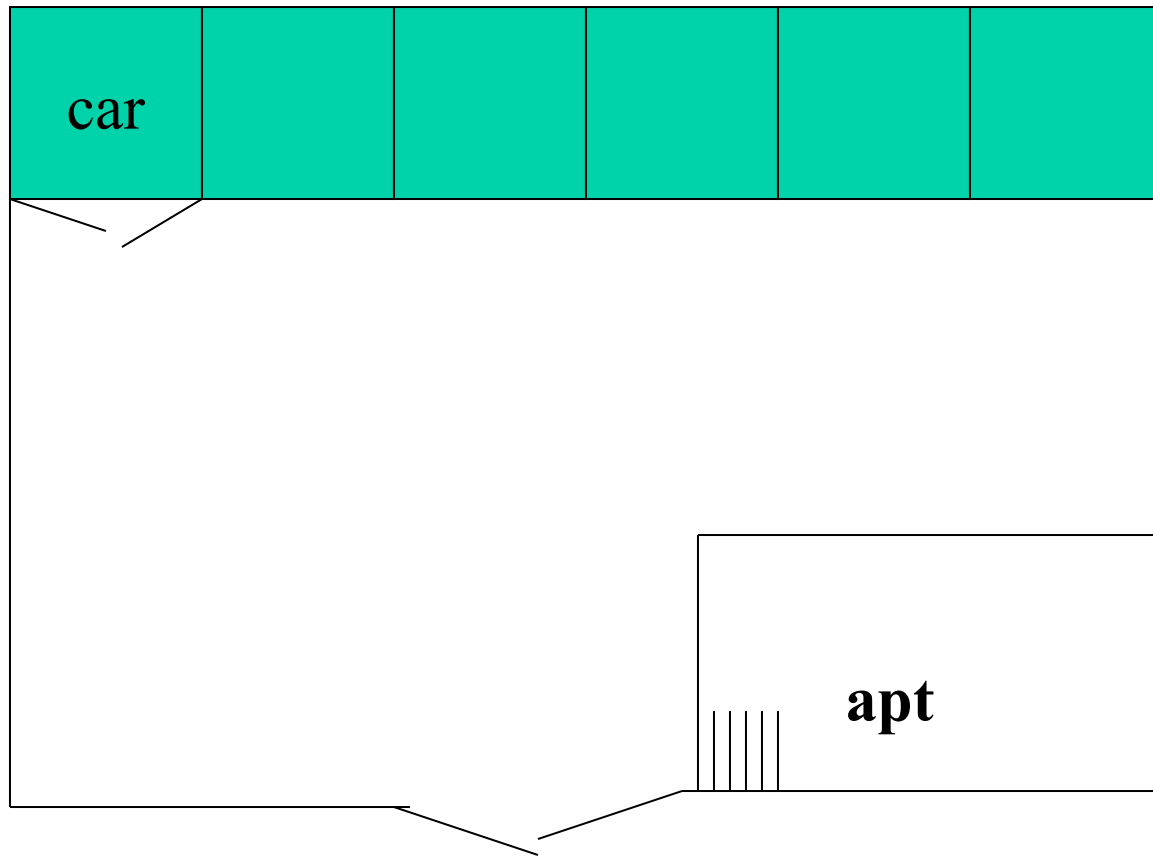


**Energy
Expenditure**

**Energy
Storage**



The French Garage



street



**La rue n'est pas
un crottoir**



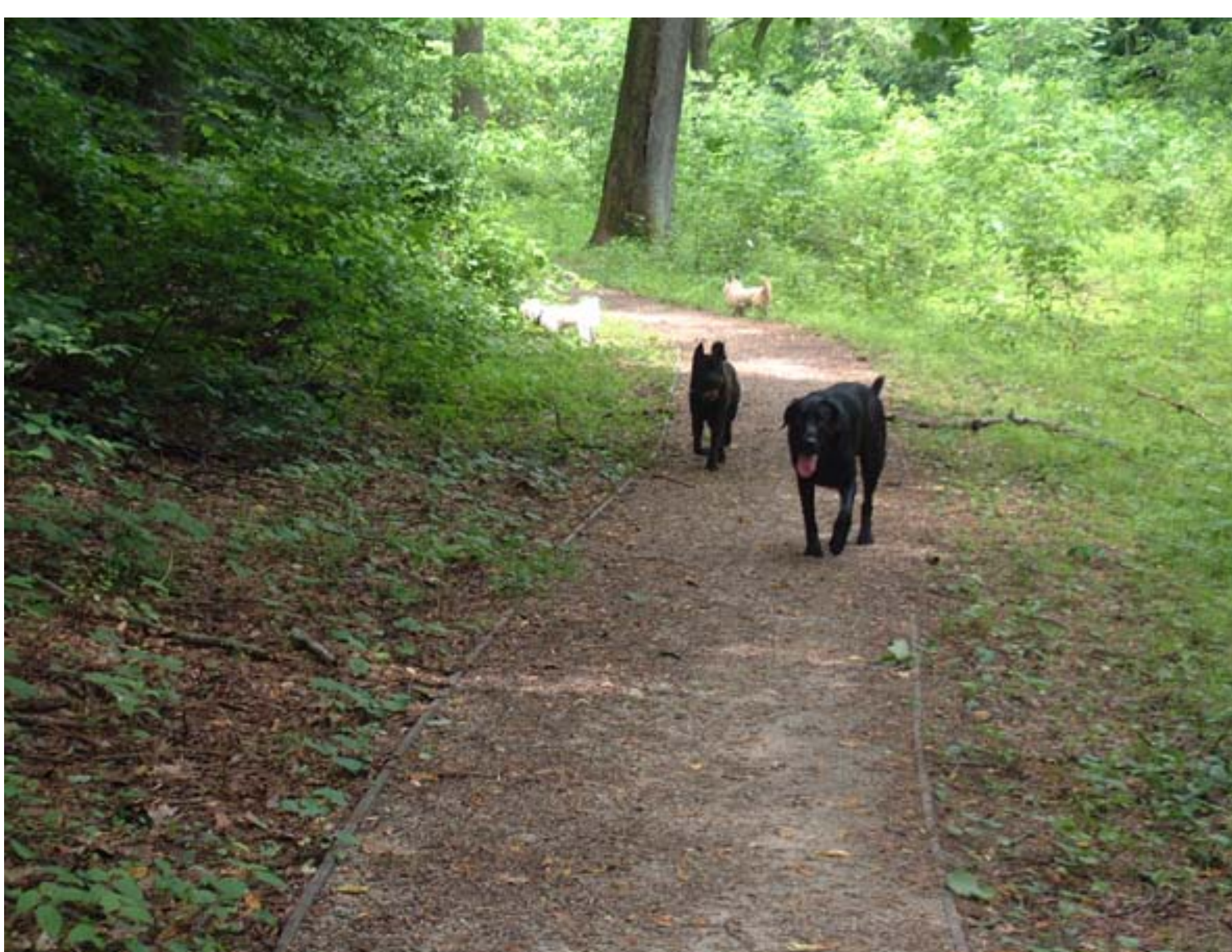
Ville de
Montpellier



**Un peu de respect
ça change la vie !**

© 2004 - Photo: Bruno Basso





France: Live to eat

USA: Eat to live



LIBERTÉ



EGALITE



FRATERNITÉ



MANGER





Freshens Smoothie Company

NONFAT YOGURT SMOOTHIES TROPICAL FRUIT JUICE SMOOTHIES

- | | |
|--|--|
| 1 JAMAICAN JAMMER
Bananas, Strawberries, Nonfat Yogurt & One Booster | 8 CARIBBEAN CRAZE
Strawberries, Bananas, Ten Juices & One Booster |
| 2 STRAWBERRY SQUEEZE
Strawberries, Nonfat Yogurt & One Booster | 9 STRAWBERRY SHOOTER
Strawberries, Ten Juices & One Booster |
| 3 RASPBERRY ROCKER
Raspberries, Bananas, Nonfat Yogurt & One Booster | 10 RASPBERRY RHAPSODY
Raspberries, Bananas, Ten Juices & One Booster |
| 4 RASPBERRY RAPTURE
Raspberries, Pineapple, Bananas, Nonfat Yogurt & One Booster | 11 RASPBERRY RUMBA
Raspberries, Bananas, Pineapple, Ten Juices & One Booster |
| 5 PEACHY PINEAPPLE
Peaches, Pineapple, Nonfat Yogurt & One Booster | 12 PEACH SUNSET
Peaches, Bananas, Strawberries, Ten Juices & One Booster |
| 6 BLUEBERRY SUNSET
Blueberries, Strawberries, Raspberries, Nonfat Yogurt & One Booster | 13 BLUEBERRY WAVE
Blueberries, Pineapple, Strawberries, Ten Juices & One Booster |
| 7 PINA COLLIDER
Bananas, Pineapple, Coconut, Nonfat Yogurt & One Booster | 14 PINEAPPLE PASSION
Pineapple, Bananas, Coconut, Ten Juices & One Booster |

ONE FREE MET-Rx BOOSTER IN EVERY SMOOTHIE!

ORANGE SMOOTHIES

- | | |
|---|---|
| 15 ORANGE SUNRISE
Orange Juice & Berries, Smoothie, Strawberries, Pineapple & One Booster | 17 ARUBA ORANGE
Orange Juice & Berries, Smoothie, Strawberries, Pineapple & One Booster |
| 16 ORANGE SHOOTER
Orange Juice & Berries, Strawberries & One Booster | 18 ORANGE WAVE
Orange Juice & Berries, Peaches & One Booster |



COFFEE SMOOTHIES

- | | |
|---|---|
| 19 FRESHENS ORIGINAL COFFEE
Freshens Original Coffee Blend & One Booster | 21 MOCHA COFFEE
Freshens Original Coffee Blend with Chocolate & One Booster |
| 20 CARAMEL COFFEE
Freshens Original Coffee Blend with Caramel & One Booster | 22 OREO COFFEE
Freshens Original Coffee Blend with Oreo & One Booster |

REGULAR 21 OUNCE 3.99
 LARGE 32 OUNCE 4.99

DECADENT SMOOTHIES

- | | |
|--|--|
| 23 FUDGE OREO SUPREME
Chocolate Fudge, Crushed Oreo, Nonfat Yogurt & One Booster | 24 PEANUT BUTTER CUP
Peanut Butter, Chocolate Fudge, Nonfat Yogurt & One Booster |
|--|--|

MET-Rx
 METABOLIC BOOSTERS

- ENERGY
- FAT BURNER
- MEMORY
- IMMUNE SYSTEM
- PROTEIN POWDER
- SOY PROTEIN

ADDITIONAL BOOSTERS ADD .49



STRAWBERRY SHOOTER

Strawberries, Ten Juices & One Booster

9

RASPBERRY RHAPSODY

Raspberries, Bananas, Ten Juices & One Booster

10

RASPBERRY RUMBA

Raspberries, Bananas, Pineapple, Ten Juices & One Booster

11

PEACH SUNSET

Peaches, Bananas, Strawberries, Ten Juices & One Booster

12

BLUEBERRY WAVE

Blueberries, Pineapple, Strawberries, Ten Juices & One Booster

13

PINEAPPLE PASSION

Pineapple, Bananas, Coconut, Ten Juices & One Booster

14

ER IN EVERY SMOOTHIE!

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ORANGE SHOOTER

Orange Juice & Sherbet, Strawberries & One Booster

16

Oran
Pean

COFFEE SMOOTHIE

FRESHENS ORIGINAL COFFEE

Freshens Original Coffee Blend & One Booster

19

Fresh
Blended with

CARAMEL COFFEE

Freshens Original Coffee Blended with Caramel & One Booster

20

Fresh
Blended with

DECADENT SMOOTHIE

3.99 / 4.99

FUDGE OREO SUPREME

Chocolate Fudge, Crushed Oreos, Nonfat Yogurt & One Booster

23

Peanut Butter
Nonfat Yogurt

4.00

MET-Rx[®]

NUTRITIONAL BOOSTERS

- ENERGY
- FAT BURNER
- MEMORY
- IMMUNE SYSTEM
- PROTEIN POWDER
- SOY PROTEIN

ADDITIONAL BOOSTERS ADD .49

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Preference for multiple varieties:
Prefer choice of 10 or 50 ice
cream flavors

	% prefer 10
France	68
USA	44

At a good restaurant, I expect a
small number of choices

	% expect small number
France	92
USA	64

Learning from the French

Some French-American differences

- Portion size
- Eating time
- Eating sociality/ conversation (conviviality)
- Freshness and taste (vs shelf life) priority in foods
- Degree of snacking and snacking opportunities
- Differences in actual foods consumed (e.g., wine)
- Differences in variety of food consumed (Drewnowski et al.)
- Walk/bicycle vs car orientation

Some basic French-American differences (Abigail Remick)

- Moderation vs abundance ideology
- Focus on quality vs quantity
- Conviviality in eating with food focus
- Pleasure vs worry orientation to food
 - Perhaps related to a Catholic as opposed to Protestant outlook

JOYS VS COMFORTS

We can learn from the French in this domain (not all domains)

- Focus on the environment to try to reduce food intake and waist lines
- Don't curtail the pleasure of eating
- Make small changes that encourage more exercise and less eating
- Let the effects of those small changes accumulate

Yes, eating can be bad for health

But NOT EATING is much
worse for health

Au revoir