

Think 53: Food Talks

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Sound Symbolism and Synesthesia
(and Wheat Thins and Rocky Road)

Thursday, April 13, 2017

Conventionalism vs. Naturalism

Conventionalism:

What's in a name? that which we call a rose

By any other name would smell as sweet

Shakespeare, Romeo and Juliet

Naturalism:

There is an inherently correct name for everything
for both “Greeks and barbarians.”

Plato, Cratylus

John Locke 1632-1704

“Thus we may conceive how words, which were by nature so well adapted to that purpose, came to be made use of by men as the signs of their ideas; not by any natural connection that there is between particular articulate sounds and certain ideas, for then there would be but one language amongst all men; but by a voluntary imposition, whereby **such a word is made arbitrarily the mark of such an idea.**”

Of the Signification of Words Book 3 Chapter II

Xúnzi 荀子

- Written by Xún Kuàng 荀況 Confucian scholar, 3rd century BCE

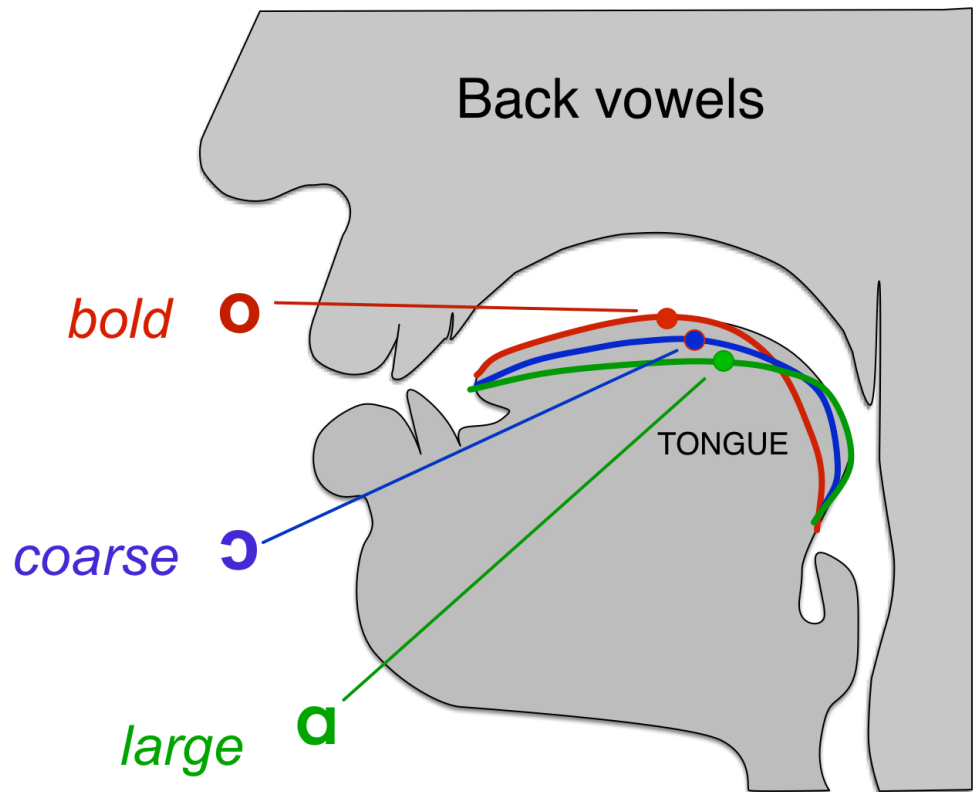
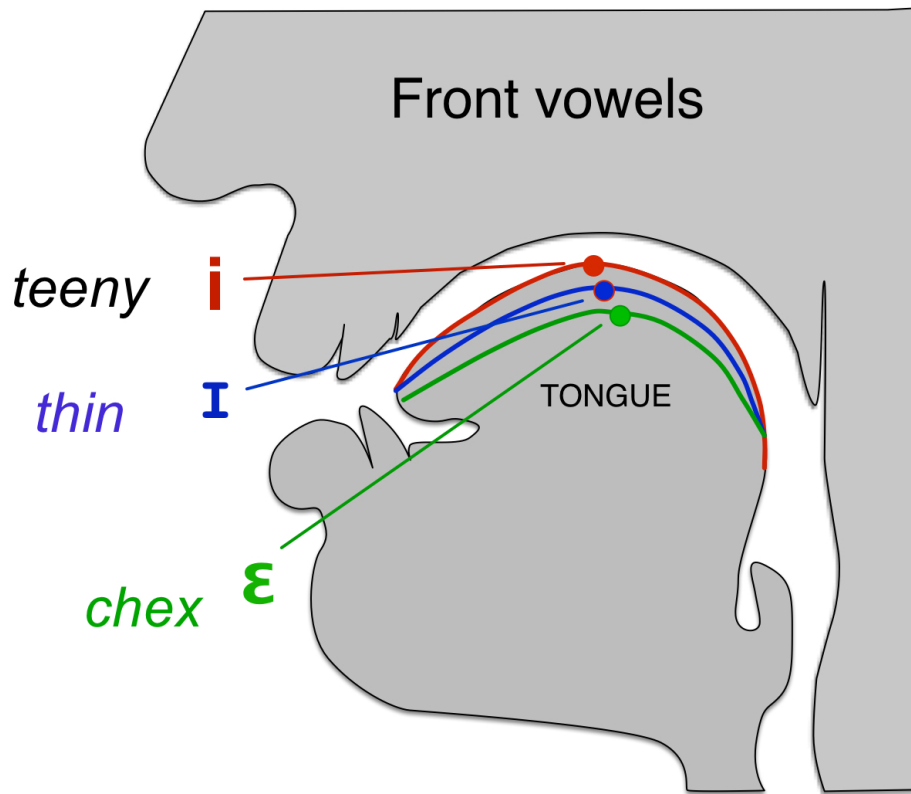
“Names have no intrinsic appropriateness. One agrees to use a certain name and issues an order to that effect, and if the agreement is abided by and becomes a matter of custom, then the name may be said to be appropriate... Names have no intrinsic reality.”

What could Naturalism Mean?

- Now **the letter *r***, as I was saying, appeared to the imposer of names an excellent instrument for **the expression of motion**; and he frequently uses the letter for this purpose: for example, in the actual words *rein* and *roe* he represents motion by *r*; also in the words *tromos* (trembling), *trachus* (rugged); and again, in words such as *krouein* (strike), *thrauein* (crush), *ereikein* (bruise), *thruptein* (break), *kermatixein* (crumble), *rumbein* (whirl): of all these sorts of movements he generally finds an expression in the letter *r*, **because**, as I imagine, he had observed that **the tongue was most agitated and least at rest in the pronunciation of this letter, which he therefore used in order to express motion**, Plato, *Cratylus*

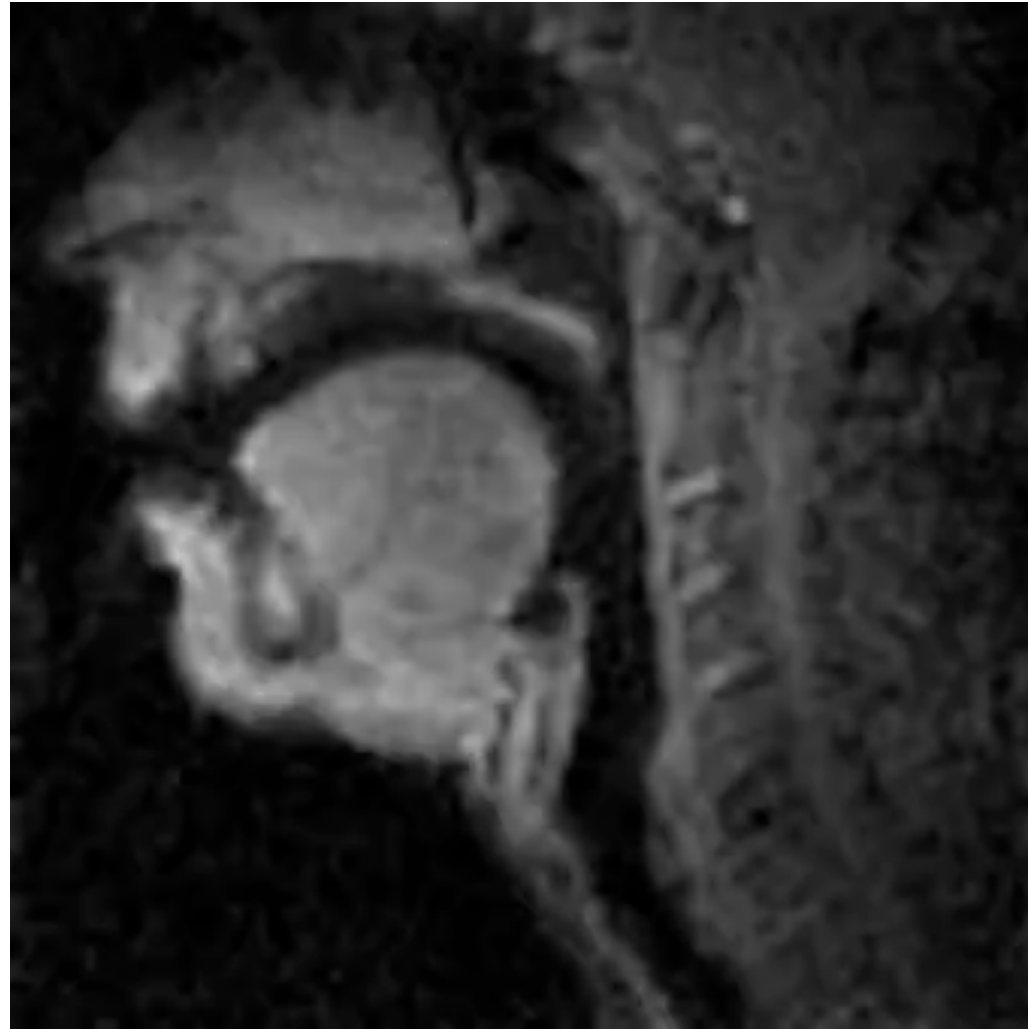
Sound Symbolism: modern naturalism

- A version of naturalism
- Suggests that certain sounds naturally are associated with certain meanings



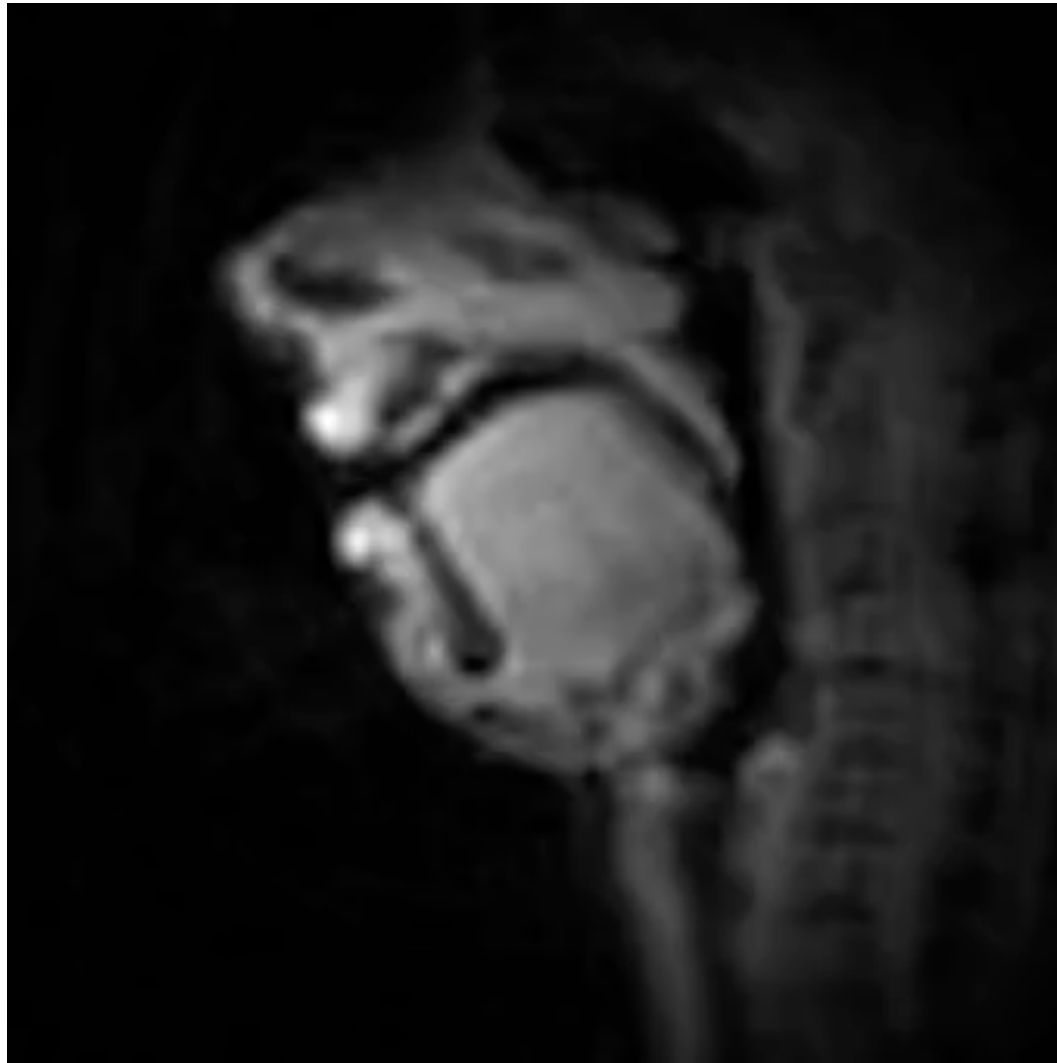
MRIs from USC's SAIL Lab

Shri Narayanan and Dani Byrd



MRIs from USC's SAIL Lab

Shri Narayanan and Dani Byrd



ix



ux



e



ox



æ



ax



- http://sail.usc.edu/span/rtmri_ipa/

Sound symbolism in vowels

- Front vowels used for little things
 - *little, itsy bitsy, teeny weeny*
 - -y used for children (Robby, Becky)
- Back vowels used for big things
 - *huge, humongous, large*
- Not an absolute, but a strong statistical tendency

Sound symbolism across many languages

- French *petit* 'small', *grand* 'big'
- Spanish *-ito*,
- Italian *-ino* 'small', *-one* 'large'
- Mandarin *xì* 细 'fine', *cū* 粗 'coarse', *qīng* 轻 'light' *zhòng* 重 'heavy'

Studies find this pattern across hundreds of languages

Sound symbolism in fiction

Gulliver's Travels

Lilliputians

Brobdingnagians



Sound symbolism in fiction

Harry Potter

Bludgers: big and dangerous

Quaffle: big and round

Golden **Snitch:** small and fast



A red quaffle, two bludgers and the golden snitch

Klink (2000)

Klink, Richard R. 2000. "Creating Brand Names with Meaning: The Use of Sound Symbolism." *Marketing Letters* 11(1): 5–20.

Which brand of laptop seems bigger, Detal or Dotal?

Which brand of vacuum cleaner seems heavier, Keffi or Kuffi?

Which brand of ketchup seems thicker, Nellen or Nullen?

Which brand of beer seems darker, Esab or Usab?

- In each case, the product named with back vowels (Dotal, Nullen) was chosen as the larger, heavier, thicker product.

Yorkston and Menon

Yorkston, E., & Menon, G. (2004). A sound idea: Phonetic effects of brand names on consumer judgments. *Journal of Consumer Research*, 31(1), 43-51.

1. “Read this press release on a new ice cream
...“called **Frish**”
... “called **Frosh**”
 2. Rate the (untasted) ice cream from 1-7 on
creaminess, richness, and smoothness
- Results:
 - Frosh (5) more creamy/rich/smooth than Frish (4)
 - People more likely to want to buy Frosh

But do marketers use this in practice?

- Hypothesis:
 - **Cracker names** will use **front vowels**
 - small, light, delicate
 - **Ice cream names** will use **back vowels**
 - rich, heavy, solid
- Dataset:
 - 592 US cracker brands from a dieting website
 - 81 ice cream flavors sold by Haagen Dazs/Ben & Jerry's

Methodology

Cracker list from a dieting website

Barnum's Animal Crackers Crackers Crackers
Barnum's Animal Crackers Crackers Snak Saks
Premium Crackers Crackers Gold
Premium Crackers Crackers Soup & Oyster
Premium Crackers Saltine Crackers Fat Free
Premium Crackers Saltine Crackers Low Sodium
Premium Crackers Saltine Crackers Multigrain
Premium Crackers Saltine Crackers Original
Premium Crackers Saltine Crackers Unsalted Tops
Ritz Bitz Cracker Sandwiches Graham Cracker S'mores
Simpsons
Ritz Bitz Cracker Sandwiches Graham Crackers
S'mores
Ak Mak Crackers
Nabisco Fat Free Saltine Crackers- Weight Watcher
Points, Carbs, Protein, Calories
NABISCO ORIGINAL PREMIUM Saltine Crackers
Nabisco RITZ Crackers
Nabisco Wheat Thins Crackers
Pepperidge Farm Goldfish Baked Snack Crackers
Wasa - Fiber Rye with Sesame & Oats Crispbread
Wasa Crackers Sesame Crispbread
Wasa Crackerbread, 7-Grain, Crisp'n Light
Wasa Fiber Rye
Wasa Multi Grain
Wasa Light Rye Crispbread
Ritz Crackers Whole Wheat
Keebler Town House Bistro Rye Crackers
100% Whole Wheat Crackers, low-fat
Asiago Cheese Cracker....
...
...

- Babyfood, crackers, vegetable
- Bell Pepper Corn Bread Crackers
- Bremner Caraway Crackers
- Bremner Crackers made with pure sunflower oil
- Bremner Oyster Crackers made with pure sunflower oil
- Bremner Soup & Chili Crackers
- Brown Rice Crackers
- Butter Corn Bread Crackers
- Carr's Table Water Crackers
- Cheddar Dill Crackers
- Cheese Crackers
- Cheese Nips Crackers 100 Calorie Pack thin Crisps
- Cheese Nips Crackers Bold Cheddar Chips
- Cheese Nips Crackers Cheddar
- Cheese Nips Crackers Four Cheese
- Cheese Nips Crackers Mini Go-Pak
- Cheese Nips Crackers Nacho Chips
- Cheese Nips Crackers Peanut Butter
- Cheese Nips Crackers Real Cheese
- Cheese Nips Crackers Reduced Fat
- Cheese with Cheddar Jack Sandwich Crackers
- CHEETOS Bacon Cheddar on Cheese Flavored Crackers
- CHEETOS Cheddar Cheese on Golden Toast Flavored Crackers
- Choc. Graham Cracker Chip
- Classic Rounds Crackers
- Cracker Crunchers Fun Kits, Bologna
- Cracker Crunchers Fun Kits, Turkey
- Cracker Crunchers, Bologna
- Cracker Crunchers, Chicken
- Cracker Crunchers, Cooked Ham
- Cracker Crunchers, Turkey
- ...
- ...
- ...

Barnum's Animal Crackers Crackers Crackers: b aa1 r n em z ae1 n ah0 m ah0 l k r ae1 k er0 z k r ae1 k er0 z k r ae1 k er0 z

Barnum's Animal Crackers Crackers Snak Saks: b aa1 r n em z ae1 n ah0 m ah0 l k r ae1 k er0 z k r ae1 k er0 z s n ae1 k s ae1 k s

Premium Crackers Crackers Gold: p r iy1 m iy0 ah0 m k r ae1 k er0 z k r ae1 k er0 z g ow1 l d

Premium Crackers Crackers Soup & Oyster: p r iy1 m iy0 ah0 m k r ae1 k er0 z k r ae1 k er0 z s uw1 p ae n d oy1 s t er0

Premium Crackers Saltine Crackers Fat Free: p r iy1 m iy0 ah0 m k r ae1 k er0 z s aa l t iy1 n k r ae1 k er0 z f ae1 t f r iy1

Premium Crackers Saltine Crackers Low Sodium: p r iy1 m iy0 ah0 m k r ae1 k er0 z s aa l t iy1 n k r ae1 k er0 z l ow1 s ow1 d iy0 ah0 m

Premium Crackers Saltine Crackers Multigrain: p r iy1 m iy0 ah0 m k r ae1 k er0 z s aa l t iy1 n k r ae1 k er0 z m ah1 l t iy g r ey1 n

Premium Crackers Saltine Crackers Original: p r iy1 m iy0 ah0 m k r ae1 k er0 z s aa l t iy1 n k r ae1 k er0 z er0 ih1 jh ah0 n ah0 l

Premium Crackers Saltine Crackers Unsalted Tops: p r iy1 m iy0 ah0 m k r ae1 k er0 z s aa l t iy1 n k r ae1 k er0 z ax n s aa1 l t ix d t aa1 p s

Ritz Bitz Cracker Sandwiches Graham Cracker S'mores Simpsons: r ih1 t s b ih1 t s k r ae1 k er0 s ae1 n d w ih0 ch ah0 z g r ey1 ah0 m k r ae1 k er0 s m ao1 r z s ih1 m p s ah0 n z

Ritz Bitz Cracker Sandwiches Graham Crackers S'mores: r ih1 t s b ih1 t s k r ae1 k er0 s ae1 n d w ih0 ch ah0 z g r ey1 ah0 m k r ae1 k er0 z s m ao1 r z

Ak Mak Crackers: ae1 k m ae1 k k r ae1 k er0 z

Now count front vowels versus back vowels

n ah0 b **ih1** s k ow0 r **ih1** t s k r **ae1** k er0 z

Nabisco Ritz Crackers

3 front vowels



r **ih1** t s k r **ae1** k er0 z hh **ow1** l w **iy1** t

Ritz Crackers Whole Wheat

3 front vowels, 1 back vowel

Crackers



Vowels in:

Crackers Names

- Ritz, Cheez It, Wheat Thins, Triscuit, Thin Crisps, Cheese Crisps, Chicken in a Biskit, Krispy

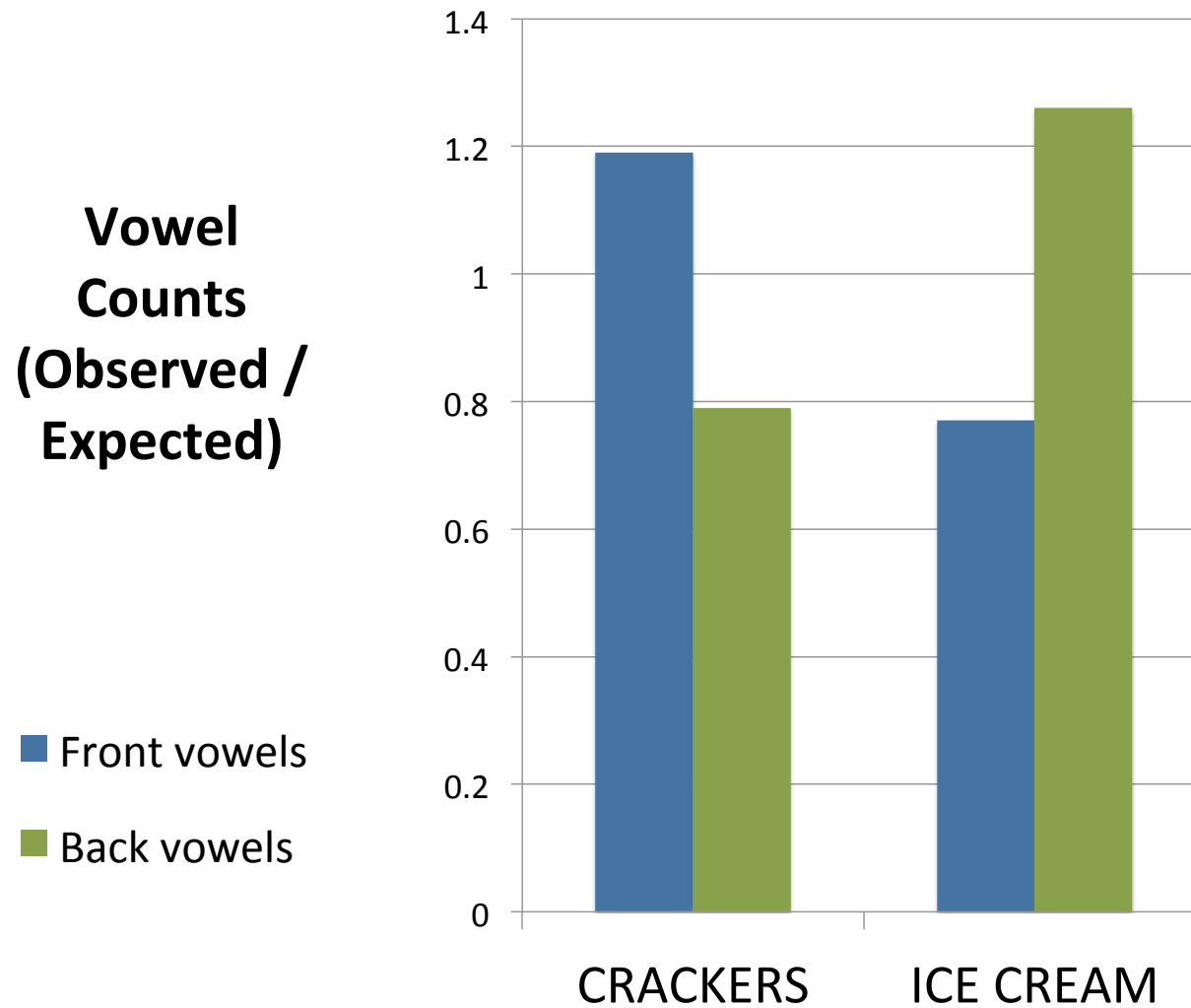
Ice Cream Flavors

- Rocky Road, Jamoca Almond Fudge, Chocolate, Caramel, Cookie Dough, Coconut

One control

- Some vowels are more common than others
 - Front vowels slightly more common than back vowels overall
- Need to divide by the expected frequency of front versus back vowels
- Called the “Observed / Expected” ratio

Vowels: Crackers vs. Ice Cream



Sound symbolism in numbers

- English Front vowels **3, 6, 7, 8, 10**
- English Back vowels **1, 2**

3 and 6 sound smaller than 2 even though they are bigger.

- Mandarin Front vowels **1, 7**
- Mandarin Back vowels **3,5,8,9**

Sound symbolism affects reasoning

Keith S. Coulter and Robin A. Coulter, "Small Sounds, Big Deals: Phonetic Symbolism Effects in Pricing", *Journal of Consumer Research*, 37, 2010



Our beautiful scoop
down from \$10.00 to
only \$7.66



Our beautiful scoop
down from \$10.00 to
only \$7.22

- Repeat the price over and over in your mind
- Now answer:
- How much lower is the sale price than the regular price in %?

Sound symbolism affects reasoning

Keith S. Coulter and Robin A. Coulter, "Small Sounds, Big Deals: Phonetic Symbolism Effects in Pricing", *Journal of Consumer Research*, 37, 2010



Our beautiful scoop
down from \$10.00 to
only \$7.66



Our beautiful scoop
down from \$10.00 to
only \$7.22

- 7.66 is more expensive but “six” sounds smaller
- 7.22 is less expensive but “two” sounds bigger

Sound symbolism affects reasoning: Results

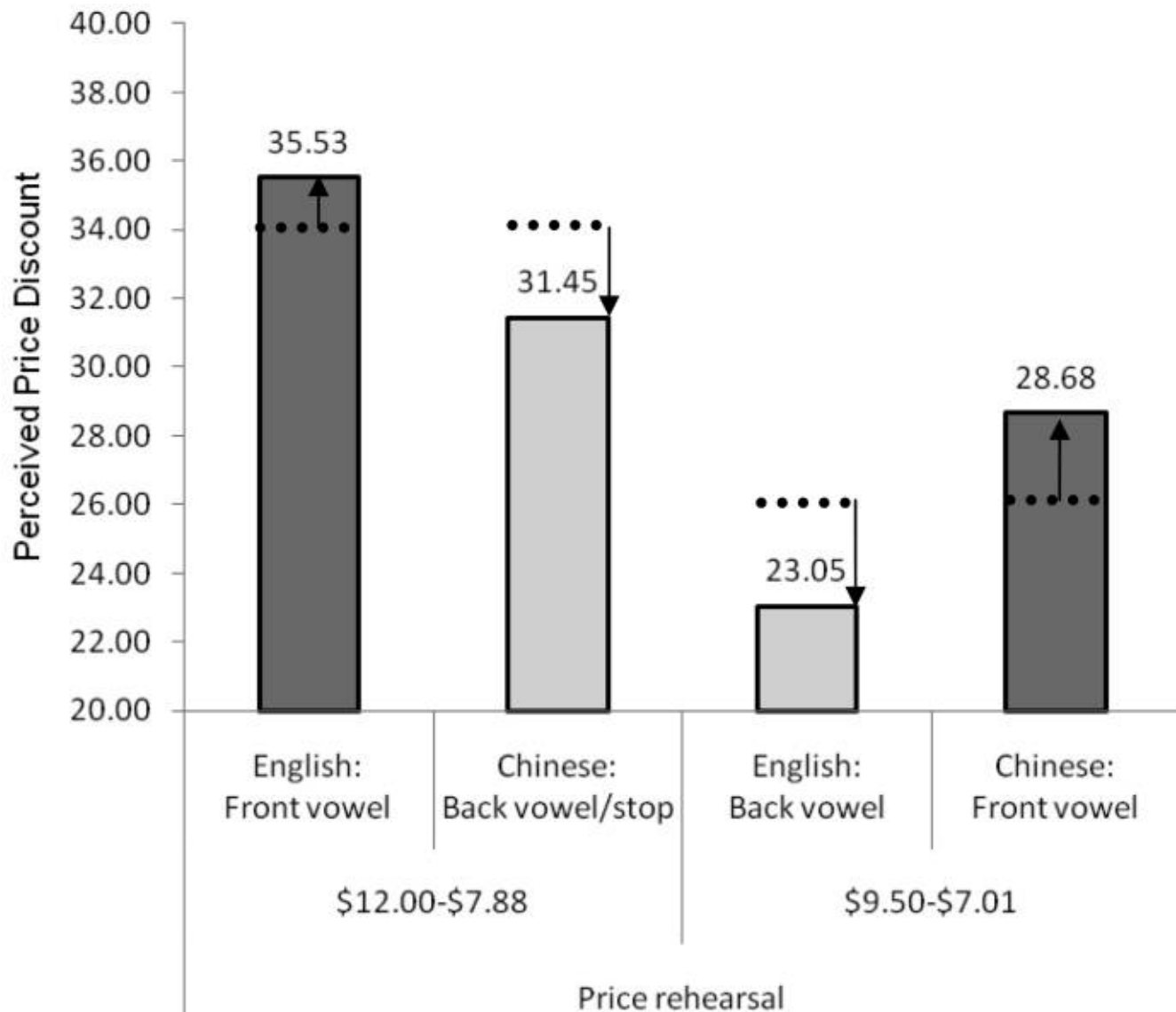
Sale Price	Discount	Rehearsal			No Rehearsal		
		Estimated Discount	Perceived Value	Purchase Likelihood	Estimated Discount	Perceived Value	Purchase Likelihood
\$7.66	23.4%	28.70%	4.87	4.20	23.21%	3.97	*
\$7.22	27.8%	25.93%	3.73	3.10	27.33%	4.67	*
\$2.33	22.3%	28.10%	4.73	4.20	22.50%	*	*
\$2.22	26%	24.13%	3.70	3.20	25.05%	*	*

Results held even for people who could not remember the prices when they made their decision

What about across languages

- \$7.88
 - English “eight eight (front vowels)”
 - Mandarin “ba ba” (back vowels)
- \$7.01
 - English “oh 1 (back vowel)”
 - Mandarin “ling yi (front vowel)”
- English: \$7.88 discount from \$12.00
- Mandarin: \$7.01 discount from \$9.50

Bilingual speakers, back vowel prices seem higher in both lgs (less discount)



What's going on with vowels?

- Why do front vowels symbolize SMALL and back vowels symbolize LARGE?

The Frequency code

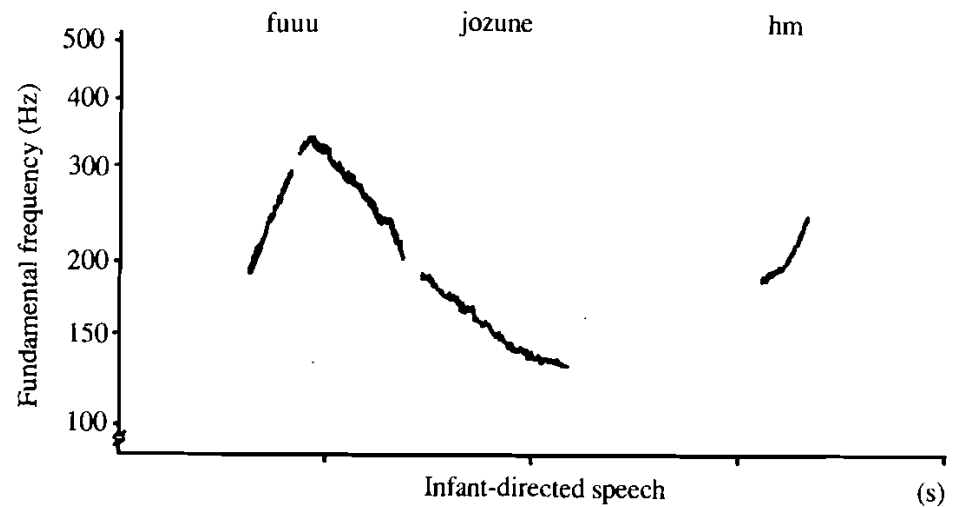
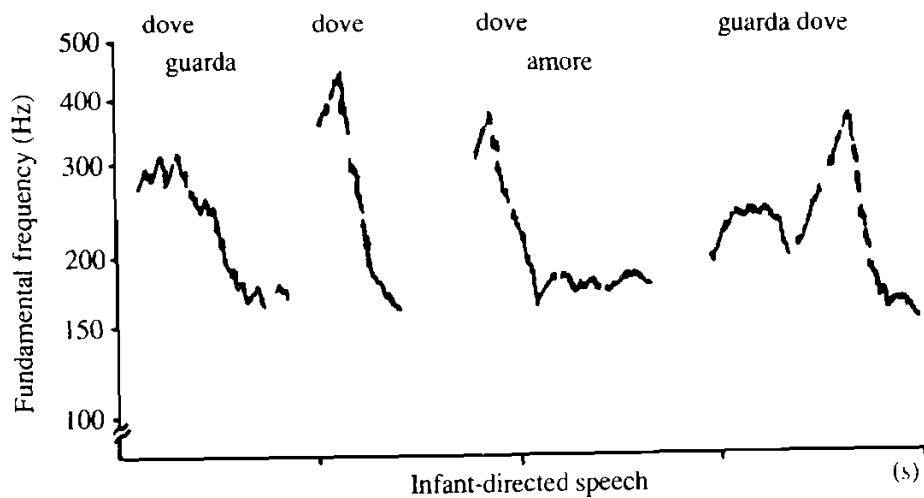
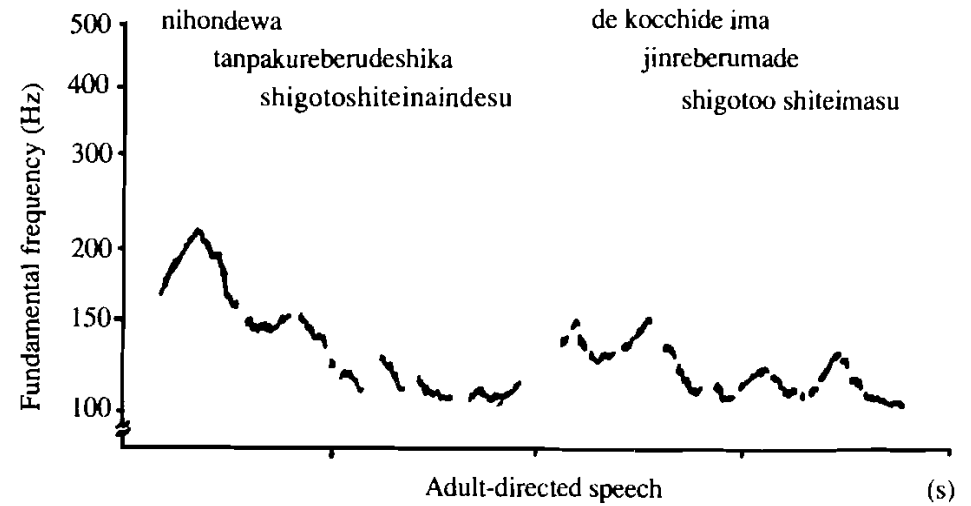
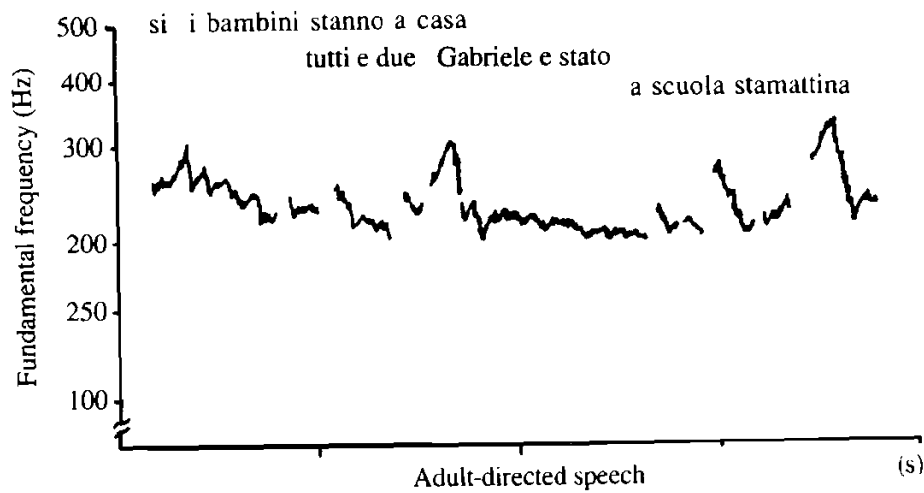
- High pitched sounds are associated with small animals
- Low pitched sounds are associated with big animals



Vowels and frequencies

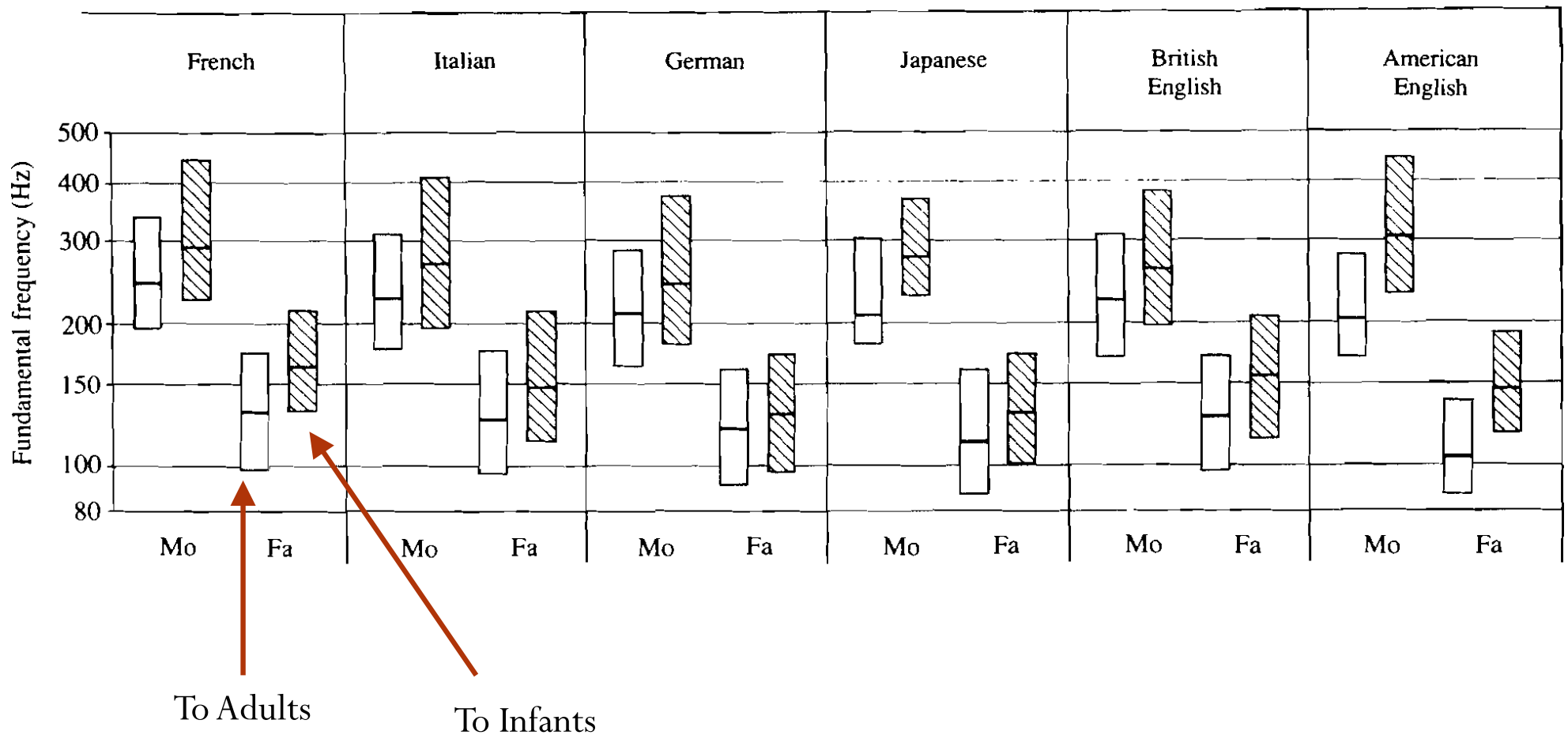
- Front vowels have high pitched resonance
 - “High second formant”
- Back vowels have low pitched resonance
 - “Low second formant”

High frequencies associated with children



High frequencies associated with babies

Both mothers and fathers raise their pitch when talking to infants



Ohala's "Frequency Code"

- Based on work of Morton (1977)
- Morton looked at vocalizations of 28 avian and 28 mammalian species in "agonistic displays", face-to-face competition
 - Confident aggressor: a low-pitched vocalization
 - Submissive nonthreatening: a high-pitched sound.
- Morton's idea: both parties put on **displays** of size to avoid actual competition
 - Look big: Erection of hair/feathers
 - Look small: flatten feathers, wings
- This might have evolved

Ohala's Frequency Code

- Maybe this led to an implicit association between high pitch and size
- Even in vowels

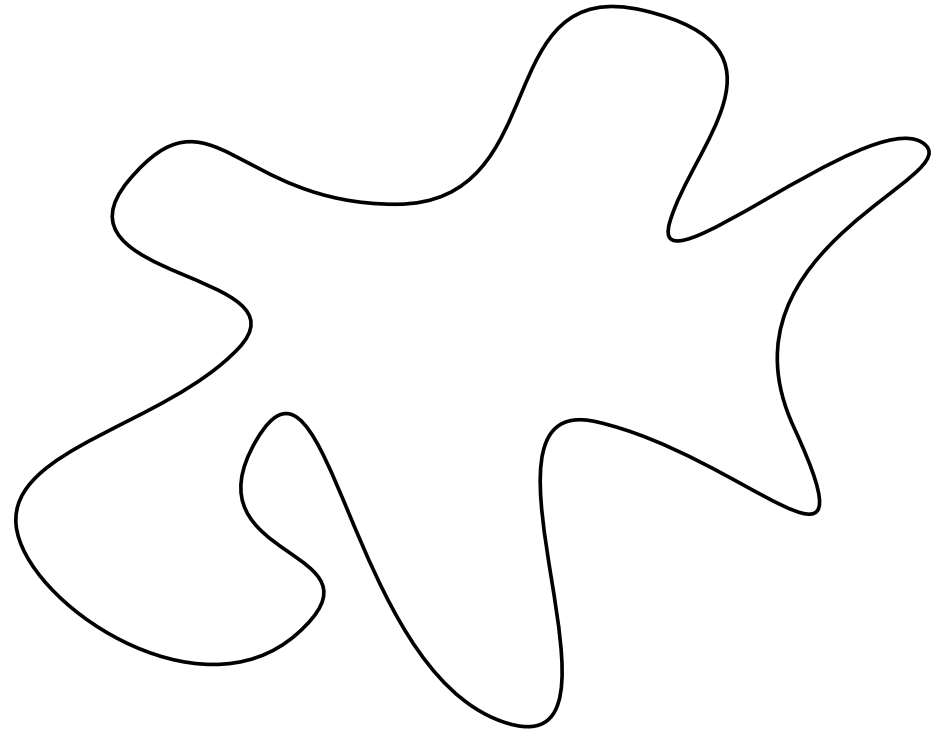
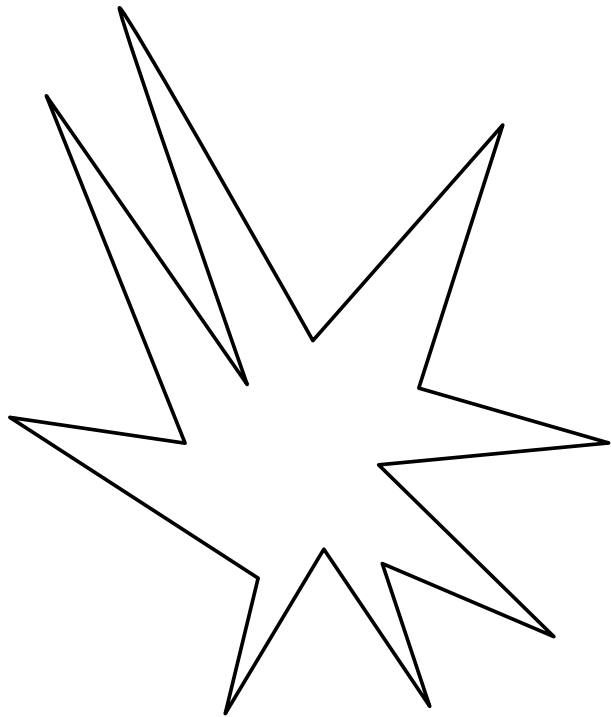
Evolutionary Implications: why do we smile?

- Smiles pull back the corners of the mouth
 - front vowel
 - cheese!
 - makes us sound smaller
- Phonetician John Ohala suggests the smile evolved in hominids (or earlier) as an appeasement gesture
 - don't hurt little old me

“Martian” words.

Which is “maluma”? Which is “takete”?

How about bouba or kiki?



Summary of bouba/kiki

- First studied by Wolfgang Köhler in 1929.
 - Founder of Gestalt psychology, refugee from the Nazis to the US
- Replicated in lots of languages
 - Swedish: Ahlner and Zlatev (2010). Swahili: Davis (1961). Otjiherero in Namibia: Bremner et al. (2013). Tamil: Ramachandran and Hubbard (2001).
- And in children: Maurer, Pathman, and Mondloch (2006).

Results from Spence lab at Oxford

Dark chocolate (Lindt 70% cocoa) **takete**

Milk chocolate (Lindt extra creamy 30% cocoa) **maluma**

Carbonated beverages: **takete**

Still water: **maluma**

We also found:

Crackers: more **t** and **k**

Ice cream: more **l** and **m**

m and **l** sounds associated with creamier,
gentler tastes, **t** and **k** with bitter, sharp tastes

Charles Spence lab at Oxford: chocolate

Ngo, M. K., Misra, R., & Spence, C. (2011). Assessing the shapes and speech sounds that people associate with chocolate samples varying in cocoa content. *Food quality and preference*, 22(6), 567-572.

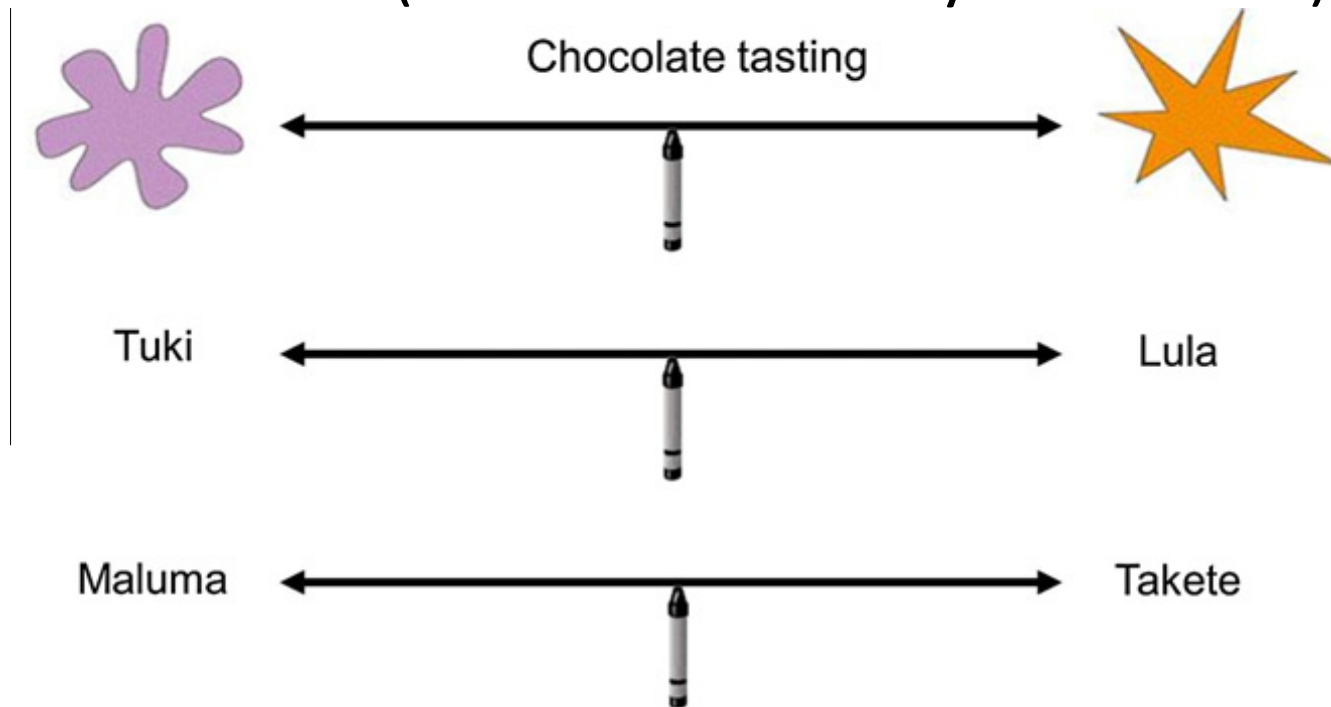
Taste 2 chocolates:

dark chocolate (Lindt 70% cocoa)

takete

milk chocolate (Lindt extra creamy 30% cocoa)

maluma



Please make a mark along the line above that you think best matches the flavour of the chocolate that you are about to try. If the flavour better matches the shape/word on the left of the page mark a point to the left of centre, whereas if the flavour better matches the shape/word on the right of the page mark a point to the right of the centre.

Charles Spence lab at Oxford: water

Ngo, M. K., Piqueras-Fizman, B., & Spence, C. (2012). On the colour and shape of still and sparkling water: Insights from online and laboratory-based testing. *Food Quality and Preference*, 24(2), 260-268.

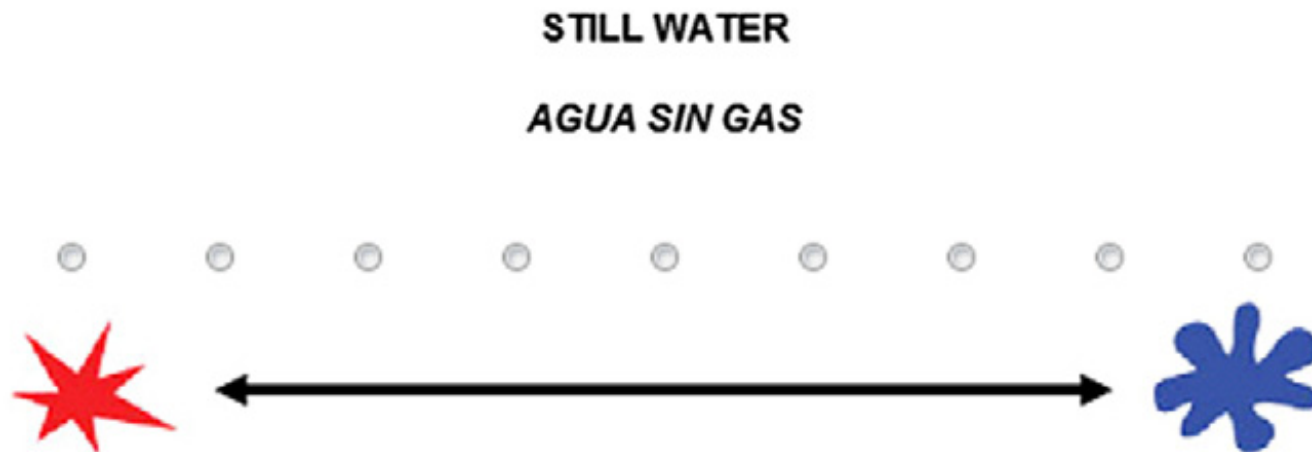
Water:

Carbonated water **takete**

Still water **maluma**

Please select a point along the scale according to the image that best matches your experience when drinking

Por favor seleccione un punto a lo largo de la escala de acuerdo a la imagen que más se parezca a su experiencia cuando bebe

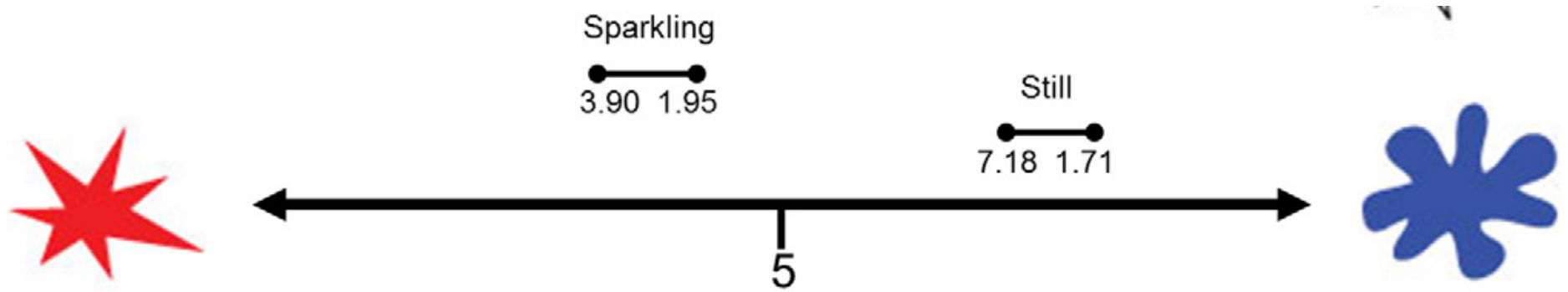


Charles Spence lab at Oxford: water

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Water:

Carbonated water **takete**
Still water **maluma**



Summary

Spence Lab

Takete: Carbonated water, dark chocolate

Maluma: Still water, milk chocolate

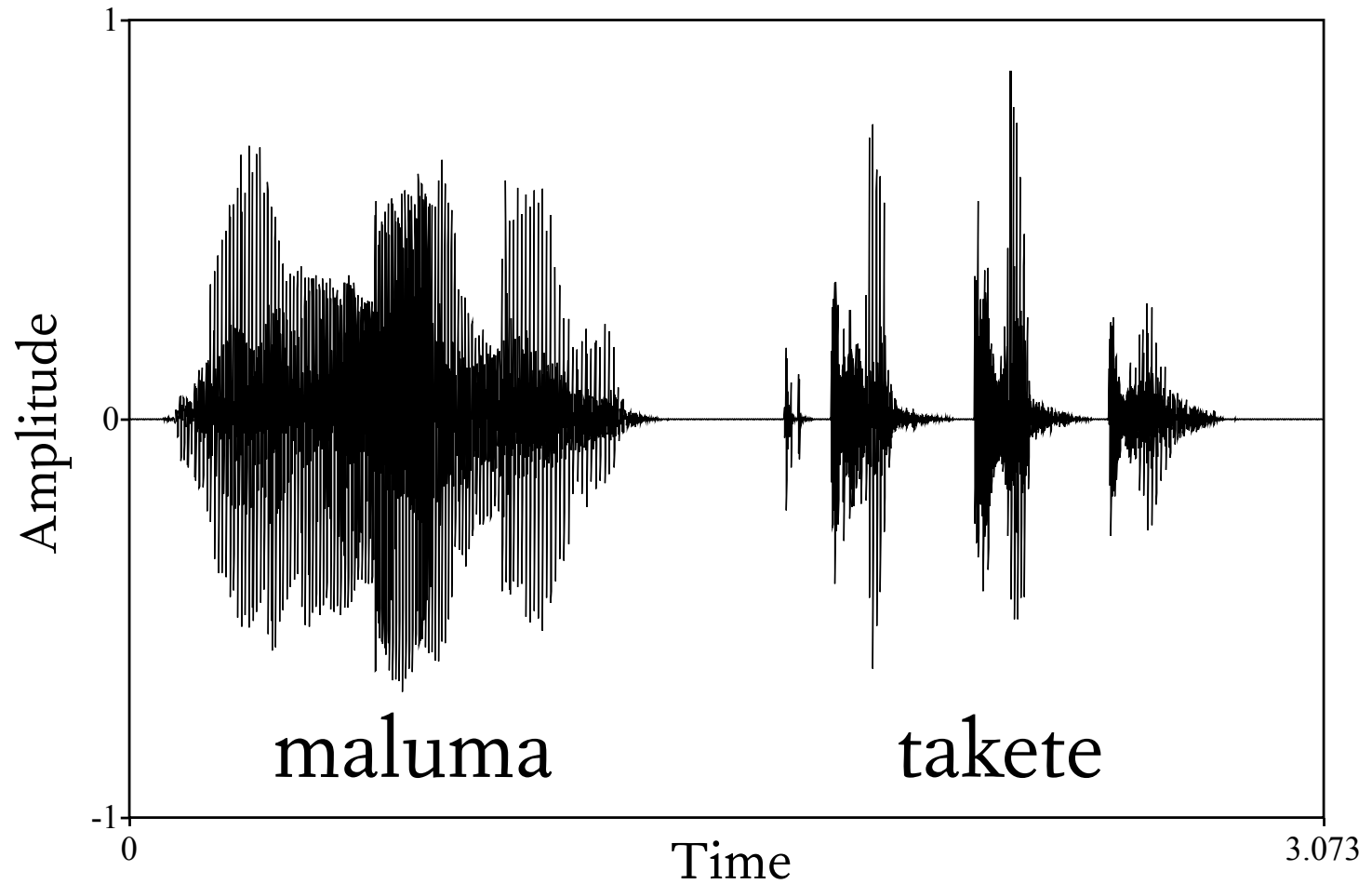
Our lab:

more **t** and **k**: crackers

more **l** and **m**: ice cream

m and **l** sounds associated with creamier,
gentler tastes, **t** and **k** with bitter, sharp tastes

Sound wave of me



The sound /t/



The sound /k/



Synesthesia: across the 5 senses


Hearing: perception of acoustic smoothness

is somehow linked to perception of smoothness by

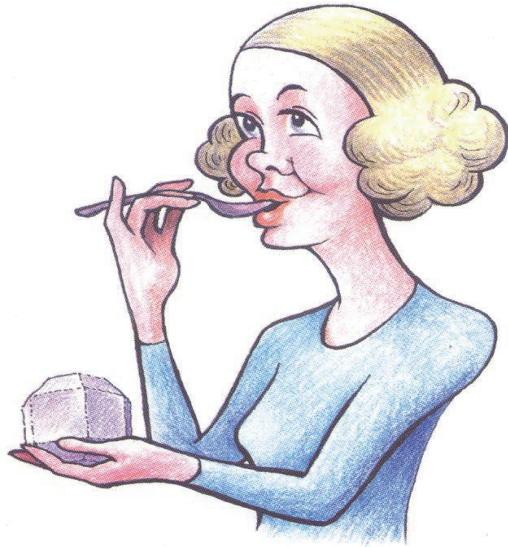
Vision (curvy not jagged figure)

Taste (creamy not sharp taste)

Synesthesia

- Real input to one sense accompanied by a perception in another sense
- 1 in 23 are strong synesthetes
 - Sound → color
 - My friend Dan Slobin has colors for musical keys
 - C major is pink, C minor is dark red tinged with black
 - Letter → color 
 - Word → taste

Taste → Shape Synesthete



Spence, C., & Deroy, O. (2014). On the shapes of flavours: A review of four hypotheses. *Theoria et Historia Scientiarum*, 10, 207-238.

‘Oh, dear [...] there aren’t enough points on this chicken. [...] I know it sounds crazy, but I have this thing, see, where I taste by shape. [...] Flavors have shape, [...] I wanted the taste of this chicken to be a pointed shape, but it came out all round. [...] Well, I mean it’s nearly spherical, [...] I can’t serve this if it doesn’t have points.’ (the synaesthete Michael quoted in Day 2011: 392-393).

Synesthesia and Bouba/Kiki

- Main theory:
 - synesthesia results from "crossed-wiring" in the brain
- Implications from Bouba/Kiki
 - Everyone is slightly synesthetic

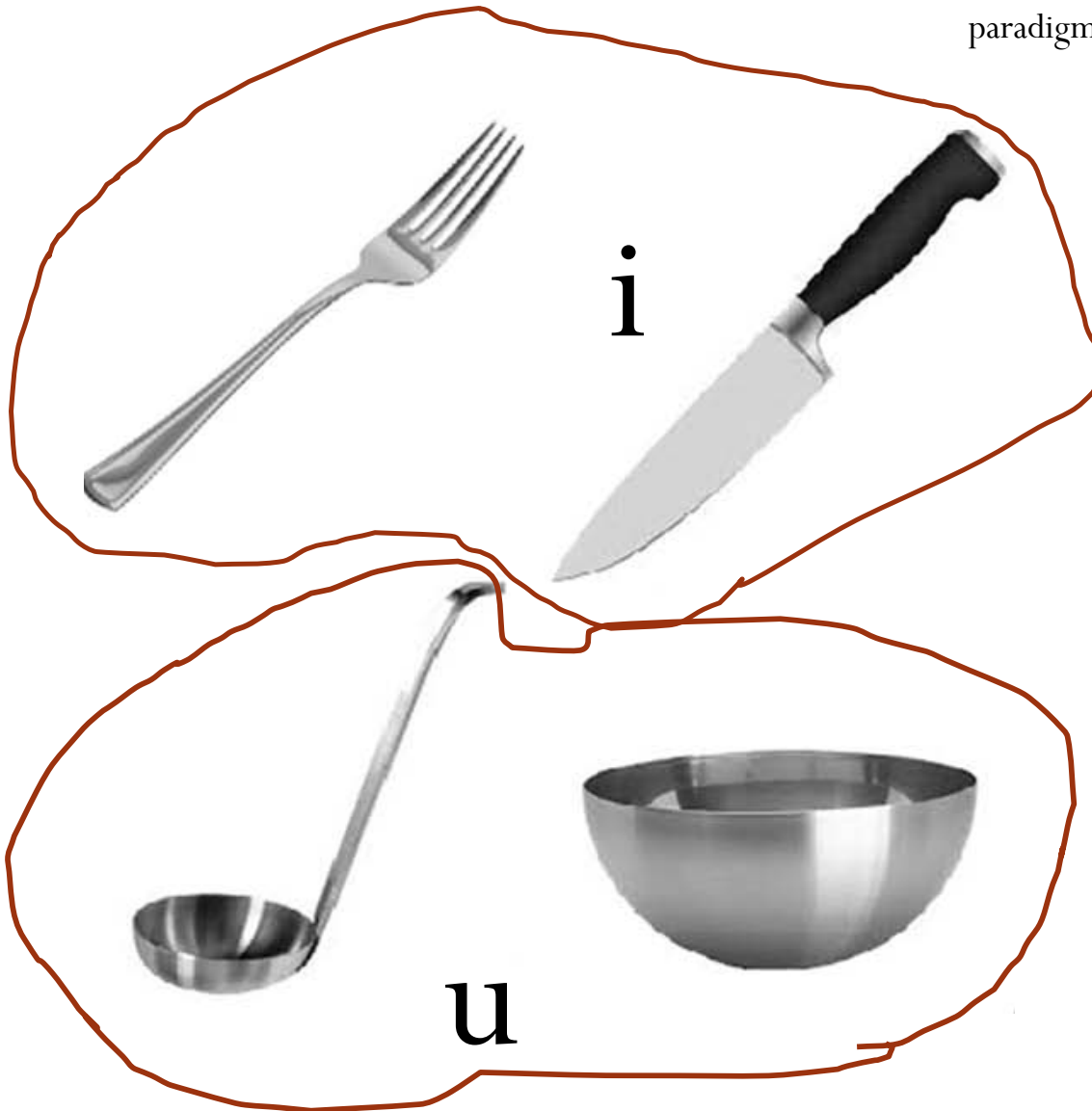
Not all of these mappings are universal

Bremner, A., Caparos, S., Davidoff, J., de Fockert, J., Linnell, K., and Spence, C. (2013). Bouba and Kiki in Namibia? A remote culture make similar shape-sound matches, but different shape-taste matches to Westerners, *Cognition* **126**, 165-172.

- The Himba of Northern Namibia
 - little exposure to Western cultural and environmental influences. No written language
 - Speak Otjiherero, a Bantu language
- Results:
 - Bouba/kiki mapped onto shapes
 - But carbonation not mapped onto an angular (as opposed to a rounded) shape.
 - Milk chocolate mapped to angular rather than rounded shapes (opposite of Westerners)

Vowels matter for bouba-kiki too: real kitchen objects

D'Onofrio, A. (2013). Phonetic detail and dimensionality in sound-shape correspondences: Refining the bouba-kiki paradigm. *Language and speech*



<u>/i/</u>	<u>/u/</u>
/pimə/	/pumə/
/bimə/	/bumə/
/timə/	/tumə/
/dimə/	/dumə/
/kimə/	/kumə/
/gimə/	/gumə/

Summary

- Conventionalism (“arbitrariness”) is the norm, but naturalism (“sound symbolism”) plays a role as well.
- Two kinds of naturalism extensively studied
 - Front vs. back vowels/high vs. low (“frequency code”)
 - Smooth vs. sharp sounds (“bouba/kiki”)
- Some aspects of these may be universal (weak versions of synesthesia).
- But others may be culture specific
 - Namibians and chocolate/carbonation

Evolutionary Implications: how did language evolve?

- How did the first listener know what the first speaker was talking about?
- Bootstrap theory!
- The first cavewoman
 - says a high-pitched 'i' to mean "baby"
 - says a low-pitched 'o' to mean "big"
 - says 'kikiki' to mean "sharp"

For Tuesday!

While you read Strauss:

Identify your favorite food or favored food in your culture, and describe the sensation you feel when you eat it.

Is your description similar to those used in the American TV advertisements given by Strauss?