



Everything is decided in the brain

Theory and methods of neuromarketing

Bernd Weber

Internet Hungary, Budapest, 2015



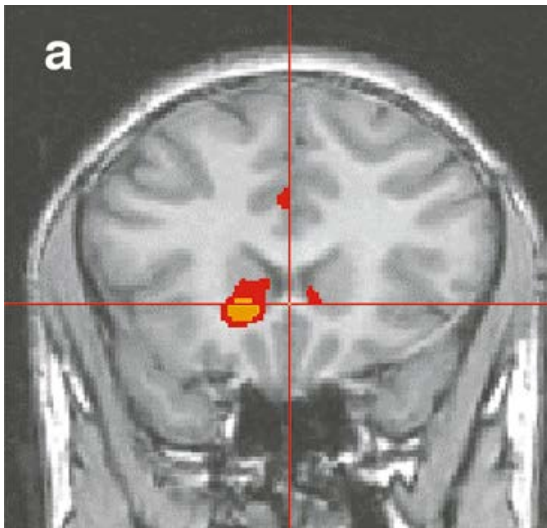
www.neuroeconomics-bonn.org



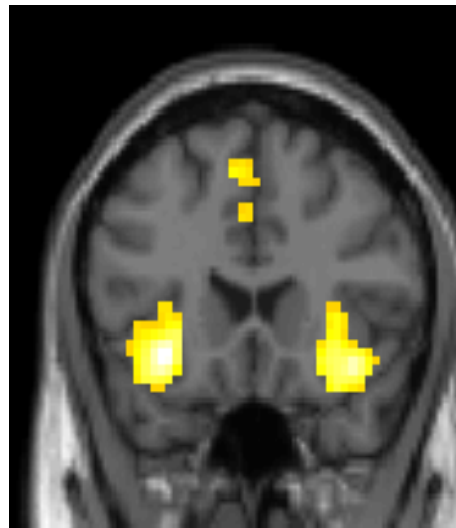
Human beings are biological entities which are influenced (constrained) by physiological factors

- In contrast, most behavioral models see humans as rational agents with unlimited cognitive resources
- This is a fundamental error:
 - Our decisions are made in the brain
 - Biological factors vary and strongly influence our decisions (stress, hunger, sleep-deprivations, darkness, excitement....)

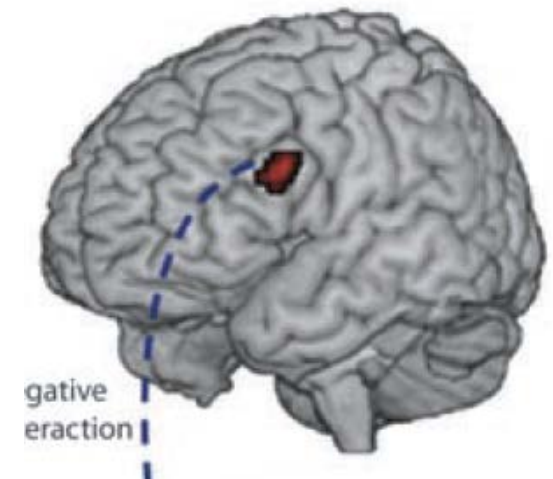
Three key systems in decision making



Reward circuitry
(adapted from Knutson et al., 2005)

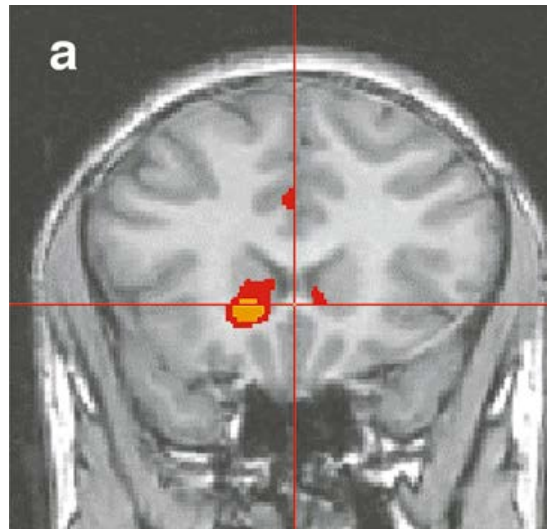


Loss aversion
(own data)



Cognitive control
(adapted from Hare et al., 2009)

Reward / Valuation System





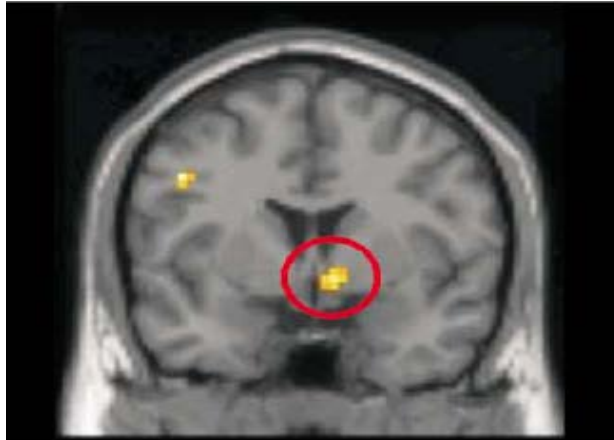
J.Olds und P.Milner, 1954

Has been described in nearly all higher species



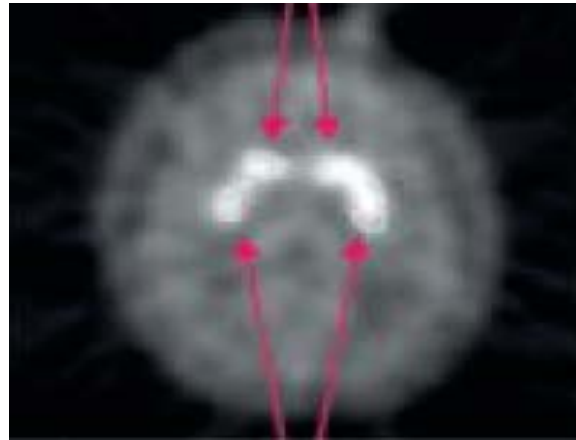
Sport Cars

(Erk et al., 2003)



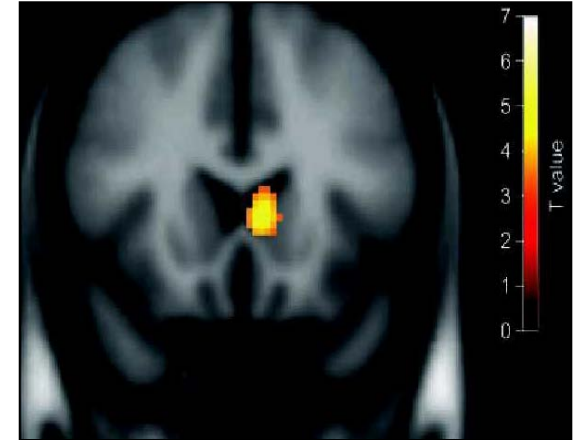
Cocaine

(Kilts et al., 2001)



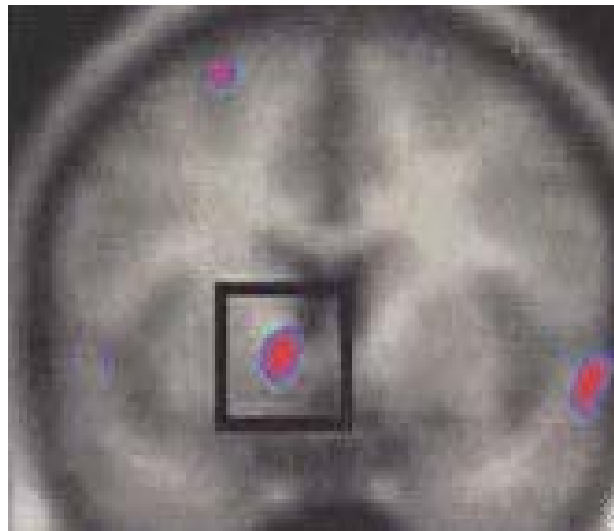
Altruistic Punishment

(de Quervain et al., 2004)



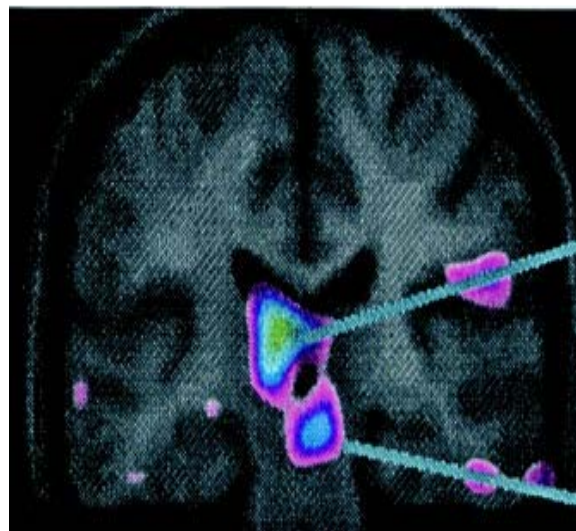
Attractiveness

(Aharon et al., 2001)



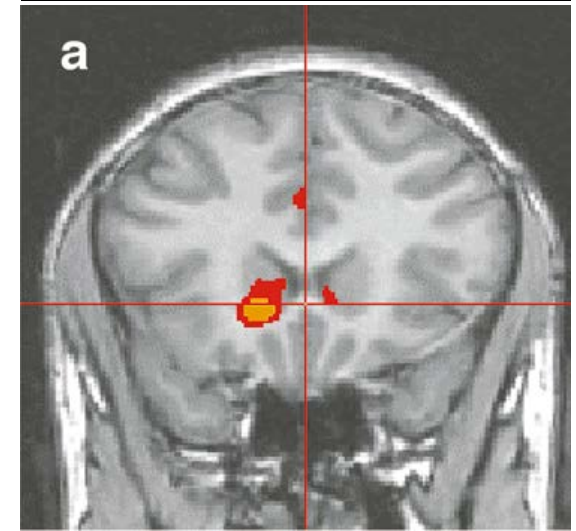
Chocolate

(Small et al., 2001)

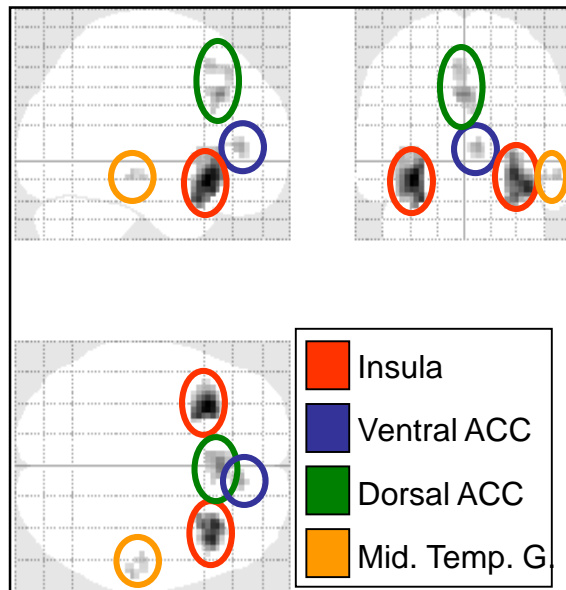


Money

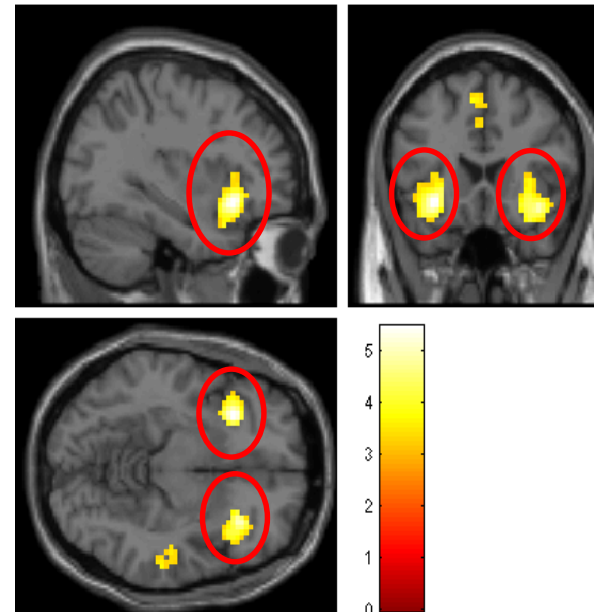
(Knutson et al., 2001)



The „pain of paying“



Loss of money



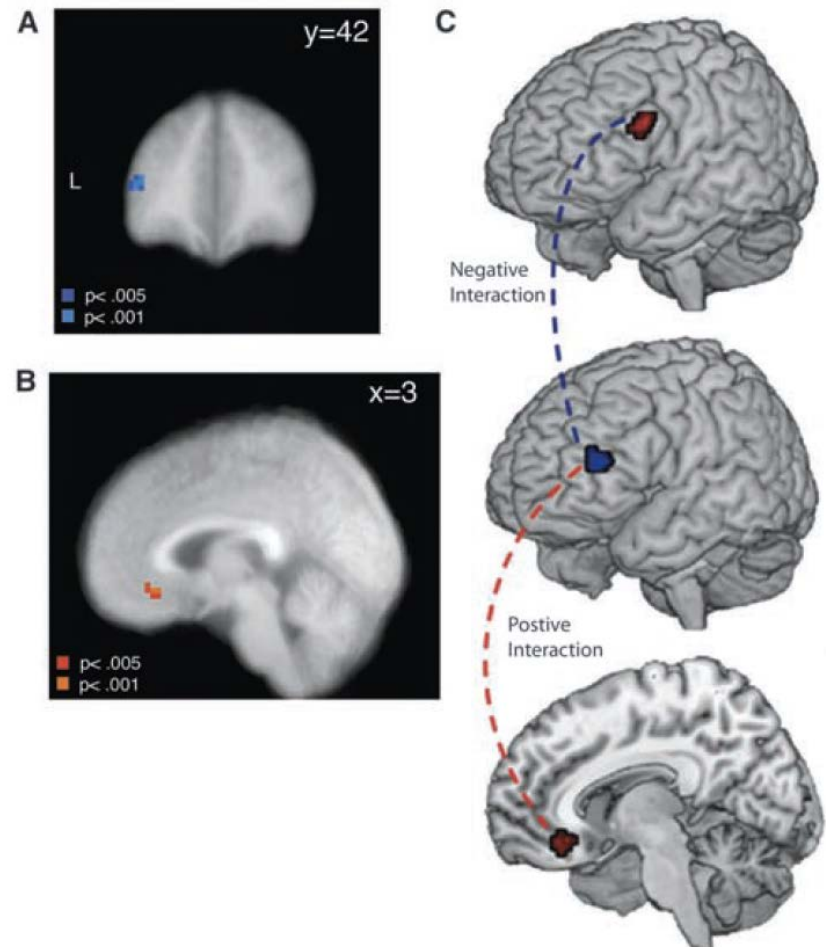
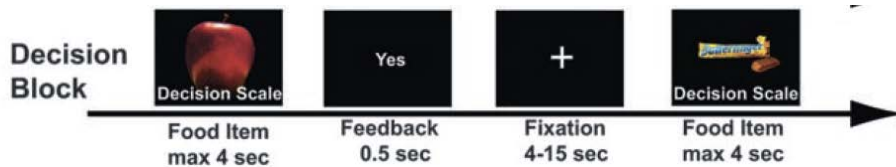
Pain perception

Loss of money leads to brain activity similar to pain perception

Cognitive Control

Self-Control in Decision-Making Involves Modulation of the vmPFC Valuation System

Todd A. Hare,^{1*} Colin F. Camerer,^{1,2} Antonio Rangel^{1,2}



Investigating Consumers with Neuroscience

Two Sides of the Coin

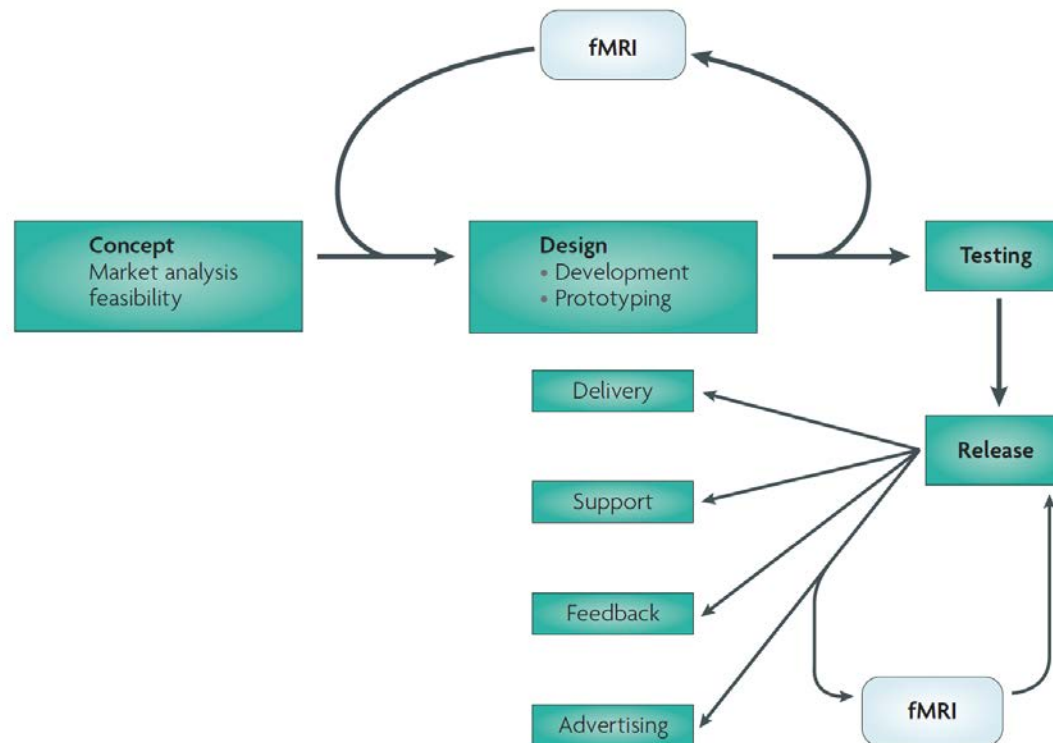
Neuromarketing

Consumer Neuroscience

Neuromarketing

Neuromarketing: the hope and hype of neuroimaging in business

Dan Ariely and Gregory S. Berns



Consumer Neuroscience

The other side of Consumer Neuroscience → understanding consumers to improve policy interventions

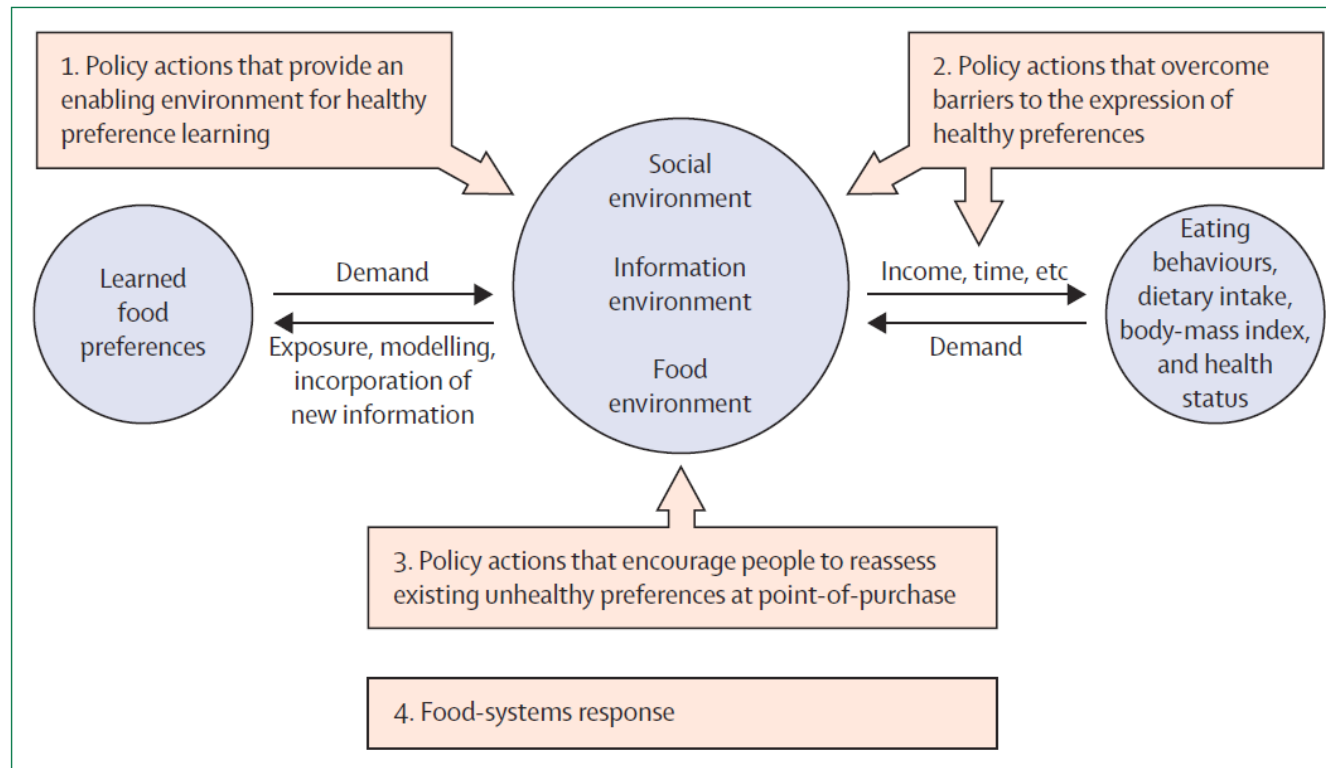
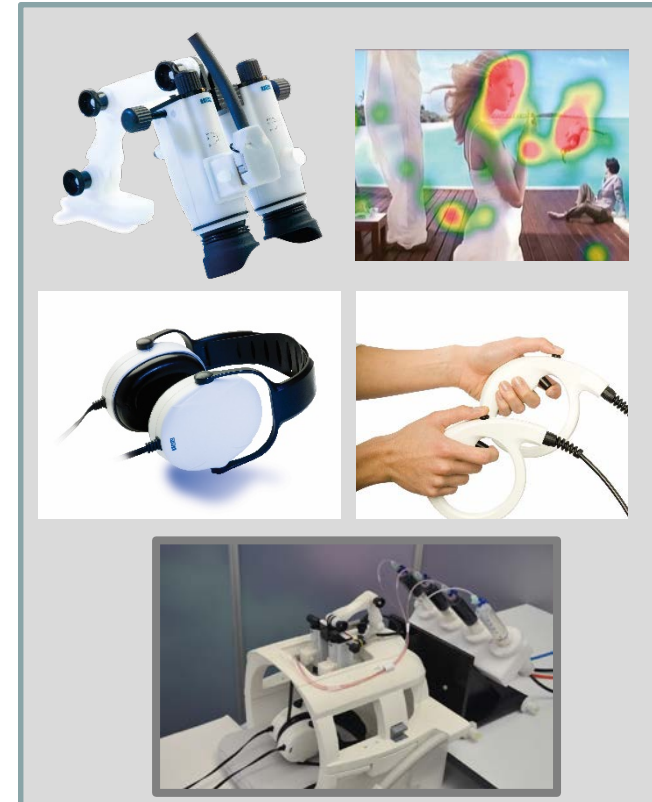
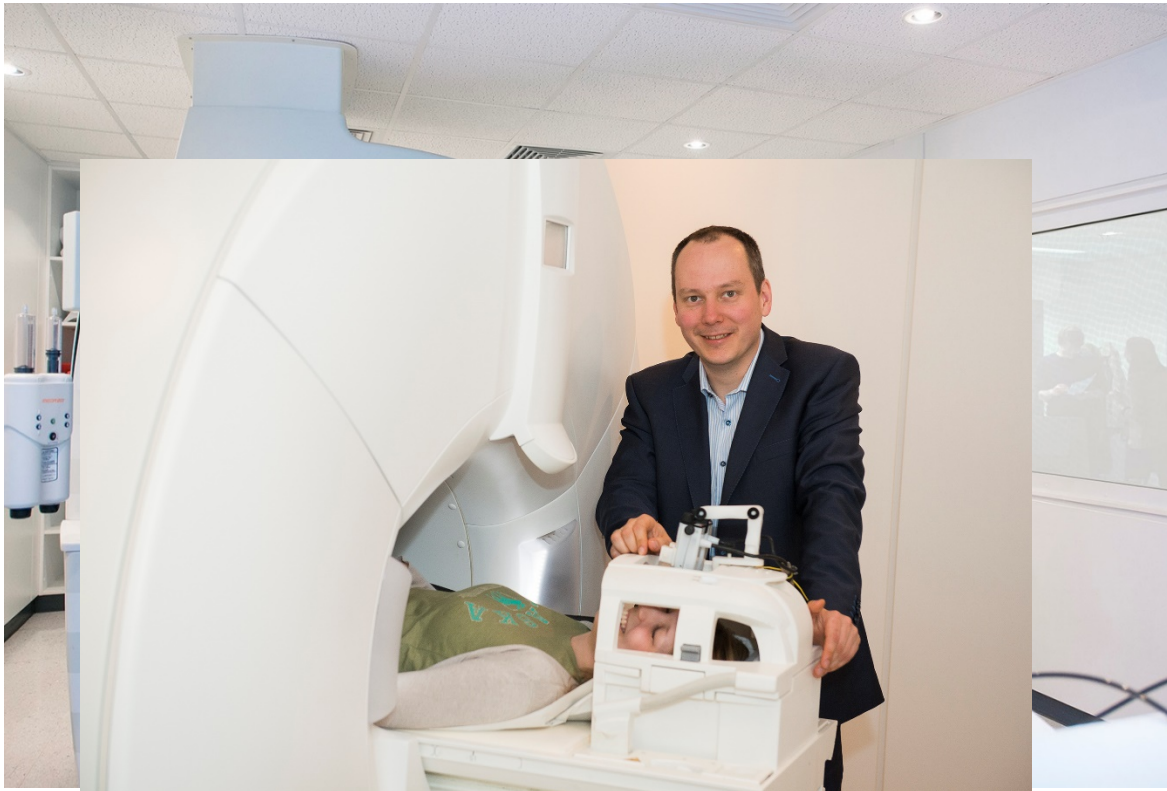


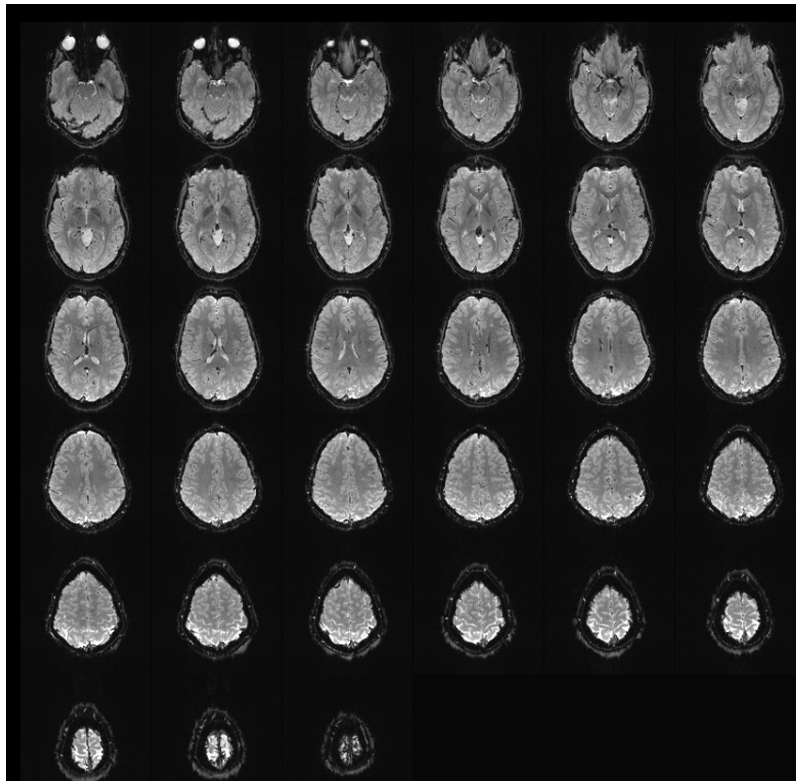
Figure: Framework of the theory of change and the four mechanisms through which food-policy actions could be expected to work

Functional MRI



fMRI

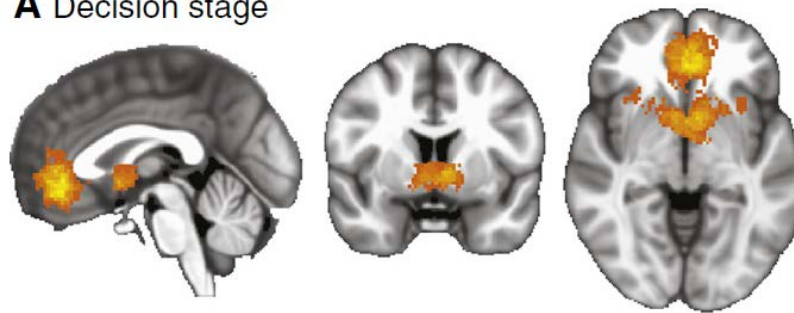
measures whole brain activity in a resolution of $\sim 3 \times 3 \times 3 \text{mm}$
every 2-3s



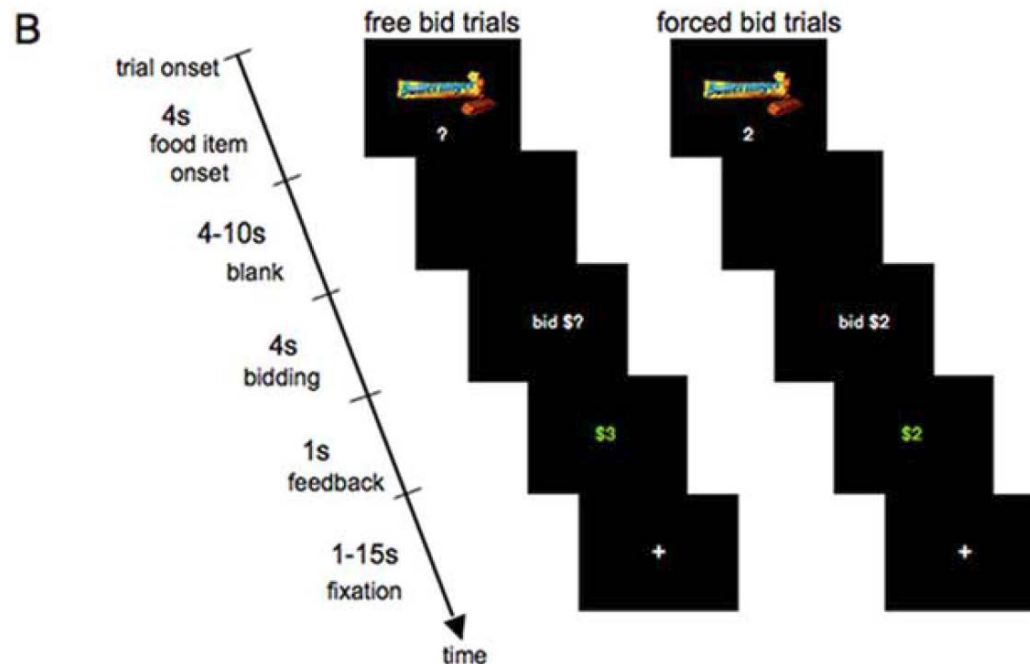
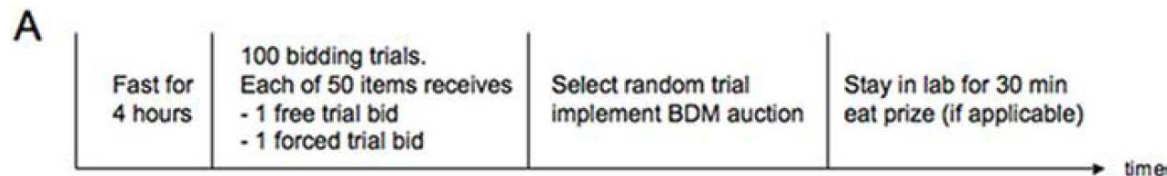
- Great spatial resolution
 - Total brain coverage
- Esp. robust signal also in “valuation” regions of the brain
 - Not portable
- Expensive investment
- *Expertise is essential*

Value – based decisions

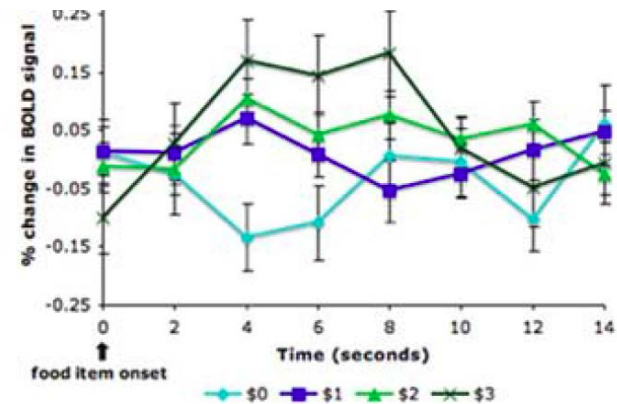
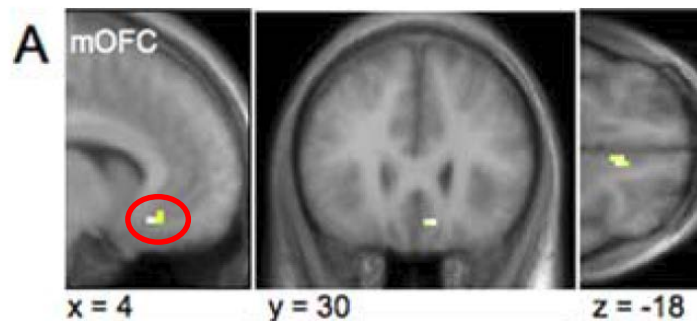
A Decision stage



Orbitofrontal Cortex Encodes Willingness to Pay in Everyday Economic Transactions



Increase in brain activity relates to willingness to pay



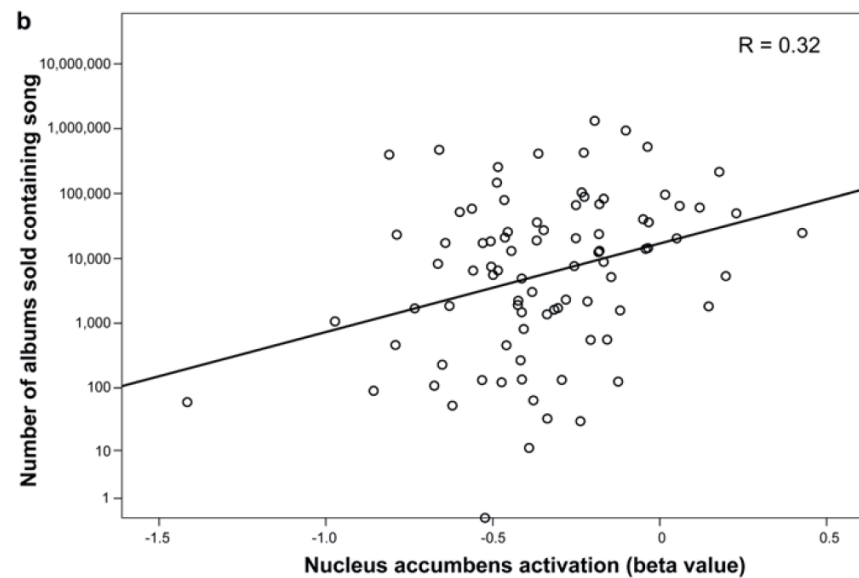
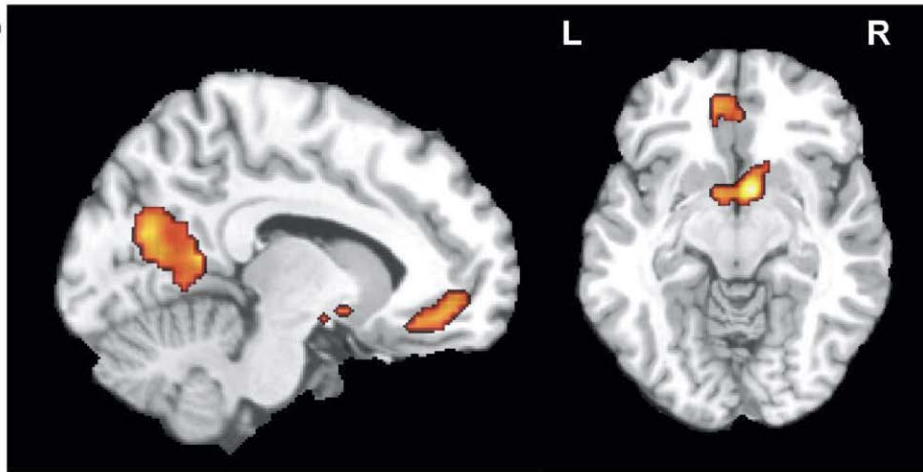
A Neural Predictor of Cultural Popularity

Gregory S. Berns¹ and Sara E. Moore¹

¹Economics Department and Center for Neuropolicy, Emory University, Atlanta, GA 30322, USA



Prediction of sales



Predicting Advertising Success Beyond Traditional Measures: New Insights from Neurophysiological Methods and Market Response Modeling

VINOD VENKATRAMAN, ANGELIKA DIMOKA, PAUL A. PAVLOU, KHOI VO, WILLIAM HAMPTON, BRYAN BOLLINGER, HAL E. HERSHFIELD, MASAKAZU ISHIHARA, and RUSSELL S. WINER*

Commercials

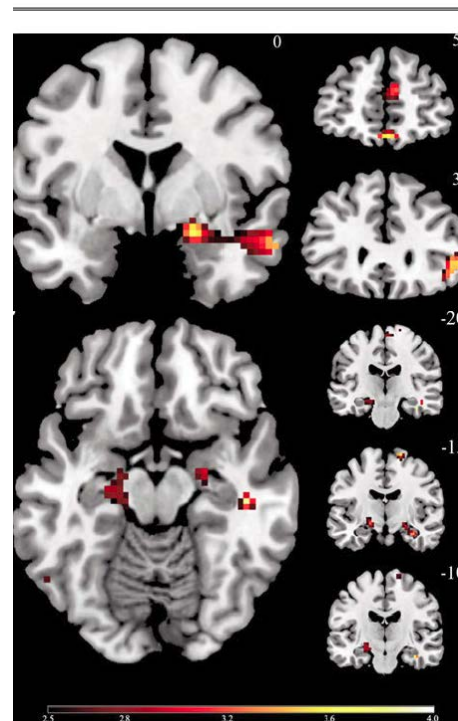
(n=37)

- Traditional Market Research
- IAT
- EEG
- fMRI
- Biometrics
- Eye-Tracking



Market Elasticity

Figure 2
NEURAL CORRELATES OF LIKING AND MEMORY FOR
TELEVISION ADS



Increase of R^2

$\sim .5 \rightarrow .85$

through fMRI

Conclusion

More importantly, we show that **predictions of advertising success** can be **substantially improved** with neurophysiological measures, **particularly fMRI**, which explained the most incremental variance in advertising elasticities beyond traditional measures.

Influence of expectations on valuation



 Deutsches 
Qualitäts-Produkt



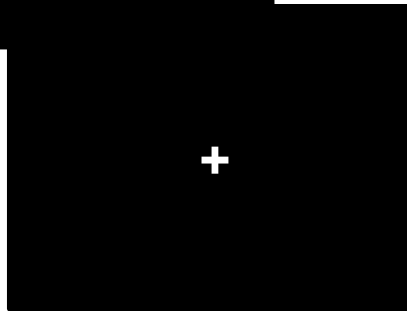
Ethics in food choice the role of fair-trade labels



Fair trial



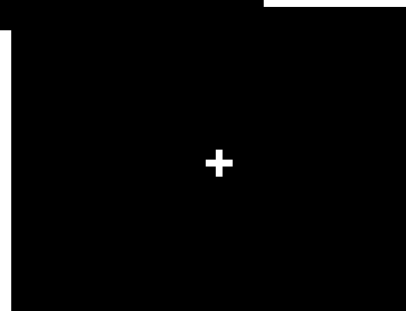
4 s



3-5 s

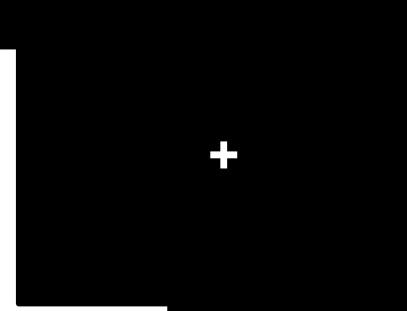


variable

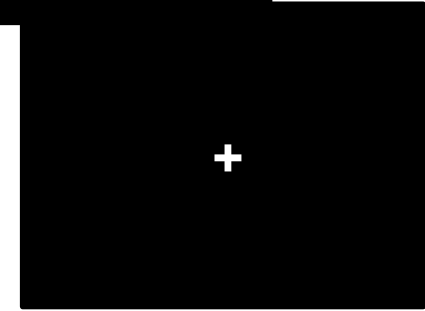


5-7 s

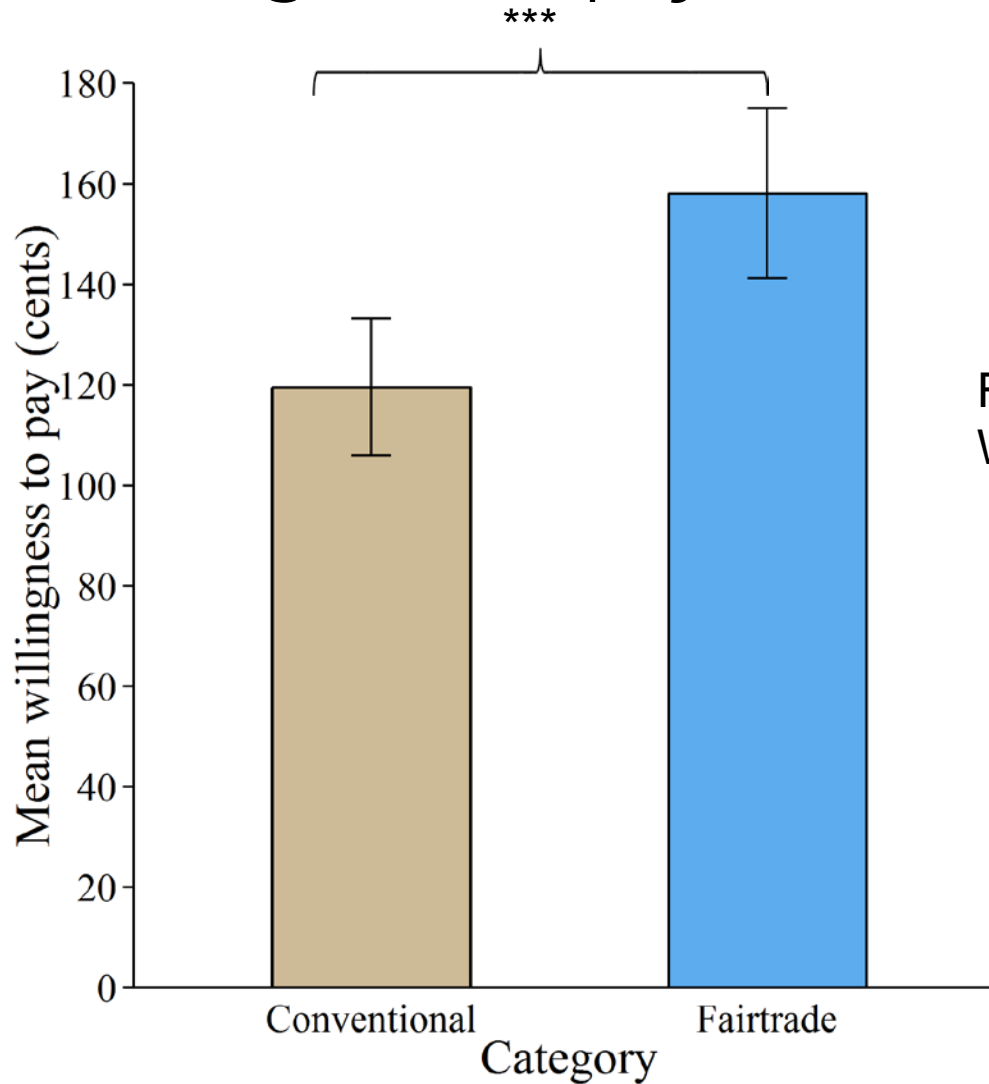
Conventional



0,50€



Increased willingness to pay for Fairtrade products

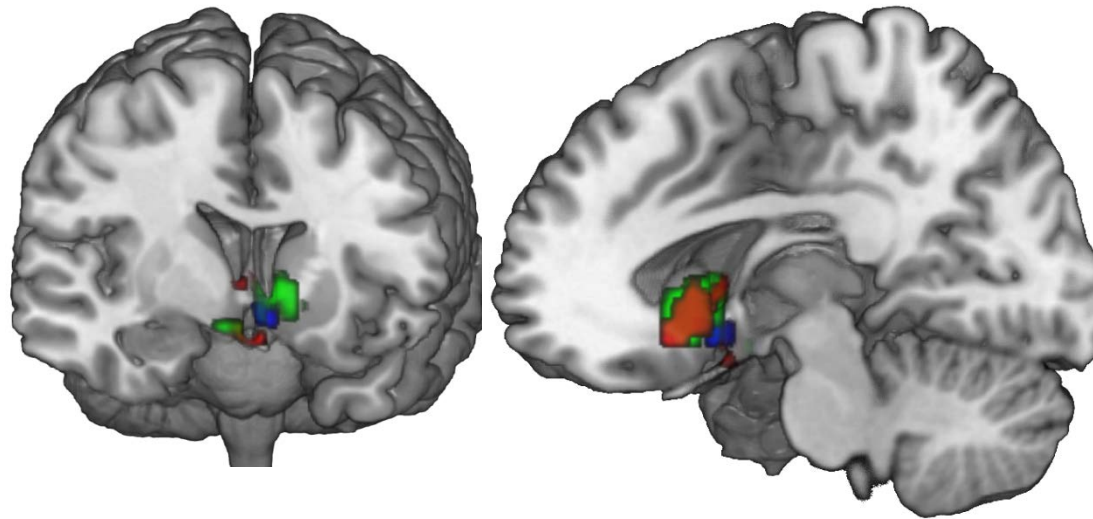


FT labeling increased
WTP by about 30%

$\chi^2(1)=193.06, p<0.001$

N = 40

Fair trade labels activate reward regions



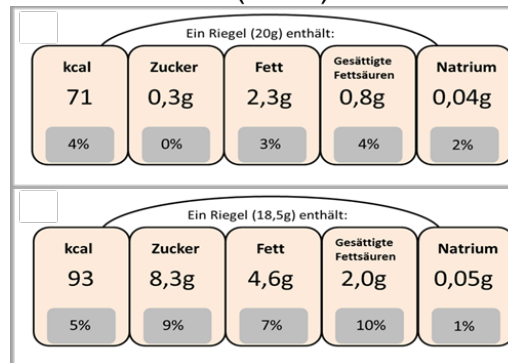
Activity in the left
ventral striatum [-9 14 -5]

$p < .005$ FWE-cor.
voxel = 105

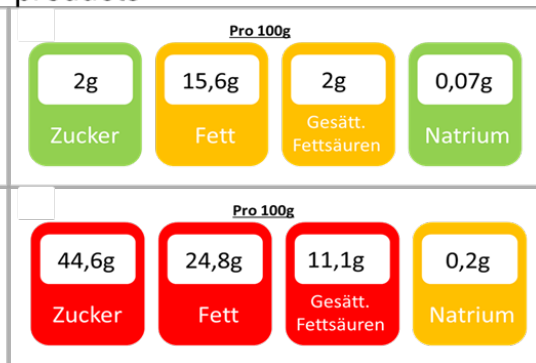
green: FT vs conv.
blue: increase of WTP for FT products
red: FT vs. conv controlled for WTP

Nutrition labels influence value computation of food products in the ventromedial prefrontal cortex

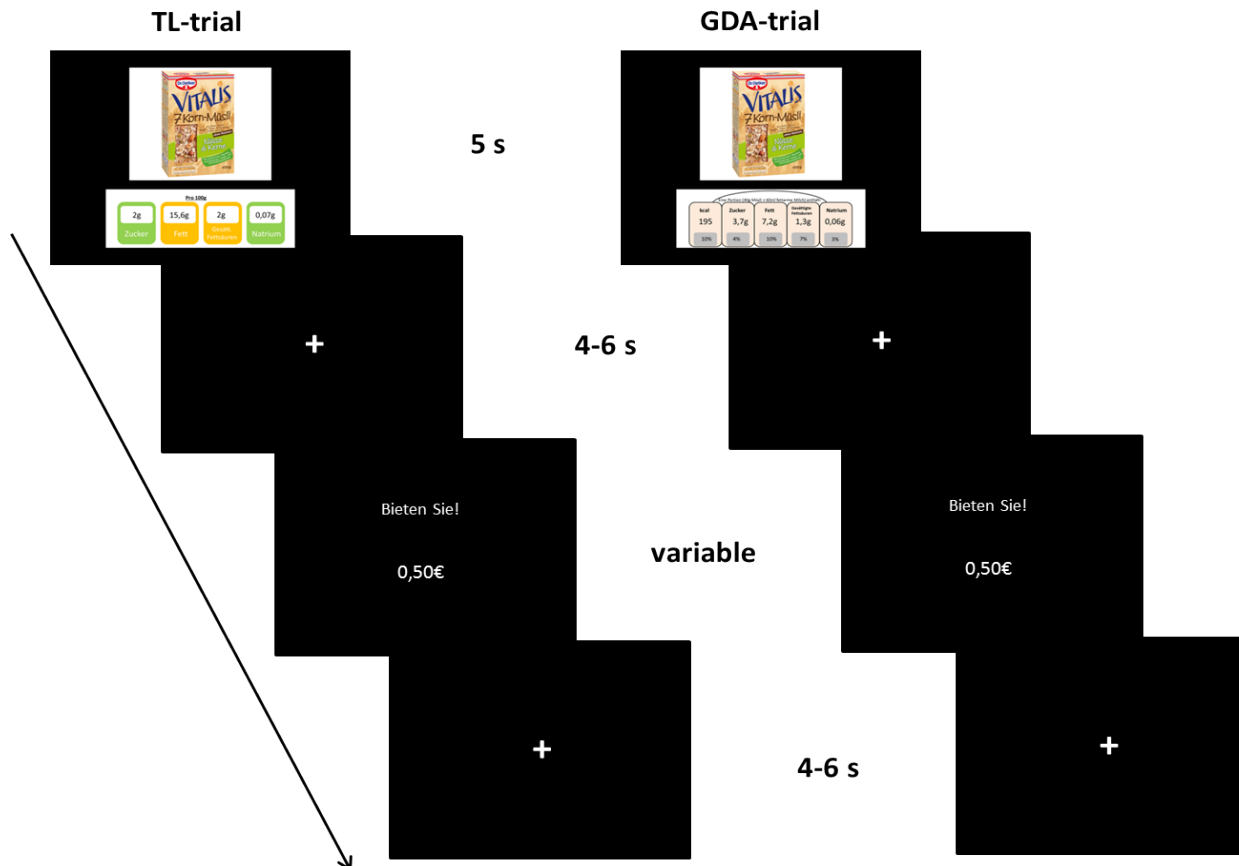
Current German guideline daily amount (GDA) label



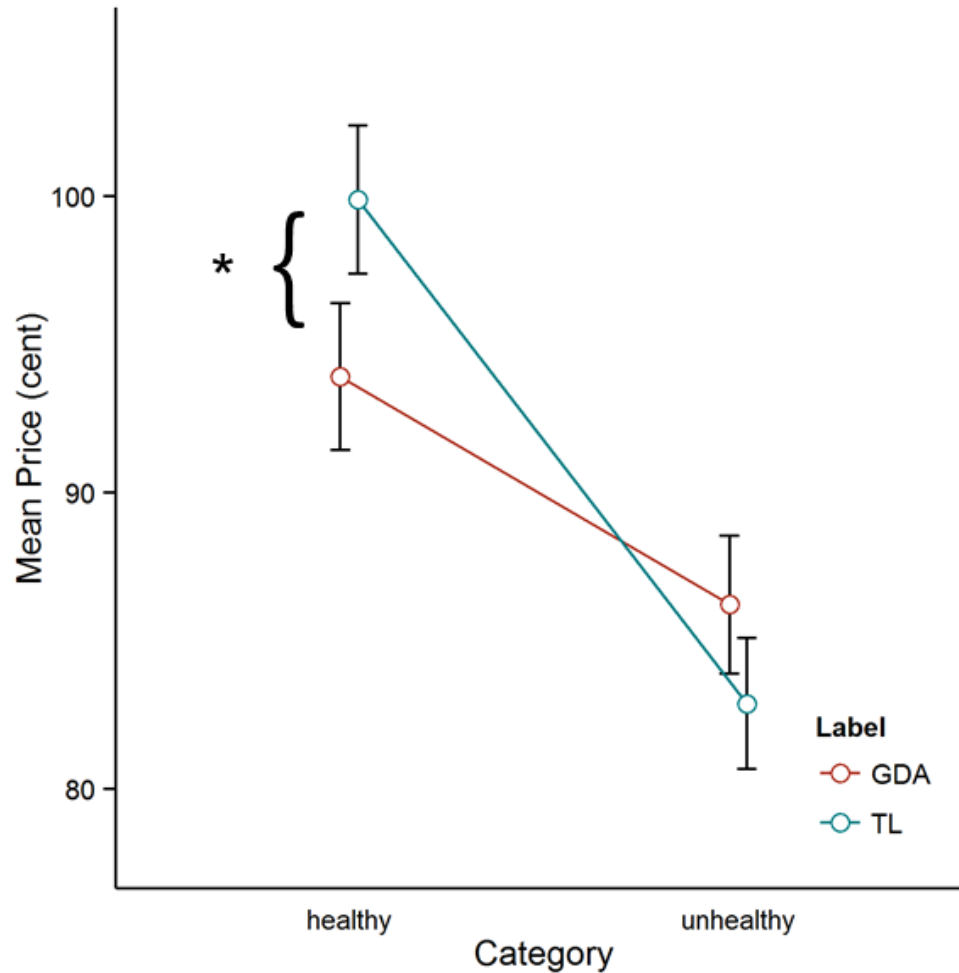
Traffic light (TL) label of the same products



- 25 subjects (age: 25.7, SD = 4.3)
- 100 food products
 - 50 high-caloric, 50 low-caloric
 - Label: traffic light (TL) or numerical (GDA label)



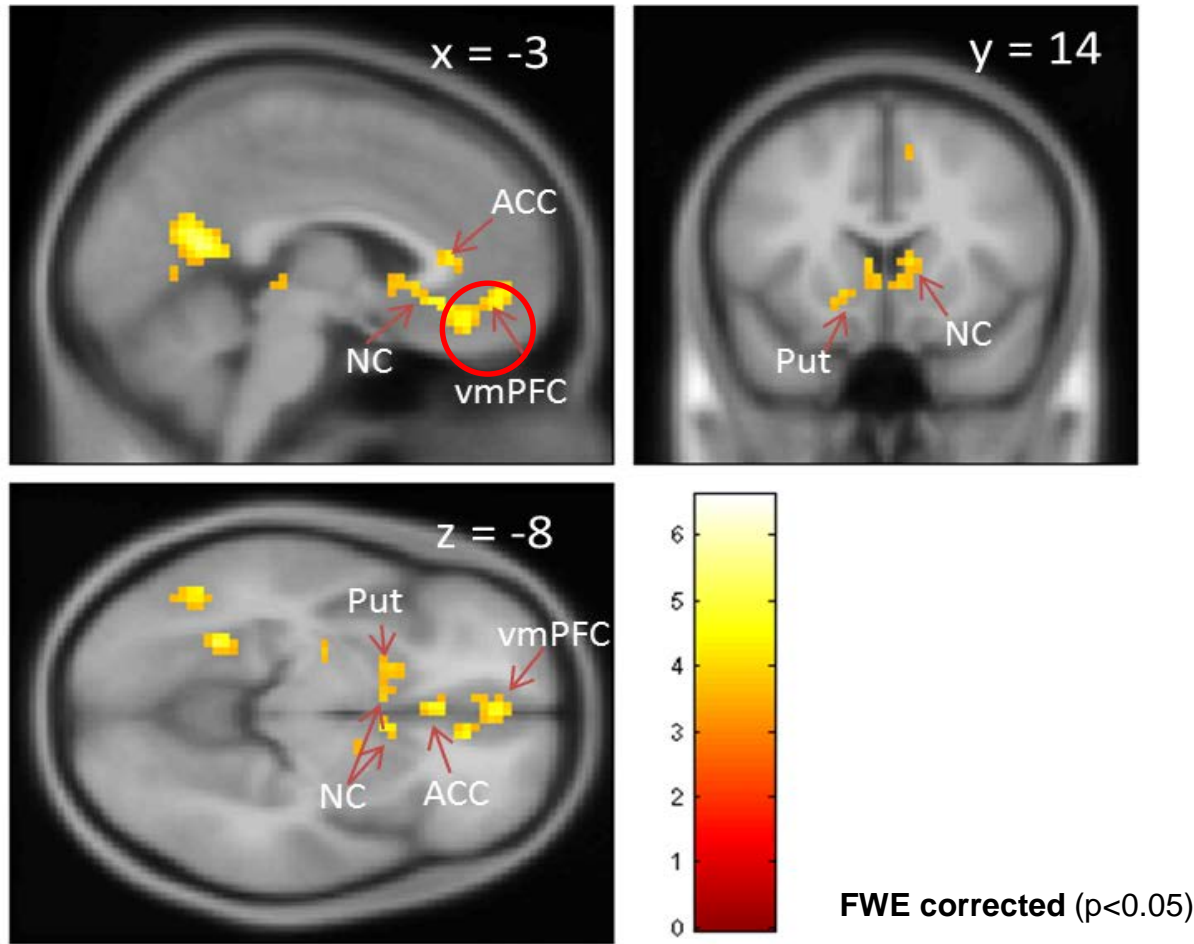
Behavior



Willingness to pay is **increased for low-calory products with green TL** and **decreased for high-calory products with red label**

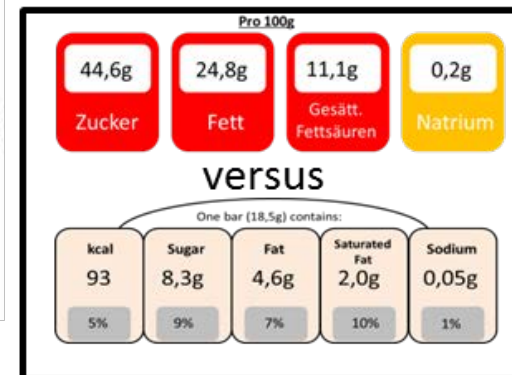
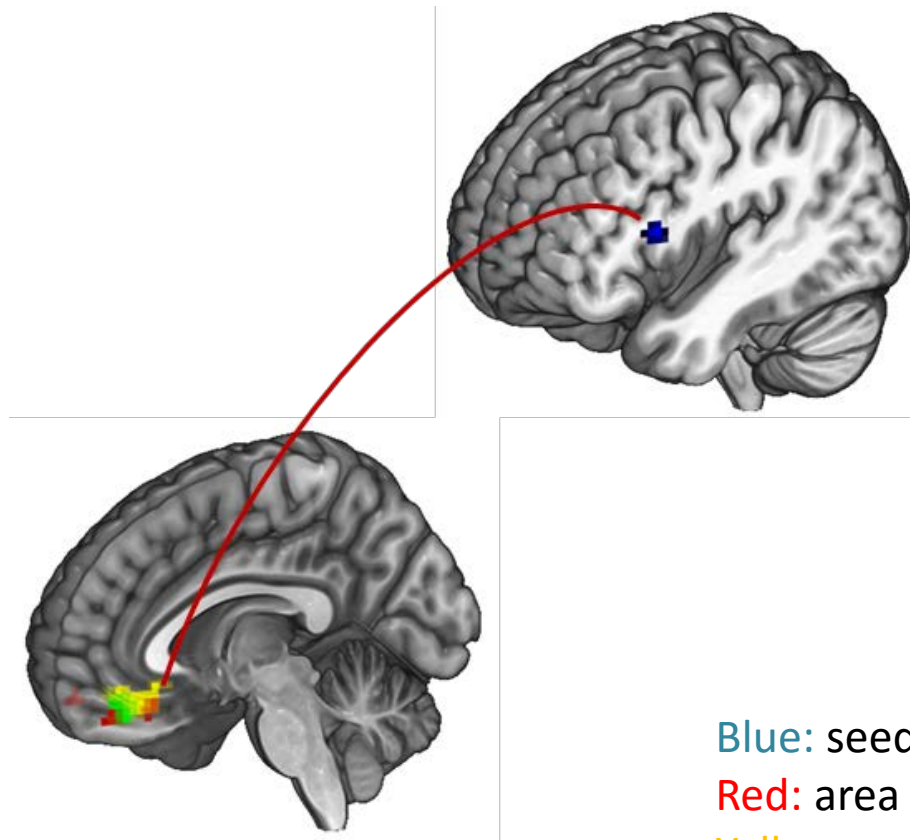
(compared to pure numerical information)

vmPFC correlates with Willingness to pay



Connectivity Analysis

Traffic light signals influence self-control



Blue: seed voxels of interest (IFG/DLPFC)

Red: area modulated by IFG/DLPFC

Yellow: vmPFC activity modulated by bids (SV)

Summary

- Neuromarketing *adds knowledge* about behavior and biology to market research
- It is *essential to have a profound knowledge* of the methods
- *Functional MRI* is able to *enhance the prediction* of market impact of commercials (claims/packaging designs) *beyond traditional measures*.
- External cues influence the valuation, experience and consumption of products



Thank you

bweber@lifeandbrain.com