

Unveiling the Multimedia Unconscious: Implicit Cognitive Processes and Multimedia Content Analysis

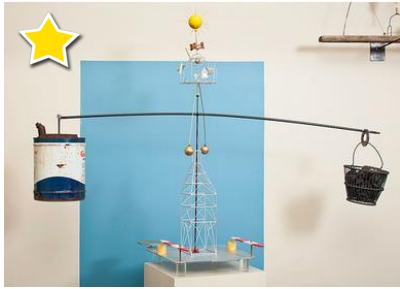


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Outline

- The new role of multimedia
- The Brunswick Lens
- Experiments on images
- Conclusions

The New Role of Multimedia

flickr 87M users: 2K views each user, each day

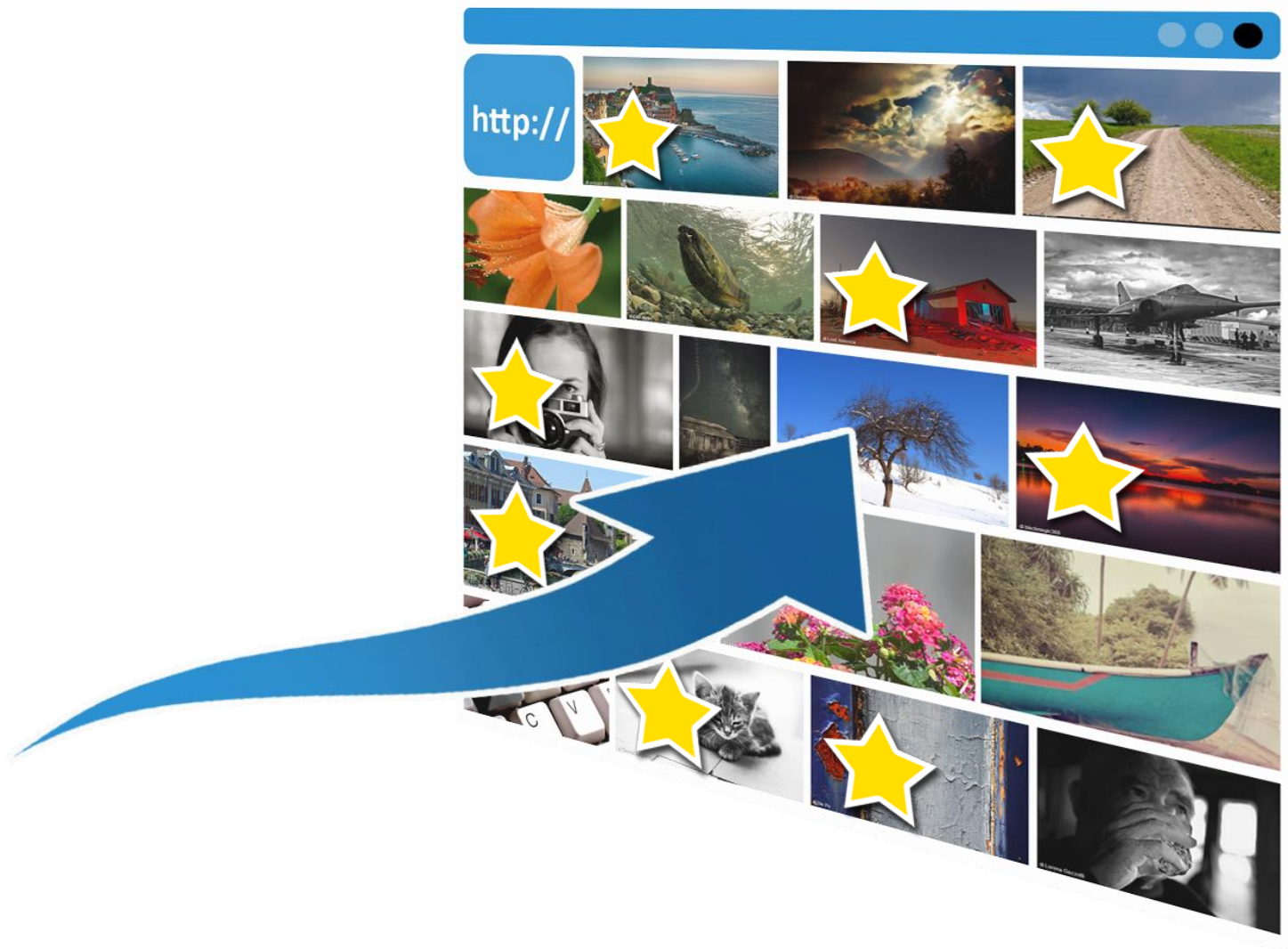
You Tube 14M people share, like, comment, each day

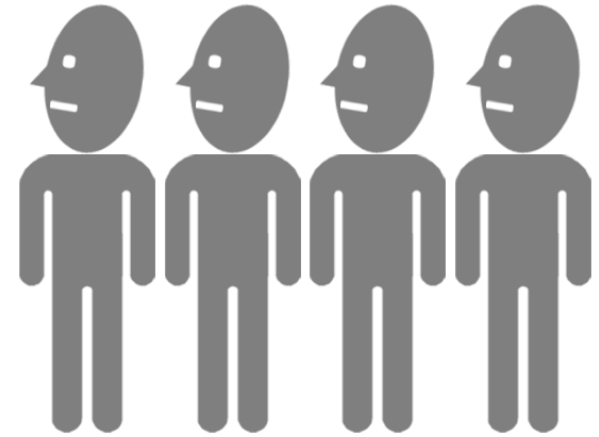
Instagram 55M photo uploads per day, 1.2B likes each day

Way to transmit information

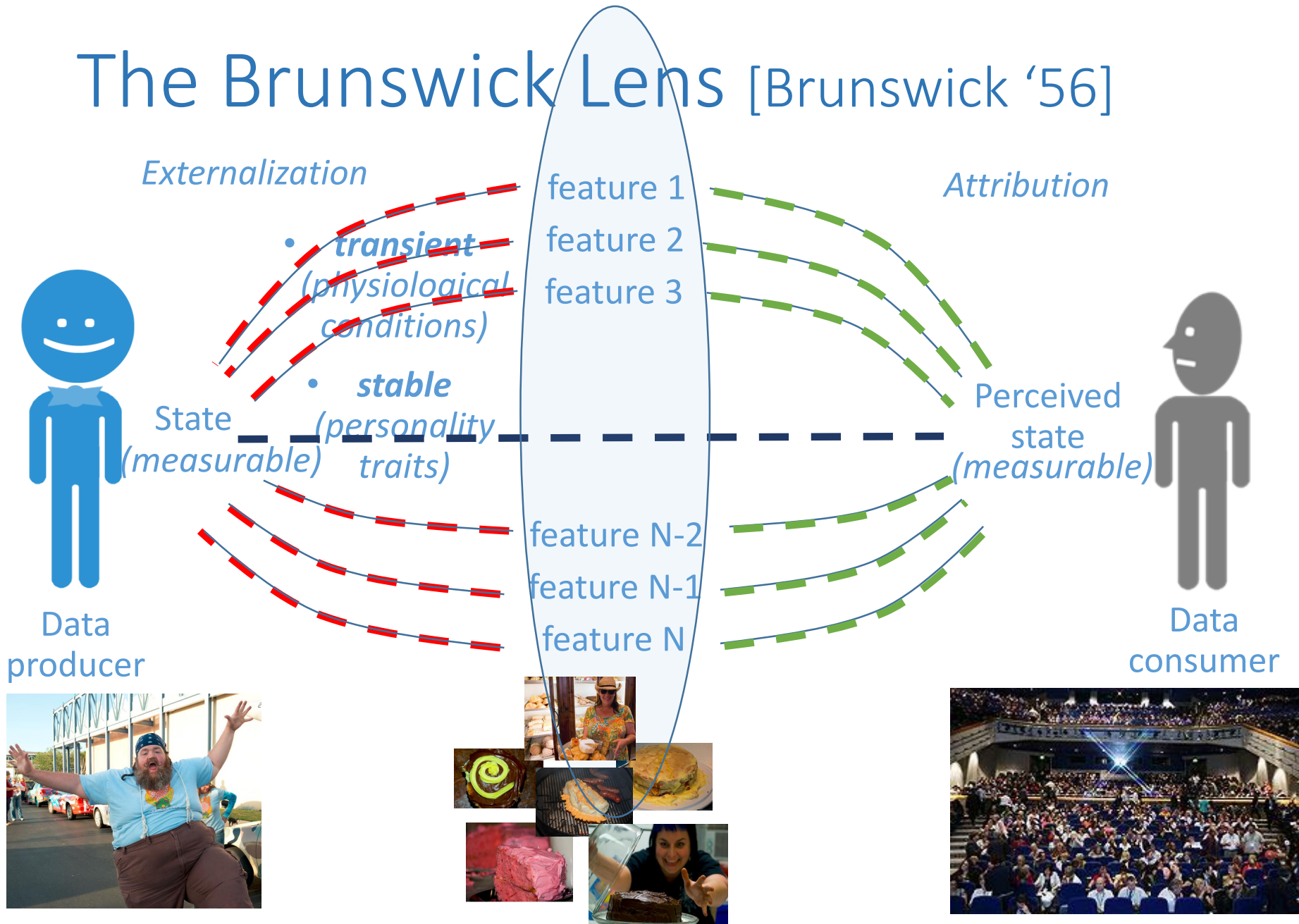


Channel for *human-human interaction*





The Brunswick Lens [Brunswick '56]



Experiments on Images

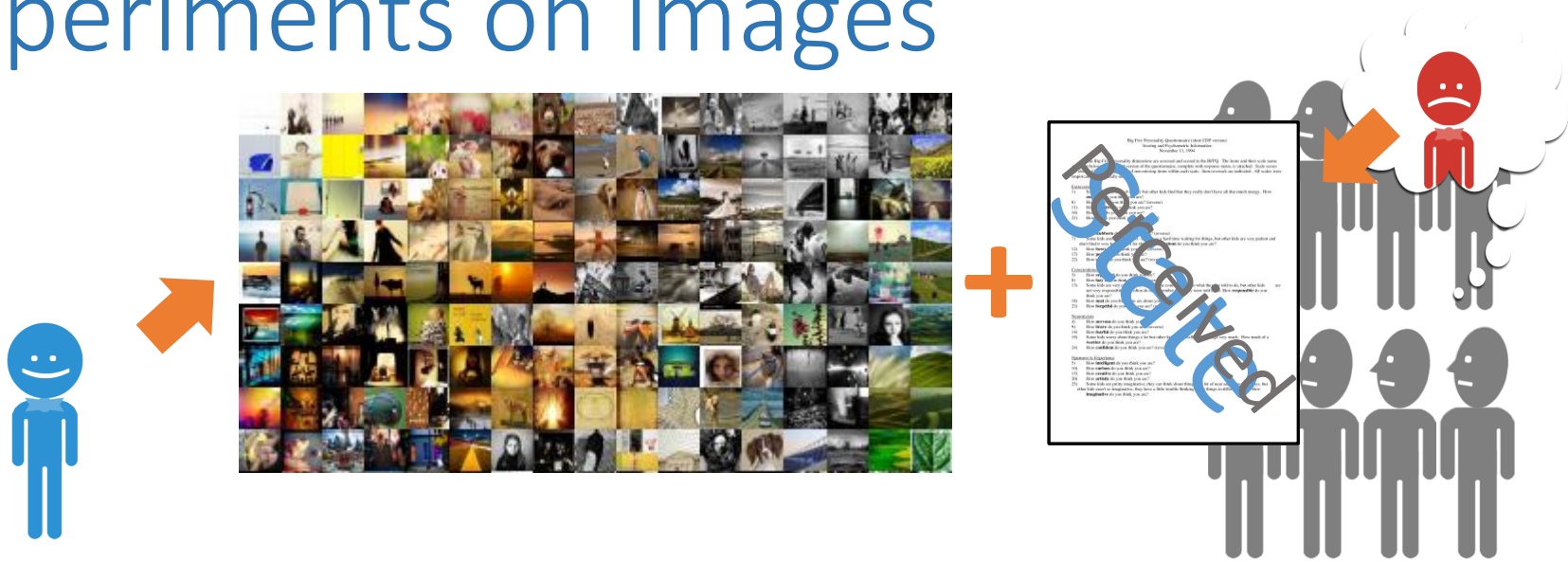


- 300 Flickr professional users (the *data producer*)
- For each user:
 - Take 200 random *faved* images, from which we extract
 - 15 computational aesthetic features [Datta '06]
 - 14 objects, scenes [Felzenszwalb et al. '10,Oliva et al. '01]
 - Let him fill a personality questionnaire (the Big Five Inventory 10)
 - It gives **5 scores** (-4...4) for the personality traits of *Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism* → the State

The Big Five

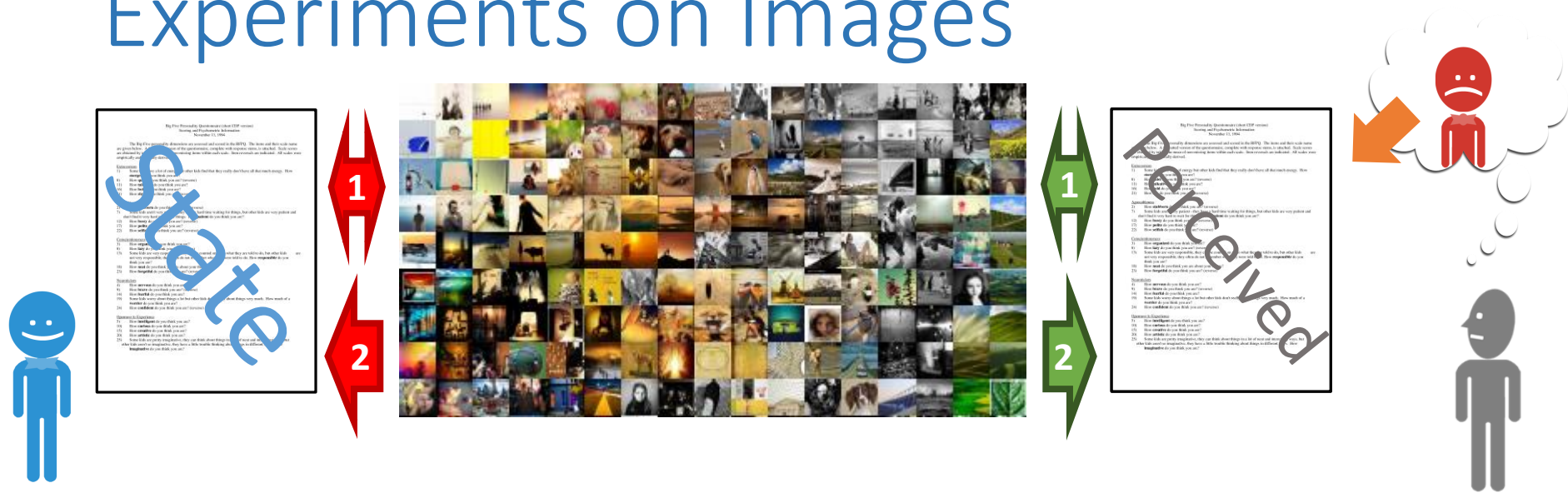
- *Openness*: intellectually open, curious, wide interests
- *Conscientiousness*: responsible, reliable and trustworthy
- *Extraversion*: interact and spend time with others
- *Agreeableness*: kind, generous
- *Neuroticism*: anxious, sensitive

Experiments on Images



- 8 assessors (the *data consumer*)
- For each assessor:
 - Check the 200 favorites of each user
 - For each user, fill the BFI questionnaire, *inferring how the user could be!*
 - We check homogeneity in the scores and the average of the test was computed. → Perceived State

Experiments on Images



- At this point we want to:
 1. Measure *correlations* **state**/perc. state, *state/feats*, *perc. state/feats*
 2. Given the faved pictures of a user
 - infer the **state**
 - infer the *perceived state*

Experiments - Correlations

Corr. state/perceived state ≤ 0.17



	0.14	Size Regions	0.27
	-0.15	Hue Ang. Disp.	-0.28
<i>Openness</i>	-0.14	Blue	-0.15
	-0.13	Texture L1 ch.H	-0.19
	-0.13	Texture L3 ch.V	-0.13
	-0.13	#Faces	-0.27
<i>Cosciousness</i>	0.12	Dominance	0.31
	-0.13	Colorfulness	-0.24
	0.12	#People	0.52
<i>Extraversion</i>	0.12	Size People	0.40
	0.16	# Faces	0.46
<i>Agreeableness</i>	0.15	# Cars	0.17
<i>Neuroticism</i>	-0.13	Purple	-0.25

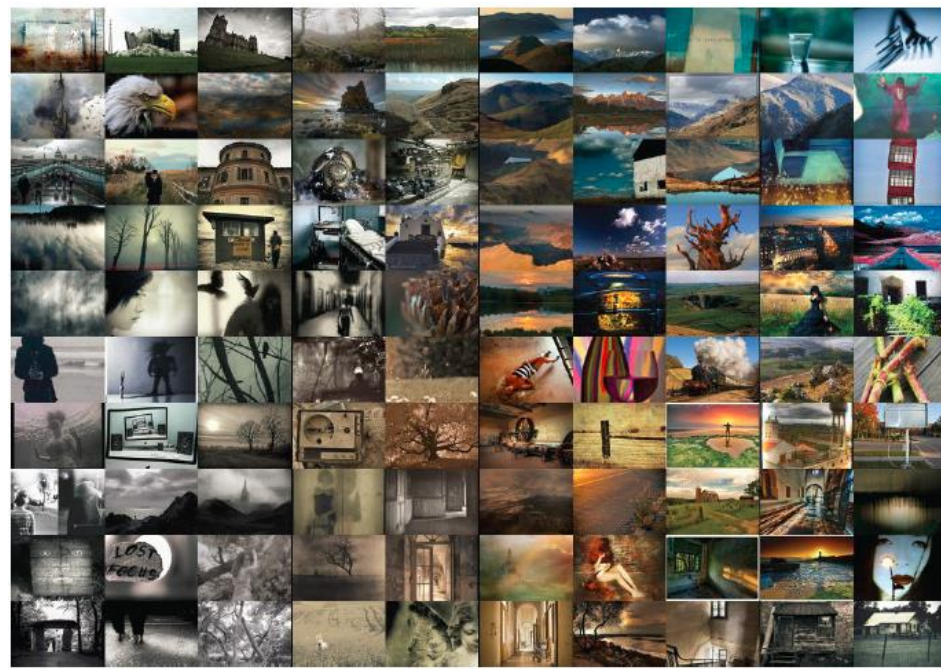
state/feats

perceived state/feats

Extraversion



(perceived) High



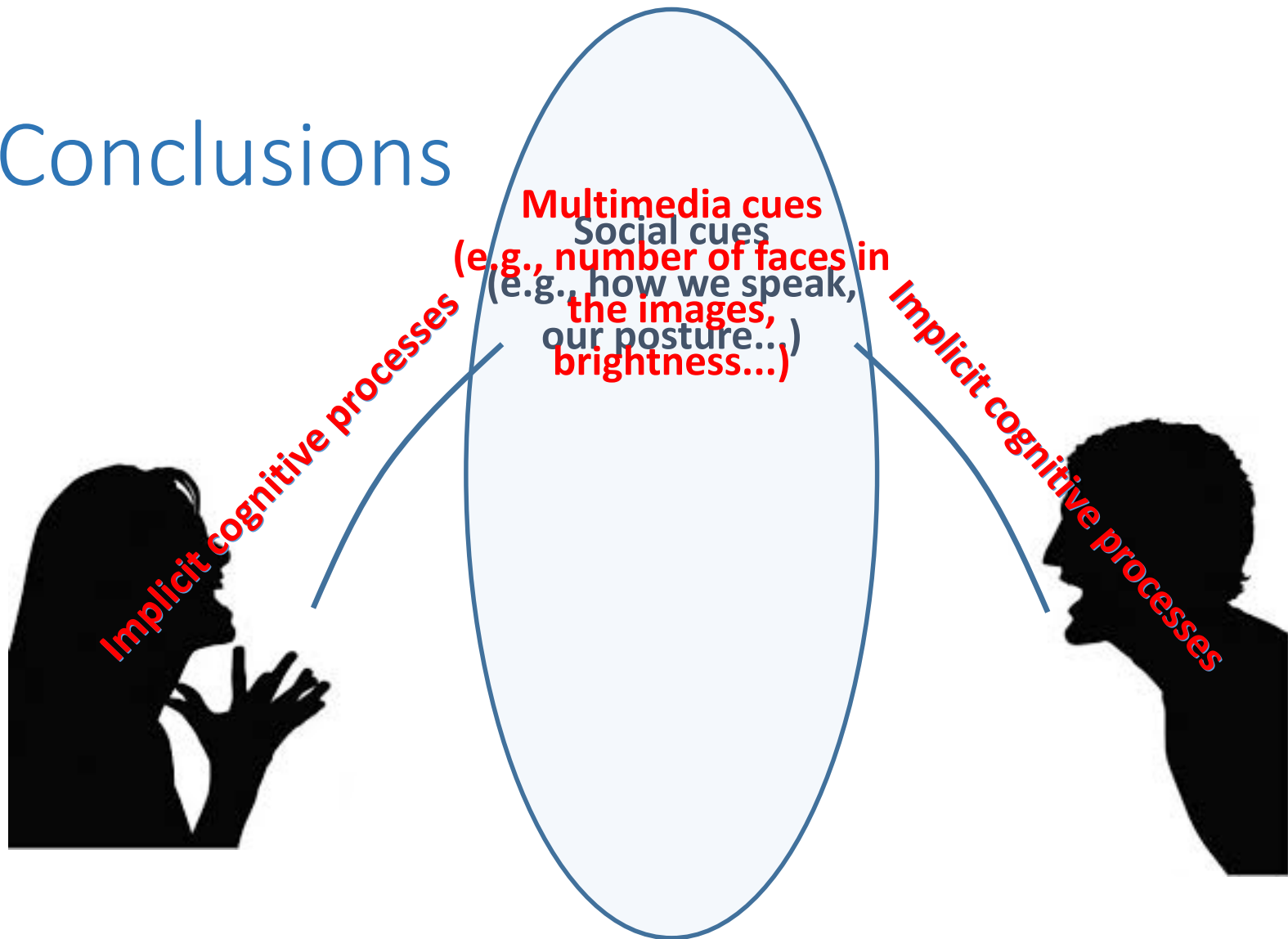
(perceived) Low

Experiments – Personality Inference

- Regression approach (see the paper), 1-user-out
- Correlation between the regr. output / state labels

Traits	Label	Correlation
<i>Openness</i>	STATE PERCEIVED	0.25 0.35
<i>Coscientiousness</i>	STATE PERCEIVED	0.24 0.57
<i>Extraversion</i>	STATE PERCEIVED	0.28 0.62
<i>Agreeableness</i>	STATE PERCEIVED	0.20 0.52
<i>Neuroticism</i>	STATE PERCEIVED	0.14 0.60

Conclusions



Social Signal Processing [Kinciarelli *et al.* 2008] **Our work**

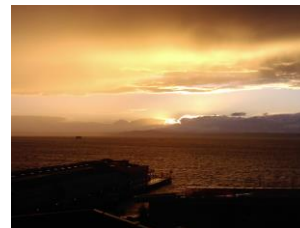
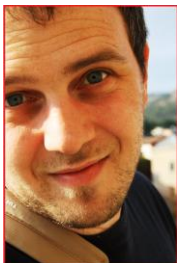
Conclusions - Potential Applications

- In Multimedia
 - recommendation systems
 - marketing
 - computational aesthetics
- In CVPR
 - feature learning

Conclusions - Open Questions

- What do we reveal about ourselves when we share multimedia data?
- Is it possible to improve multimedia technologies by taking into account implicit cognitive processes?
- Once we are aware that our implicit cognitive processes can be encoded, how do we change our behavior with respect to the multimedia data?

Our preferred images... what do you guess?



Thanks!!!

Experiments – Personality inference

- After feature extraction
- Low-dimensional projection of the features on a 2D manifold via **Counting Grids** [Perina et al. '11]
- Regression on the personality traits via **LASSO** [Tibshirani '94]

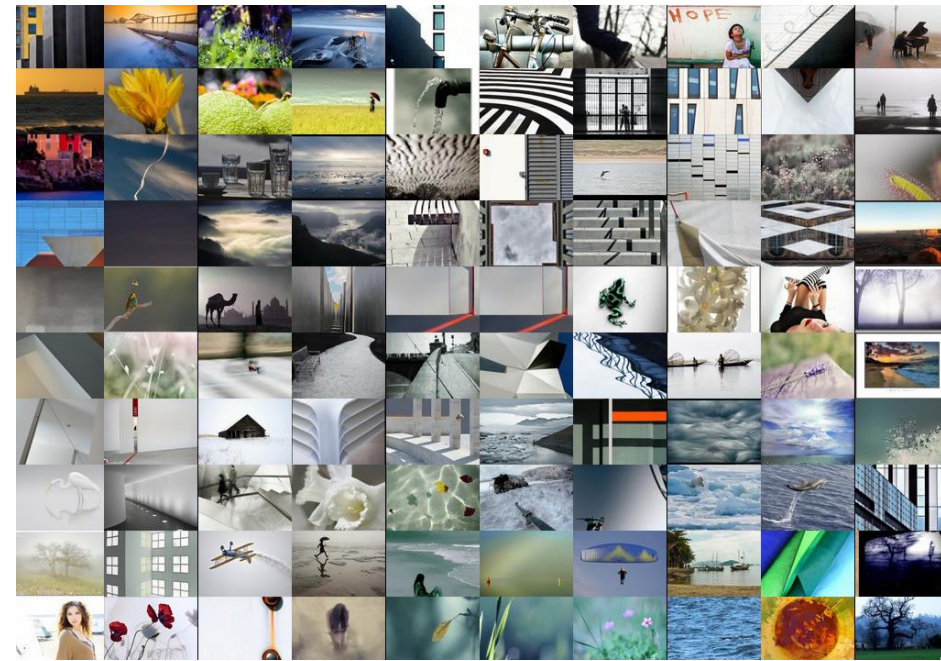
Coscientiousness



-0.13
0.12
-0.13

#Faces
Dominance
Colorfulness

-0.27
0.31
-0.24



High



Low

Regression Results

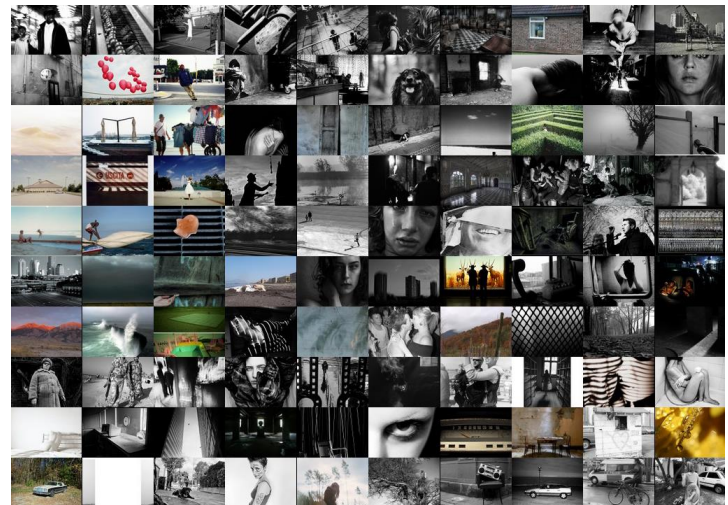
Traits	Label	Max corr.	Mean (std) corr	% s.s
<i>Openness</i>	SELF	0.25	0.17 (0.04)	100%
	PERC.	0.35	0.32 (0.04)	100%
<i>Coscientiousness</i>	SELF	0.24	0.22 (0.03)	44%
	PERC.	0.57	0.49 (0.05)	100%
<i>Extraversion</i>	SELF	0.28	0.19 (0.05)	88%
	PERC.	0.62	0.55 (0.03)	100%
<i>Agreeableness</i>	SELF	0.20	0.17 (0.03)	55%
	PERC.	0.52	0.45 (0.05)	100%
<i>Neuroticism</i>	SELF	0.14	0.12 (0.07)	7%
	PERC.	0.60	0.54 (0.04)	100%

Conclusions - Potential applications

- In multimedia
 - Recommendation systems
 - Marketing
 - Computational Aesthetics
- In CVPR
 - Feature Learning
 - Example: *Agreeableness*



HIGH



LOW

The new role of multimedia

flickr 87M users: 3 uploads per day, 2K views per day

You Tube 14M people share, like, comment per day

Instagram 55M photo uploads per day, 1.2B likes per day

Way to transmit information



Channel for *human-human interaction*