



# Sensory Perception and Facial Reactions of Basic Tastes

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# Background

rest

water

sweet

sour

bitter



liking

disgust

*(Steiner, 1979)*



bitter

bitter (mid face)

sweet



gape

grimace  
nose wrinkle

”smile”

(Steiner et al, 2001)



# Identification



sweet



sour



bitter

*neutral*

salt

*neutral*

umami

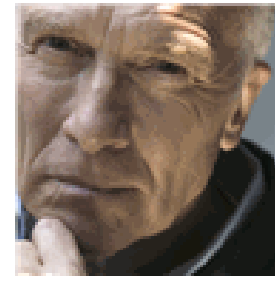
- Sensory quality cannot be distinguished by facial reactions alone
- For characterisation sensory methodology can be used

(Steiner, 1979)



# Hedonics / Emotions

- Facial reactions are intense in negative emotions, such as disgust
- Facial reactions are neutral/of low intensity in neutral positive emotions, such as pleasantness
- Sensory methodology can be used to measure hedonics/emotions, such as liking, pleasantness etc



# Aim

The aim of this study was to explore relationships between perception (identification, intensity and pleasantness) and facial reactions of basic taste solutions in different concentrations



# Material

<b>taste</b>	<b>compound</b>
sweet	sucrose
salt	sodium chloride
sour	citric acid
bitter	caffeine monohydrate
umami	sodium glutamate

concentrations: 1.0xISO, 2.0xISO and 4.0xISO  
water

21 selected, but untrained assessors  
3 replicates



# Methods

- Observation by film
- Questionnaires: identification  
intensity (9-point scale)  
pleasantness (9-point scale)



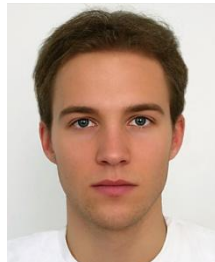
# FACS (Facial Action Coding System)

FACS describes all visual distinguishable facial activity on the basis of 44 unique action units

FACS is anatomically based, but there is not 1:1 correspondence between muscle groups and action units

The facial reactions in this study were based on FACS

The facial reactions of were coded and analysed by the use of a 9-point scale by two independent evaluators



# Reactions evaluated

reaction	highest intensity (=9)
frown	
eye widening	
eye diminishing	



# Reactions evaluated

reaction	highest intensity (=9)
nose wrinkle	
nostril widening	
lips pressed	





# Reactions evaluated

reaction	highest intensity (=9)
lips pursed	
lip corner up	
lip corner down	



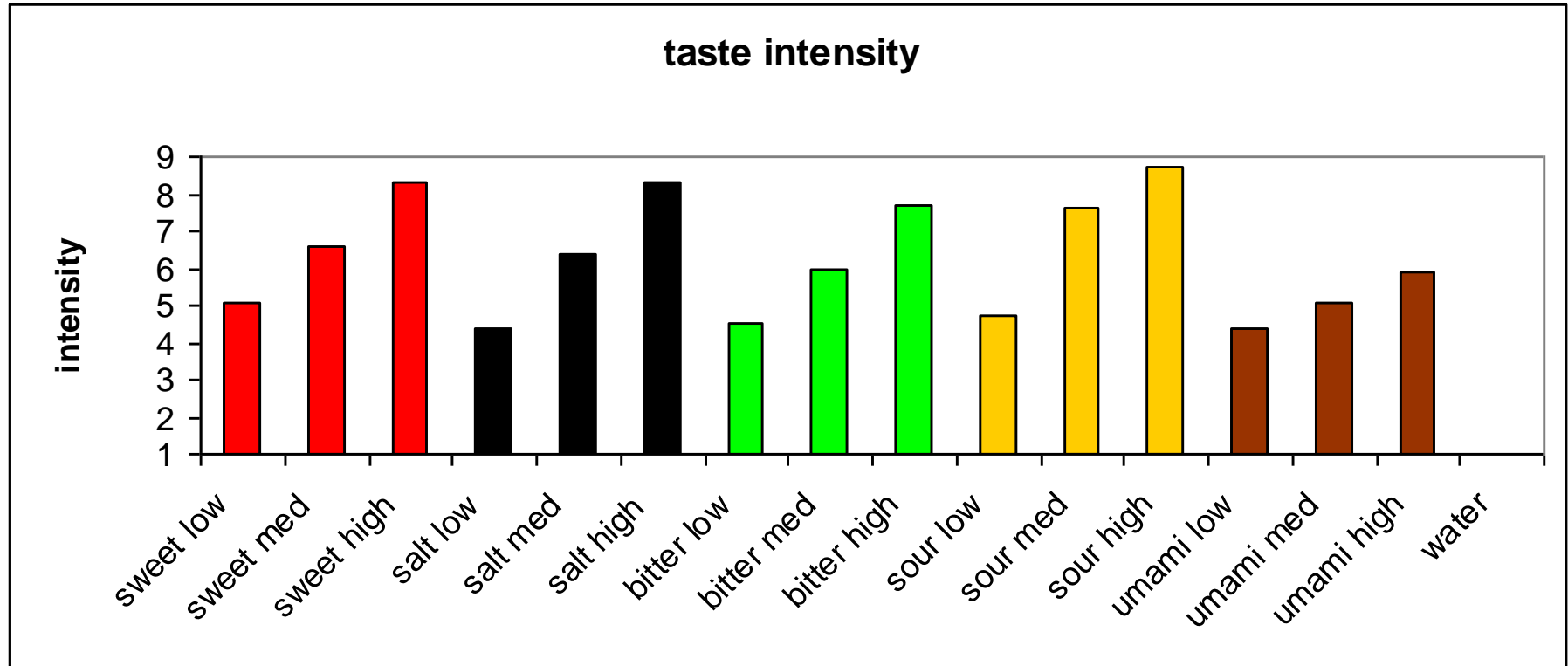
# Reactions evaluated

reaction	highest intensity (=9)
mouth opening	
tongue out	



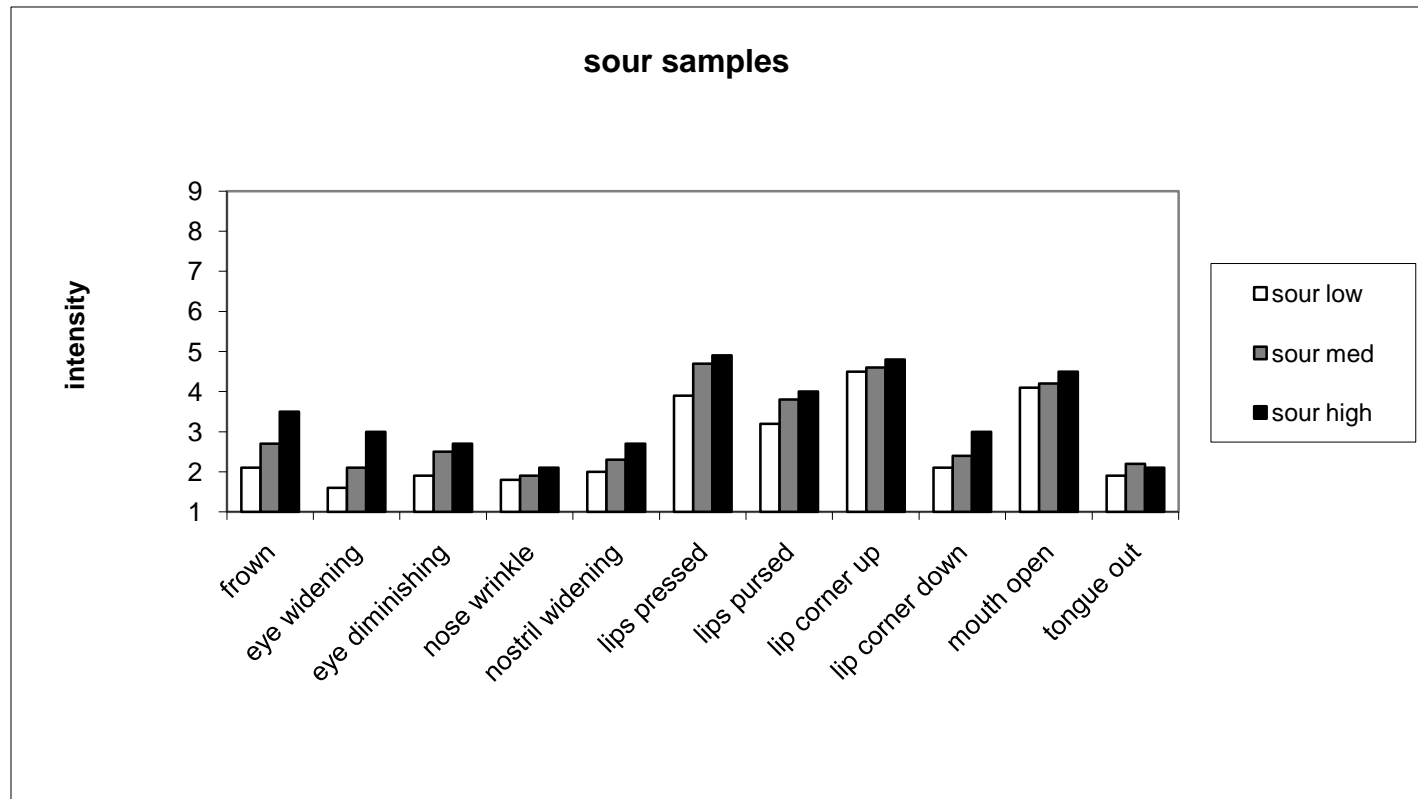
# Results

## Identification and Intensity



# Results

The intensity of all facial reactions increased with increasing concentration of stimuli,

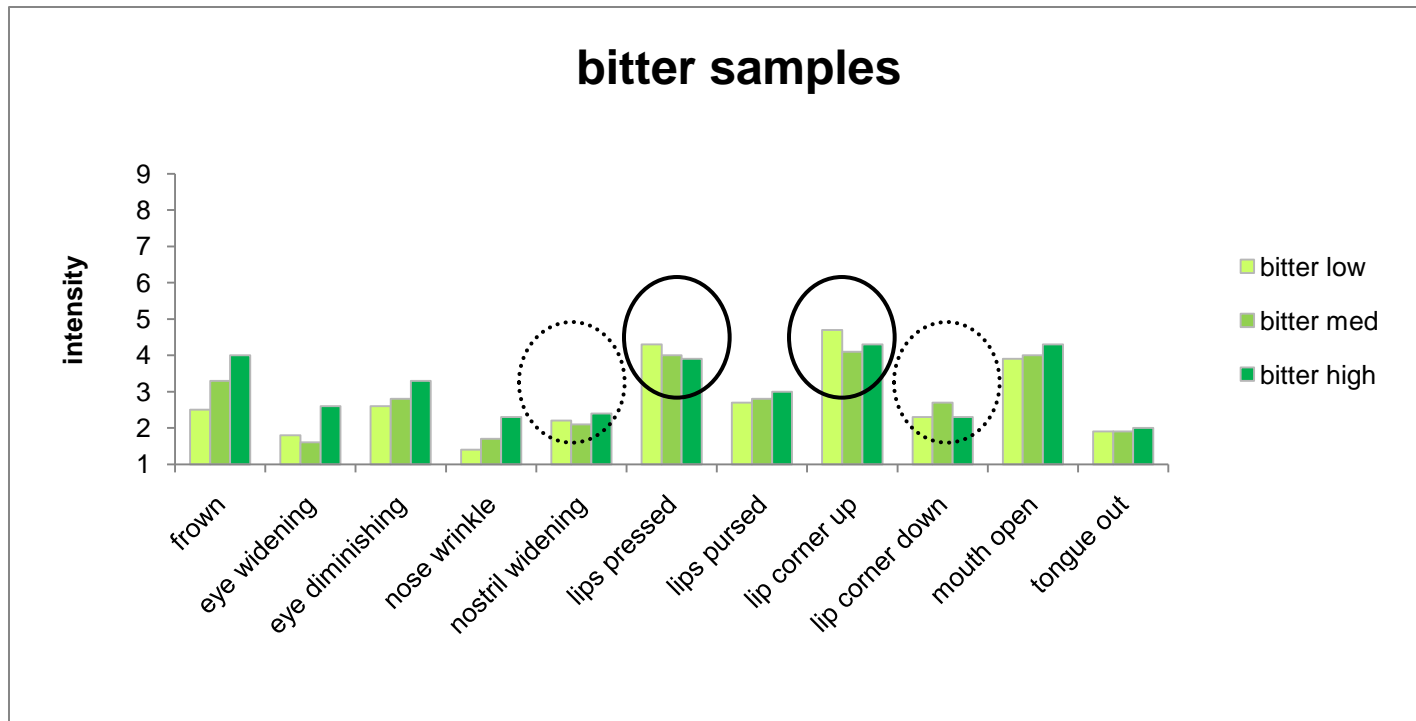


Example sourness

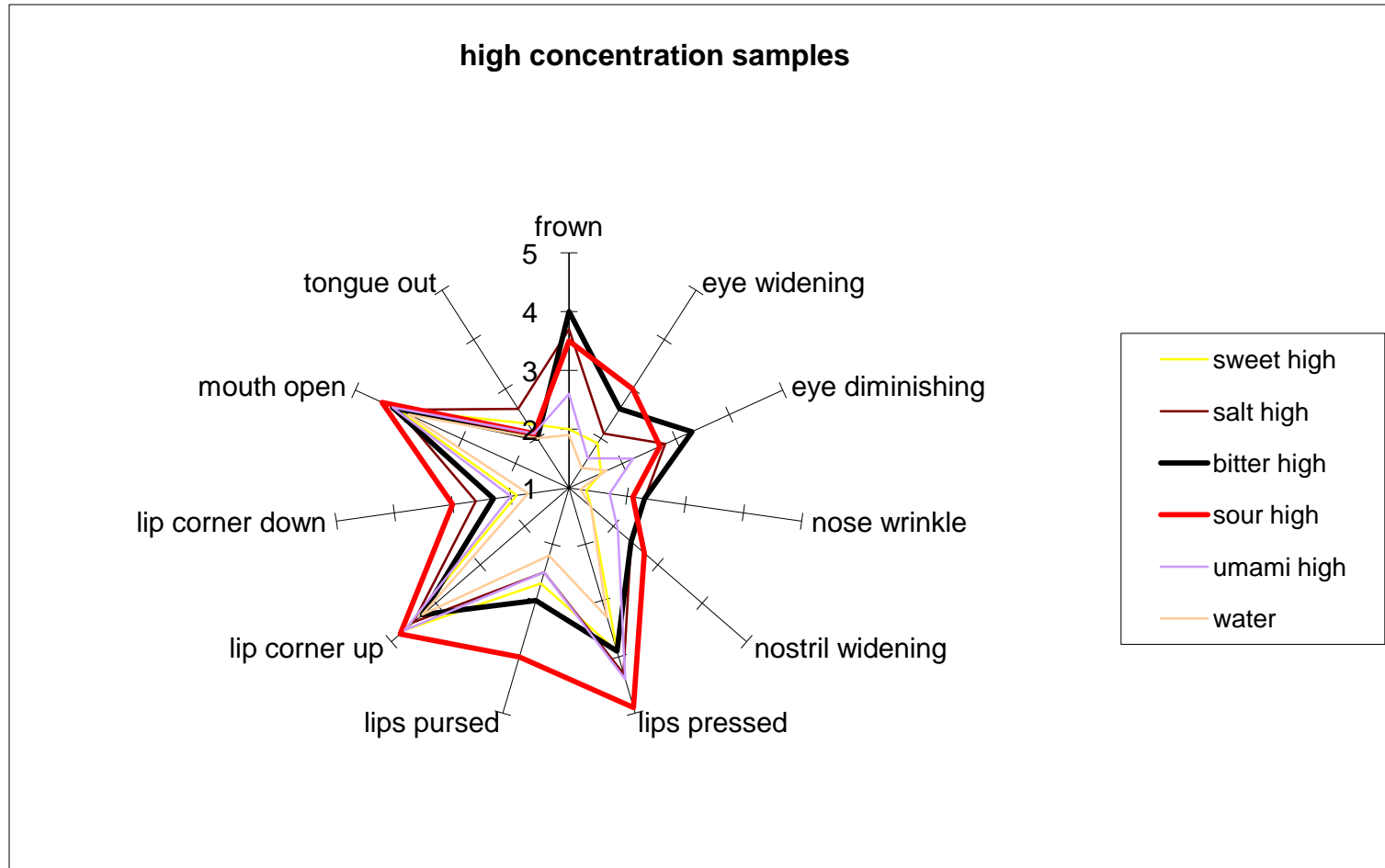


# Results

The intensity of all facial reactions increased with increasing concentration of stimuli, except for some reactions of bitterness



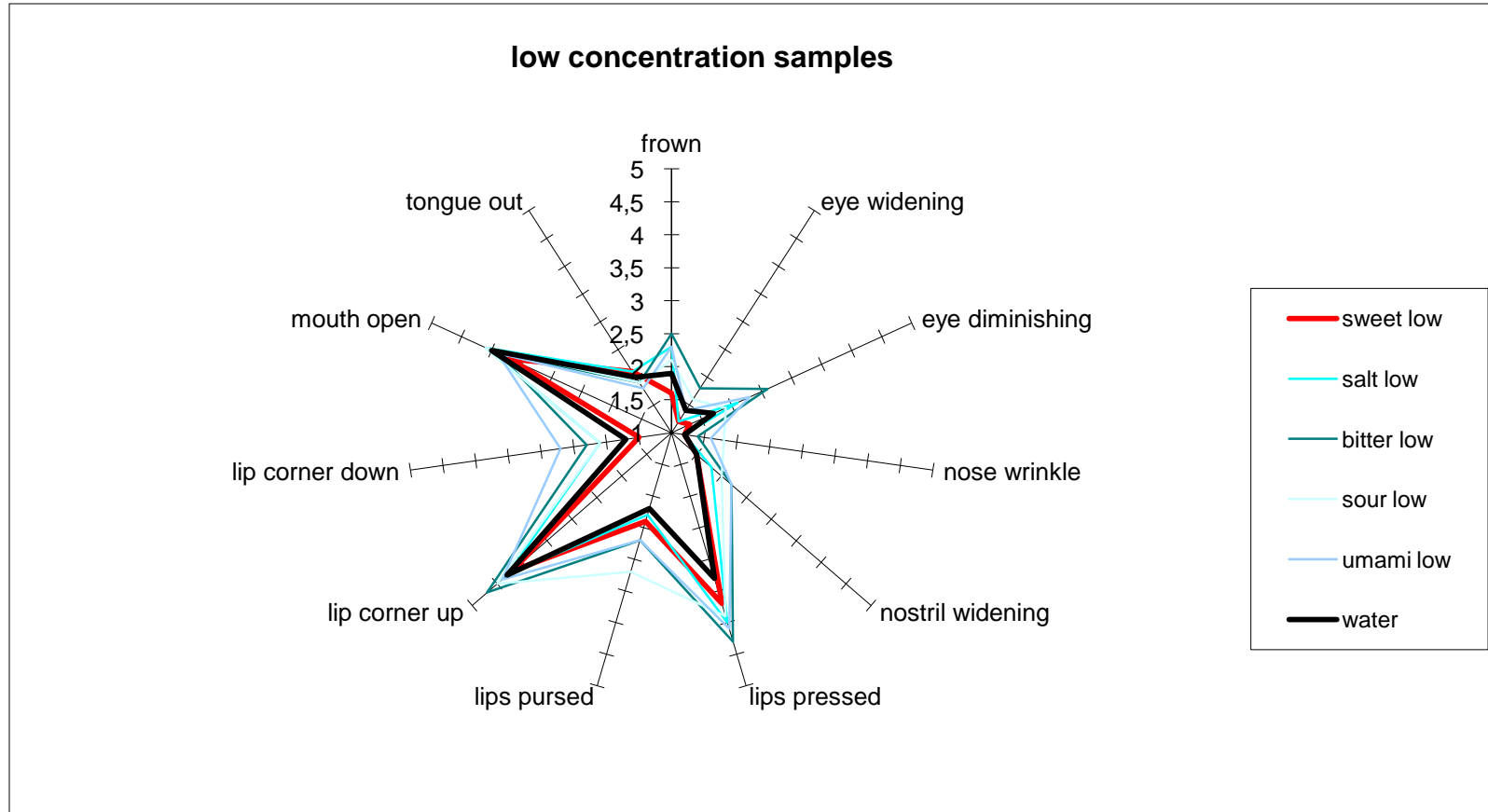
# Results



Most intense reactions from **sourness** (lips and mouth) and bitterness (eyes and forehead)

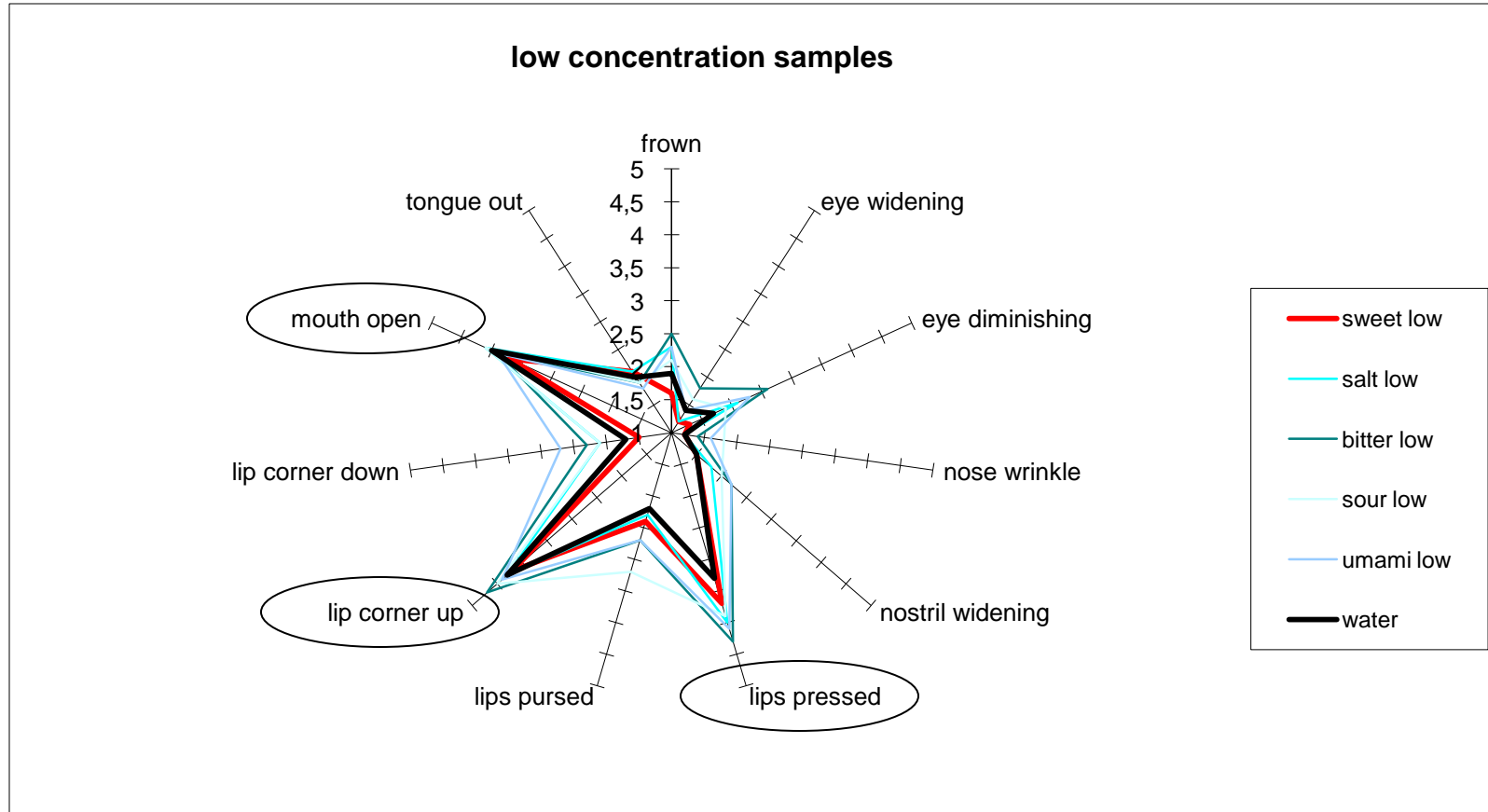


# Results



Least intense facial reactions from water and **low sweetness**.

# Results

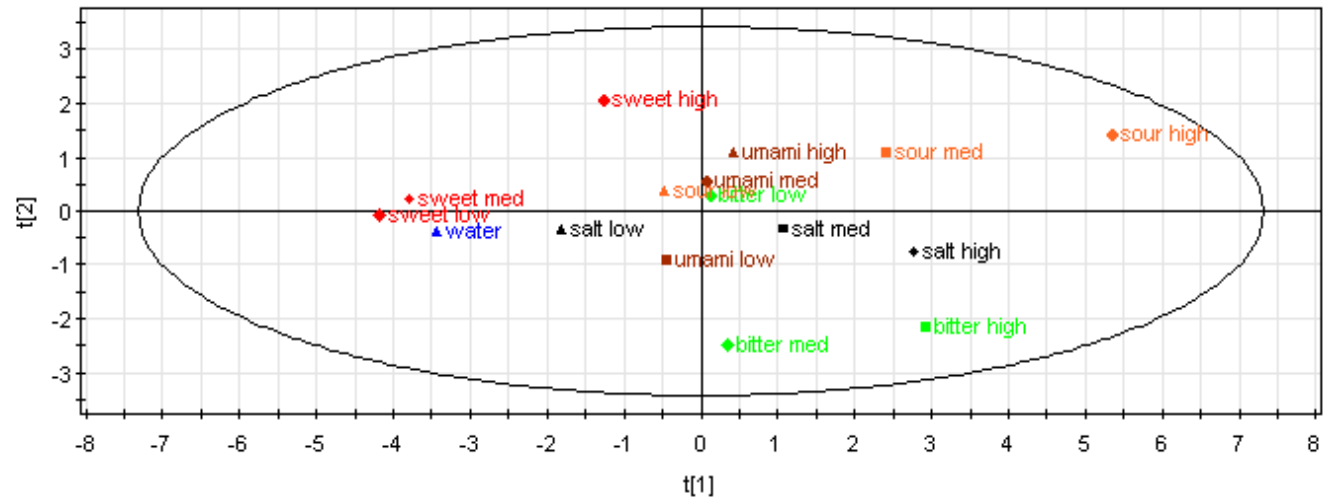


Least intense facial reactions from water and **low sweetness**.

It should be noted that the reactions lips pressed, lip corner up and mouth open are high for all samples, including water

# Facial reactions indicated both stimuli quality and concentration

FACS.M1 (PCA-X)  
 t[Comp. 1]/t[Comp. 2]  
 Colored according to Obs ID (Primary)

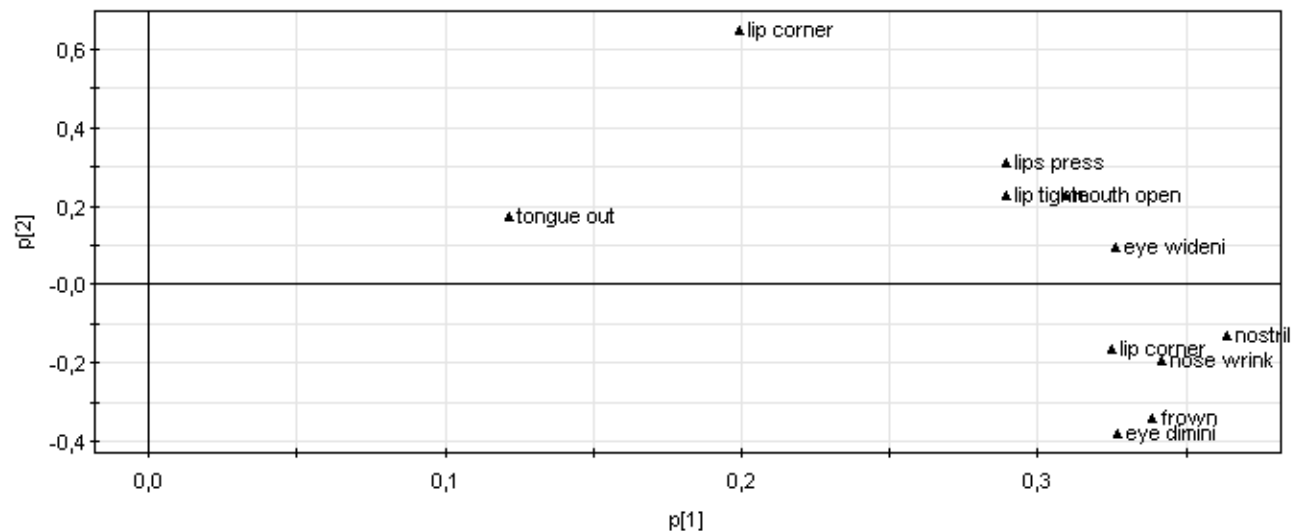


R2X[1] = 0,610323

R2X[2] = 0,131973

SIMCA-P+ 11 - 2009-12-28 21:03:05

FACS.M1 (PCA-X)  
 p[Comp. 1]/p[Comp. 2]

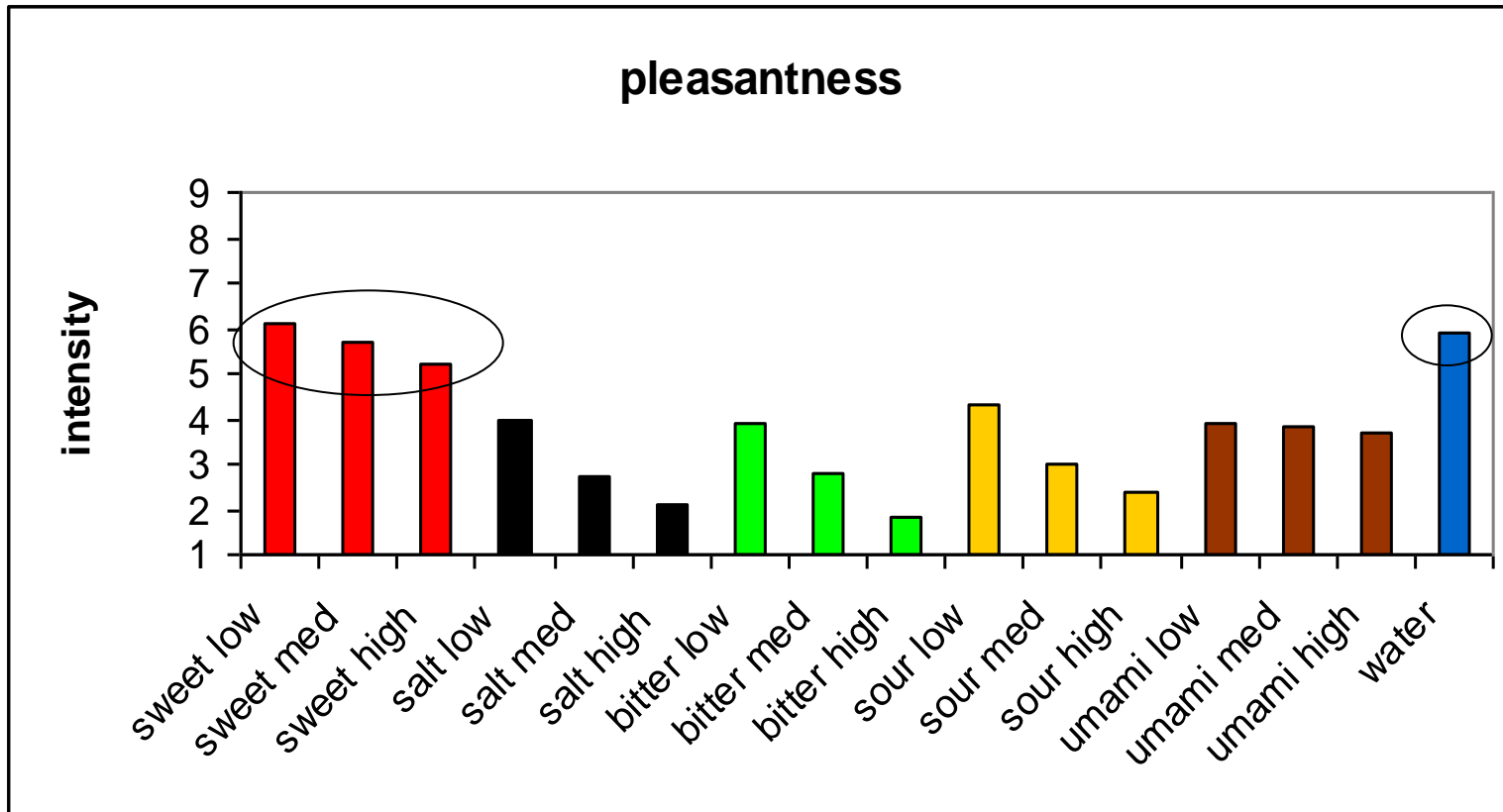


R2X[1] = 0,610323 R2X[2] = 0,131973

SIMCA-P+ 11 - 2009-12-28 21:03:24



# Results

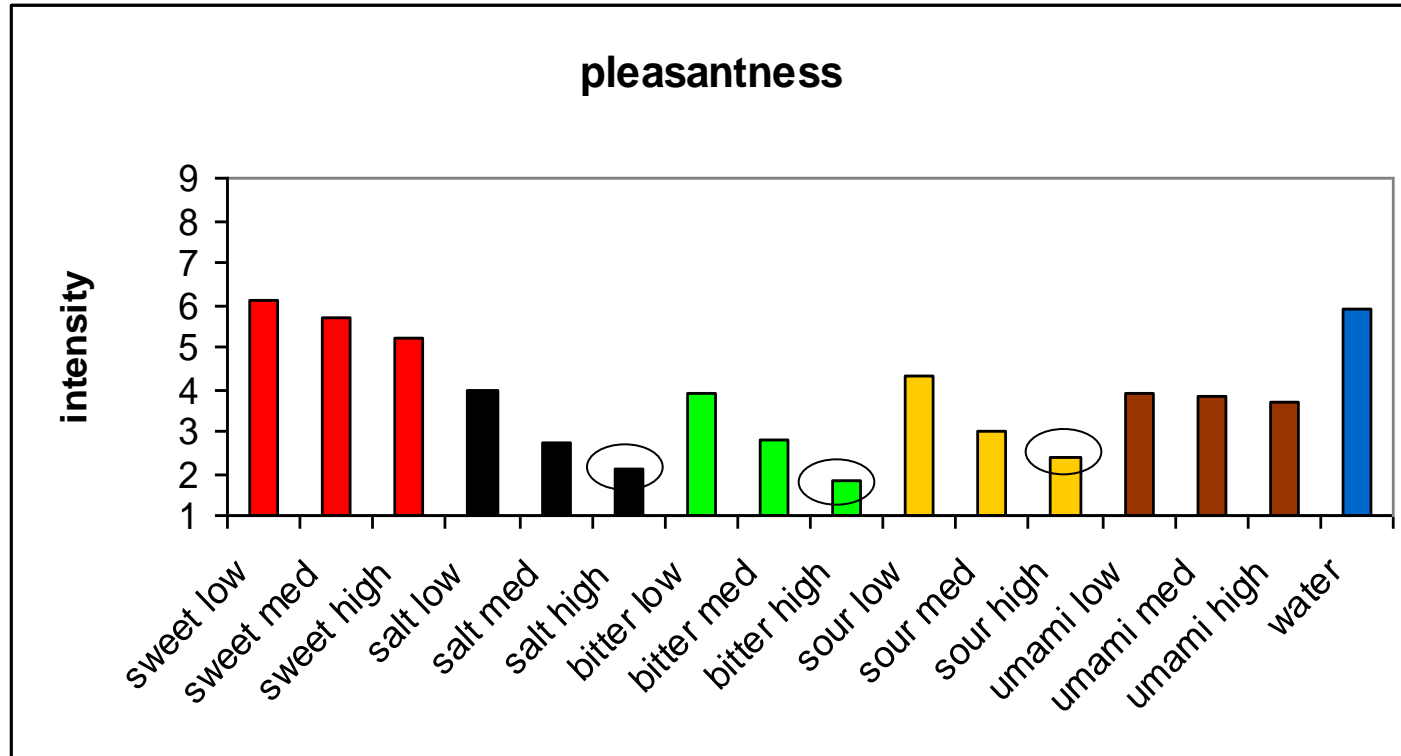


Pleasantness decreased with increasing stimuli concentration

Most pleasant were **water** and **sweet** samples



# Results



Least pleasant were high **salt** high **bitter** (highly intense facial reactions in eyes and forehead)

High **sour** was also low in pleasantness, but not that low. Sourness intense in lips and mouth, not eye and forehead



# Conclusions

- Facial reactions indicated both stimuli quality and concentration
- Facial reactions indicate negative emotions, by being more intense
- Most negative are those reactions with intense reaction of eyes and forehead (bitter and salt)
- No or low intensity of facial reactions when positive/pleasant reactions (water and sweet)



# Conclusion

Combination of sensory analyses and facs seems to be successful in exploring perception of basic tastes



# Authors

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