

# Thermal Taster Status and its impact on Sensory Perception

Qian Yang<sup>1</sup>, Tracey Hollowood<sup>2</sup>, and Joanne Hort<sup>1</sup>.

<sup>1</sup>Division of Food Sciences, University of Nottingham, UK. <sup>2</sup>Sensory Dimensions, Nottingham, UK.

## INTRODUCTION

Individual variation in taste perception has long been investigated, particularly in relation to PROP taster status. In 2000, Cruz and Green<sup>[1]</sup> found a new marker of individual variation whereby some individuals perceive a 'phantom' taste sensation from temperature stimulation of the tongue: Thermal Tasters (TTs). Research on supra-threshold response across TT groups has indicated that TTs perceive some stimuli as more intense, however, until now no research has focused on detection threshold level responses. This poster presents the impact of thermal taster status on detection thresholds for a variety of stimuli across different modalities.

## MATERIALS & METHODS

**Screening Session:** Intra-oral thermode (Pathway Pain & Evaluation System, Medoc, Israel) (Figure 1), following warming (15 to 40°C) and cooling (35 to 5°C) trials was used to screen thermal taster status<sup>[2]</sup>.

**Subjects:** 200 subjects were screened for thermal taster status: 110 subjects attended threshold study.

**Thermal taster classification:** Due to inconsistencies in reported taste sensations, subjects were classified as:

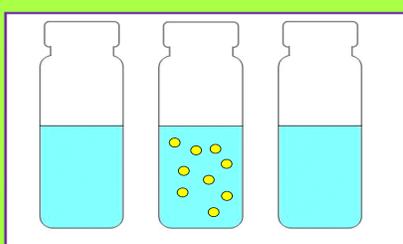
- confirmed Thermal Taster (TT)
- potential Thermal Taster (TT?)
- potential Thermal non Taster (TnT?)
- confirmed Thermal non Taster (TnT)

**Stimuli:** Stimuli concentrations (Table 1) were prepared by serial dilution-from low to high, increasing by a step factor.

Table 1: Stimuli and concentration used

Stimuli	Concentration Range	Step Factor
Sucrose	0.63-7 (g/l)	1.35
Sodium Chloride	0.078-2 (g/l)	1.5
Caffeine	0.03-0.45 g/l	1.5
Capsaicin	0.001-0.17 mg/l	1.9
WS3	0.091-10 mg/l	1.8
Ethyl butyrate	0.001-0.4 ppm	2.1
Isoamyl acetate	0.001-0.4 ppm	2.1

**Procedure:** ASTM procedure E679-04 was employed for measuring detection thresholds<sup>[3]</sup> (Figure 2).



Which sample is different from the other two?

Fig 2: Each 3-AFC test (sample size=15ml).

### Data Analysis

- Data was interrogated at two levels: all data and confirmed TT and TnT alone.
- Each thermal group threshold was calculated from the geometric means of the individual Best Estimate Thresholds (BET).
- Data were log<sub>10</sub> transformed for statistical analysis.
- ANOVA were applied to the full data set and t-tests to the TT & TnT alone ( $\alpha=0.05$ ).

## RESULTS & DISCUSSION

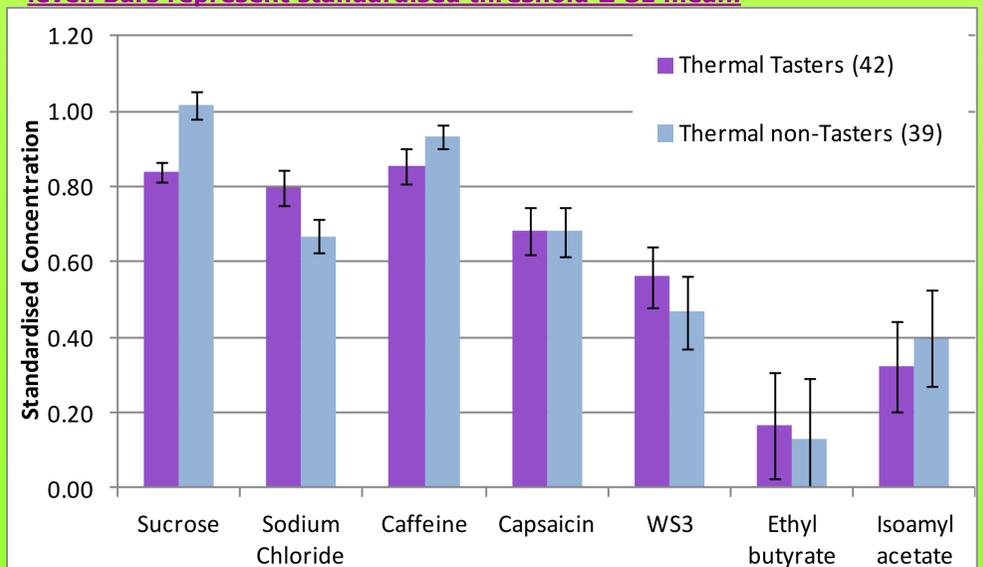
### All data:

- No significant difference in thresholds found for all stimuli for ANOVA tests.

### Confirmed TTs and TnTs:

- No clear pattern with Thermal Taster Status (TTS) classifications was observed (Figure 3).
- Although not significant, TT had lower threshold than TnT for sucrose, caffeine & isoamyl acetate.
- However, TT had higher threshold than TnT for sodium chloride, WS3 and ethyl butyrate.
- For sucrose the differences approached significance (0.083).

Fig 3: Thermal taster status (TTS) effect on oral sensations at threshold level. Bars represent standardised threshold  $\pm$  SE mean.



## CONCLUSION

- Detection thresholds did not differ across TT & TnT phenotypes across all modalities.
- When only individuals with a robust TTS classification were analysed, TTs exhibited a lower detection threshold for sucrose, although it did not reach significance ( $p=0.083$ ).
- This study also highlights the issue of clarity in TTS classification and more work is needed in this area.
- Previous studies showed that TTs have a greater sensitivity at supra-threshold level to taste, aroma and some trigeminal sensations<sup>[2,4]</sup>. This study indicates that the detection threshold sensitivity across TT groups may not be in accordance with supra-threshold findings from other work. As detection threshold and supra-threshold are likely to operate via different mechanisms<sup>[5]</sup>, this work suggests the TT advantage does not exist across the full perceptual range.
- Further work will compare detection threshold sensitivity and supra-threshold sensitivity to taste, aroma and trigeminal sensation across thermal taster groups.

## References

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