

Combining foods with condiments:

How bread and potato influence *in vivo* aroma release and aroma perception of mayonnaises

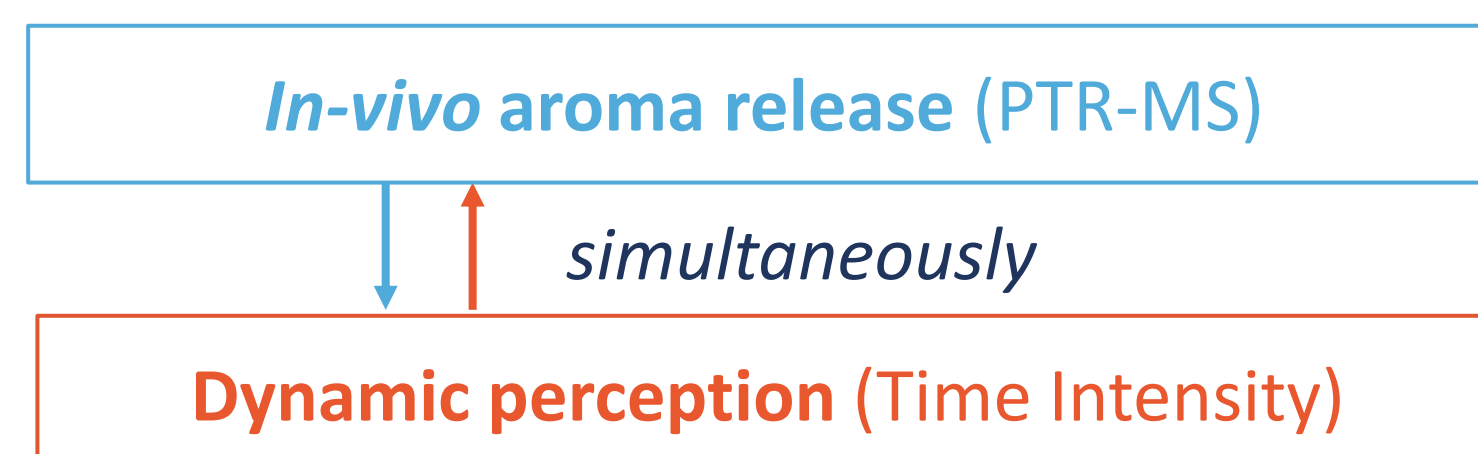
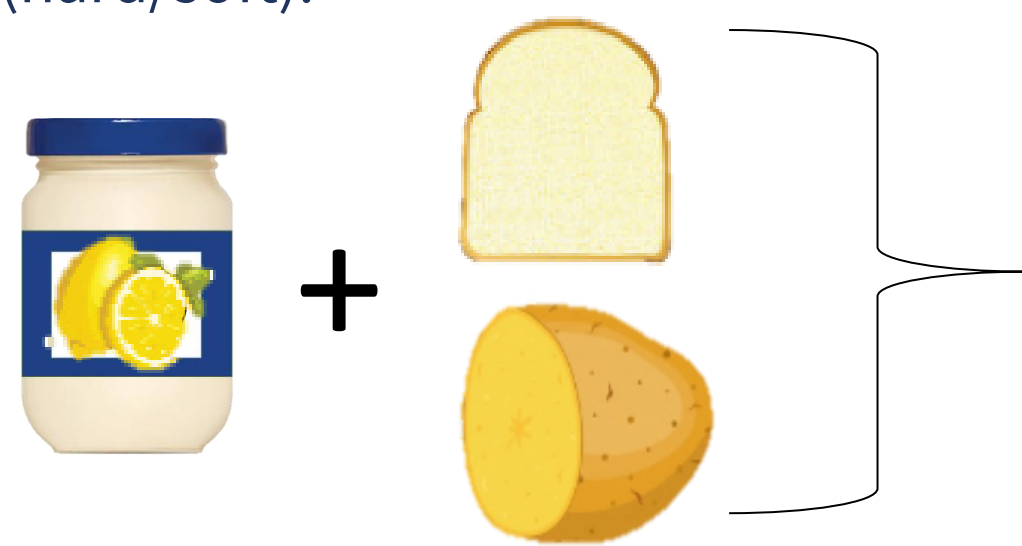
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1. Background:

The addition of condiments to foods is known to affect oral processing behaviour [1,2] and sensory perception [3-5]. Little is known about the relationship between flavour perception and aroma release of composite foods. **The aim of this study was to investigate the interplay between condiment properties and carrier properties on *in vivo* aroma release and dynamic aroma perception.** Proton Transfer Reaction Mass Spectrometry (PTR-MS) nose space analysis was used in combination with Time Intensity (TI) sensory analysis to investigate in details aroma perception and release mechanisms.

2. Approach:

Two lemon aroma compounds (limonene, citral) were added at 0.1% w/w to mayonnaises varying in fat content (high/low) and viscosity (high/low)(Table 1). These mayonnaises were consumed alone and in combination with bread and potato differing in hardness (hard/soft).



In vivo real-time analysis of aroma release (PTR-MS) and dynamic perception of lemon intensity (Time-Intensity) were assessed simultaneously based on previous work [6].

Panel: 14 young, Caucasian, European females (trained)



Table 1: Product properties of mayonnaises varying in fat content and viscosity

	Full Fat Thick	Low Fat Thick	Low Fat Thin
Fat (w/w %)	70	27	27
Xanthan (w/w%)	0	1.55	0.62
Viscosity at 1 s ⁻¹ (Pa·s)	84±19	73±12	11±3
Viscosity at 10 s ⁻¹ (Pa·s)	13±3	10±1	2±1
D3,2 (µm)	11±2	8±1	7±1

3. Results:

Mayonnaise properties

In vivo limonene and citral release and lemon intensity increase with increasing fat content and decrease with increasing viscosity (Figure 1, Table 2).

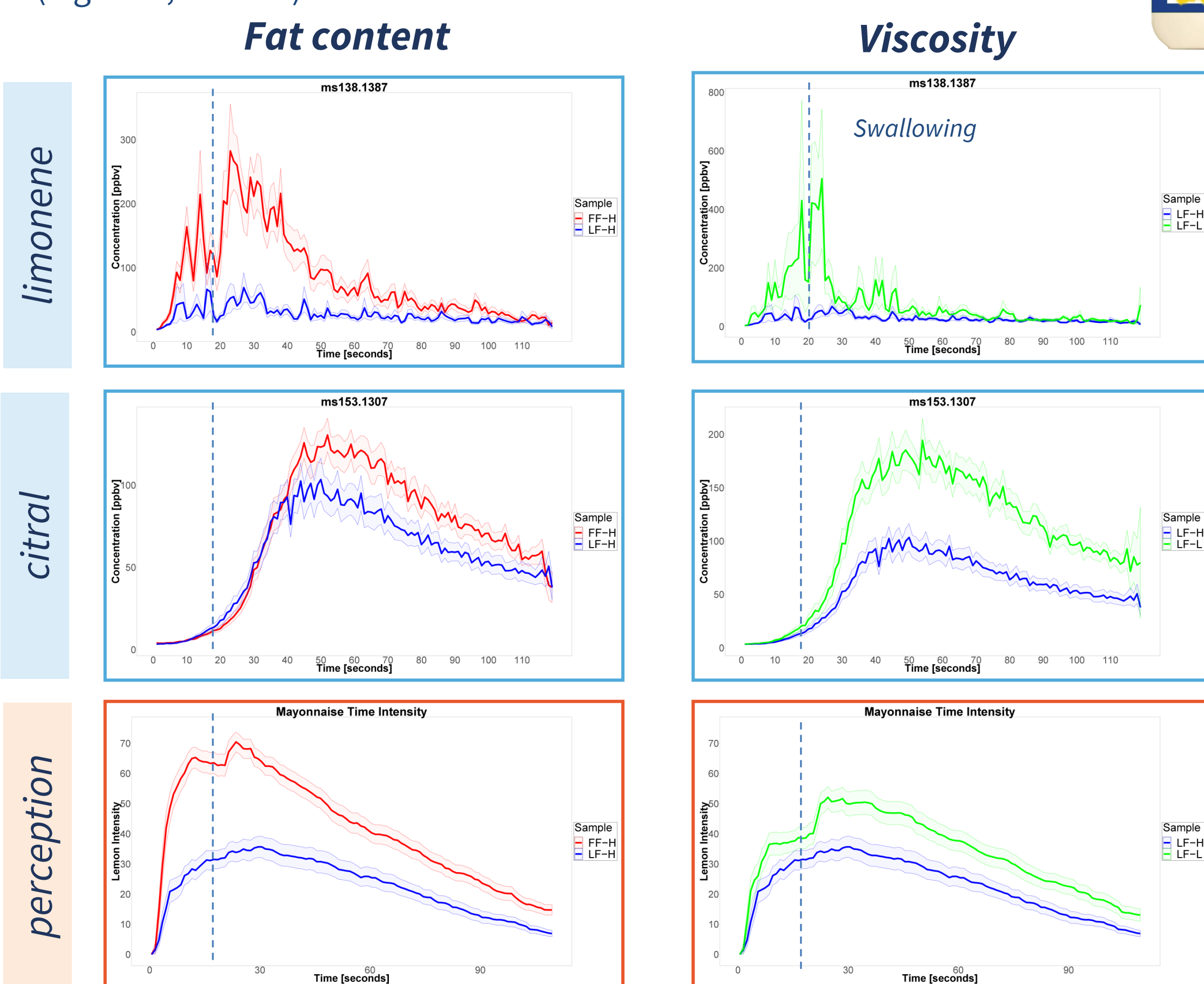


Figure 1: Averaged in-nose limonene release, in-nose citral release and lemon intensity perception during mastication and after swallowing for mayonnaises varying in fat content and viscosity.

Addition of carrier foods

In vivo limonene and citral release increase and lemon intensity decreases with the addition of carrier foods to mayonnaises (Figure 2, Table 2).

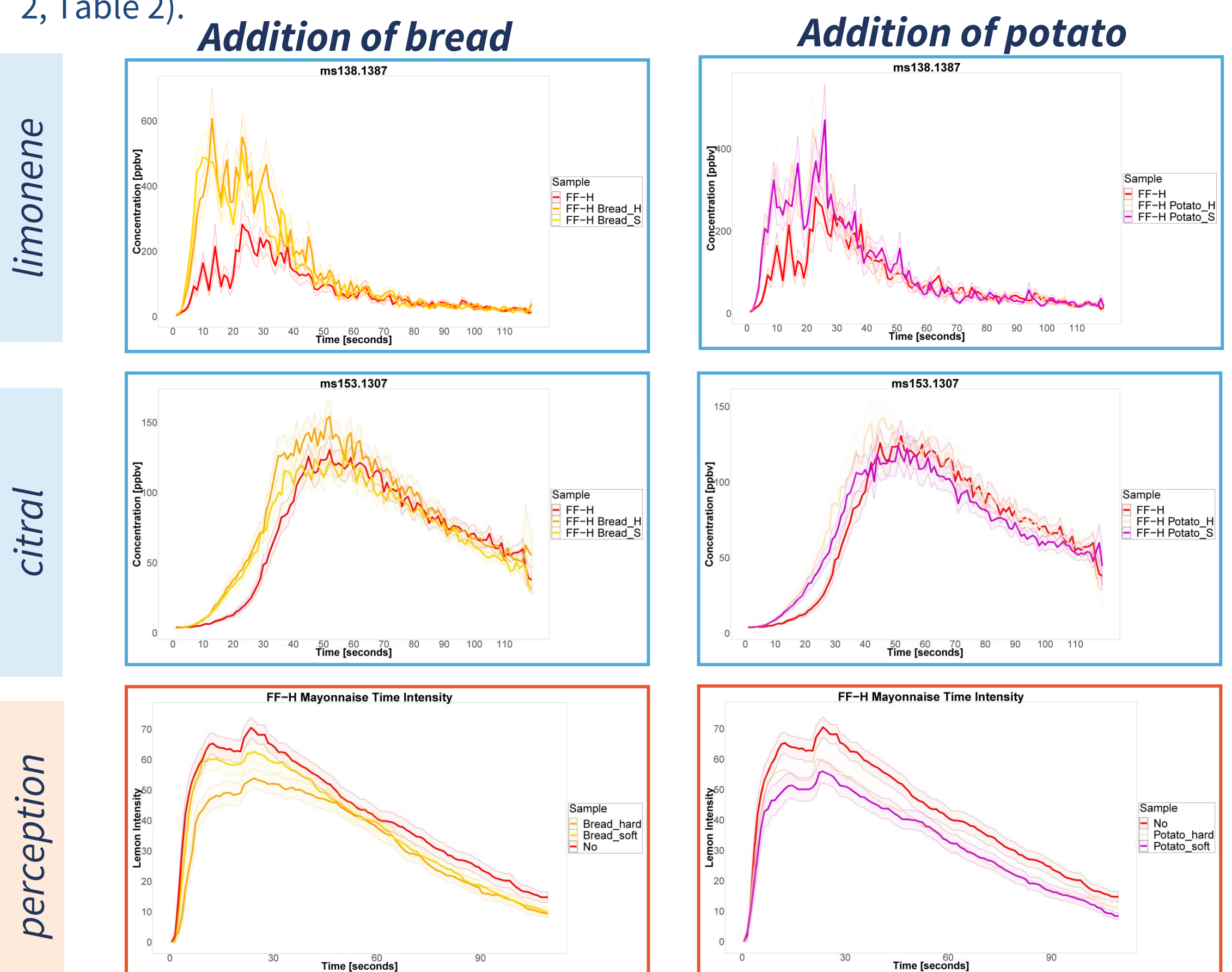


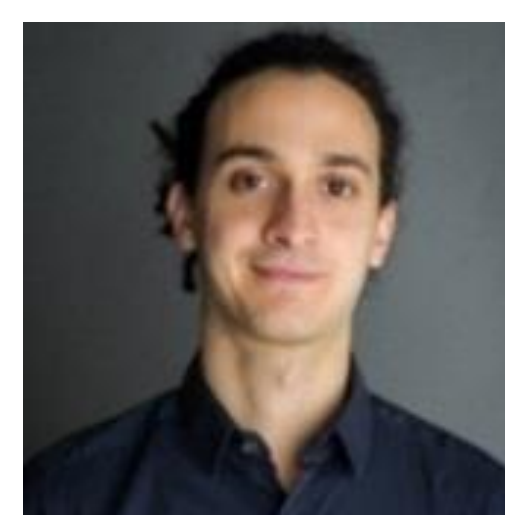
Figure 2: Averaged in-nose limonene release, in-nose citral release and lemon intensity perception during mastication and after swallowing for mayonnaises varying in fat content and viscosity.

Table 2: Summary of main results of *in vivo* aroma release and perception of mayonnaises

	↑ fat	↑ viscosity	Carriers
Limonene release	↑	↓	↑
Citral release	↑	↓	↑
Lemon perception	↑	↓	↓

4. Conclusions:

- ✓ Fat content, viscosity, and addition of food carriers (bread/potato) affect aroma release and perception of mayonnaises.
- ✓ Physicochemical and physiological effects play a role in the aroma release and perception of complex food combinations. Particularly, the addition of carrier may increase aroma release due to an increase in surface area and by affecting oral processing behaviour;
- ✓ Despite the higher amount of in-nose aroma compounds measured when carrier are added, lower perception was reported indicating that cognitive mechanisms are likely to modulate condiment-carrier perception.



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