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Dynamism of flavour perception phenomena: Complementarity of sensory and instrumental temporal methods

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We investigated the impact of roasting degree and sugar addition on flavor perception and volatile release of coffee combining sensory and analytical techniques. The evolution of flavor in-mouth perception was measured by “Temporal Dominance of Sensations (TDS)” carried out by 18 trained panelists using 9 attributes: sweet, sour, bitter, astringent, roasted, burnt, caramel, nutty, vegetal. Volatile release was measured by nosespace (NS) analysis simultaneously to sensory evaluation using a direct injection mass spectrometry technique (Proton Transfer Reaction-Time of Flight-Mass Spectrometry).

Two espresso coffees (light and dark roasted ground *Arabica* coffee) with or without sugar were evaluated.

Both TDS and NS profiles revealed significant differences between all samples.

Roasting induced the dominance of astringent, bitter, burnt and roasted attributes in TDS and an increase in overall release of volatiles in NS.

The addition of sugar in coffee modified the dynamic description of coffees illustrated by a modification and an increase of used attributes while it had little effect on NS data. This suggest that the effects observed in TDS could likely be related to cross-modal interactions between taste and olfactory stimuli.

Moreover, NS analysis showed that the release curves of volatile compounds fell into two distinct groups characterized by different time-evolution patterns: on one side curves that increased steeply and tailed down relatively fast, on the other, mass peaks with slower increase and decrease remaining in NS for a longer time after sample introduction. This observation led to identification of candidate mass peaks tentatively to be used to explain some of the changes in temporal dominance for burnt and roasted attributes in different time phases.

This work represents the first example of simultaneous application of TDS and NS to a real food matrix. NS could interestingly complement TDS by identifying some compounds as candidates “temporal dominance markers” to be used to understand sensory dominance.

Keywords: TDS, Nosespace analysis, Flavour perception, Coffee