Effect of food **texture contrast** on sensory perception of **dispersed systems**: a mechanistic approach

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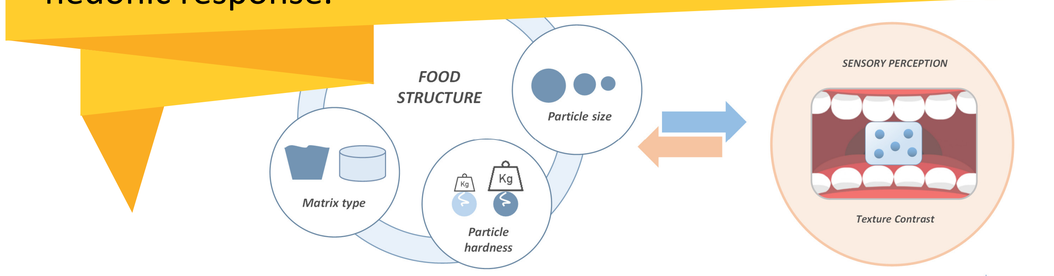
Background

Many commercially available foods contain particles embedded in a food matrix varying in size and hardness, such as fruit pieces in yogurt, vegetable pieces in soups, and chocolate pieces in biscuits.

These composite foods with dispersed particles display complex texture profiles and are often associated with positive hedonic responses. Despite the high consumer appreciation and industrial relevance of such foods, the properties that contribute to texture perception and positive hedonic responses are poorly understood.

Aim

To investigate the influence of **size** and **mechanical properties** (fracture stress) of dispersed particles present in liquid and gelled **food matrices** on sensory perception and hedonic response.



Study design

Particles varying in size and hardness (fracture stress) were prepared to obtain heterogeneous foods with controlled mechanical contrast. K-carrageenan was used as gelling agent. The particles (15%) were added to liquid, starch-based model soups and semi-solid, protein-based model gels. The sensory profiles were quantified by untrained panellists (n=54) using the Rate-All-That-Apply (RATA) method.

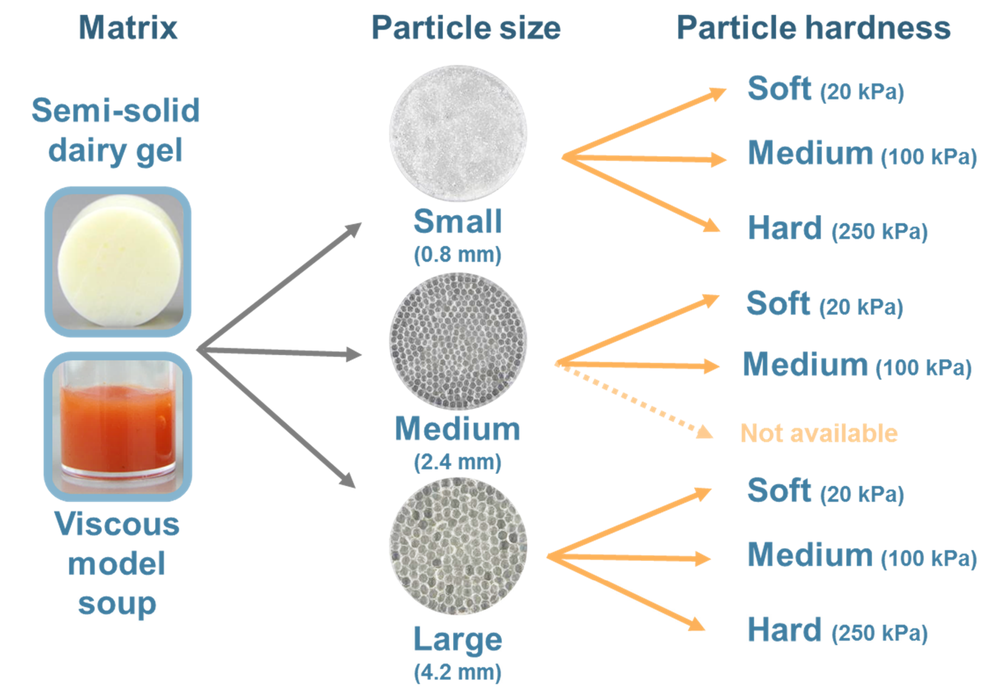
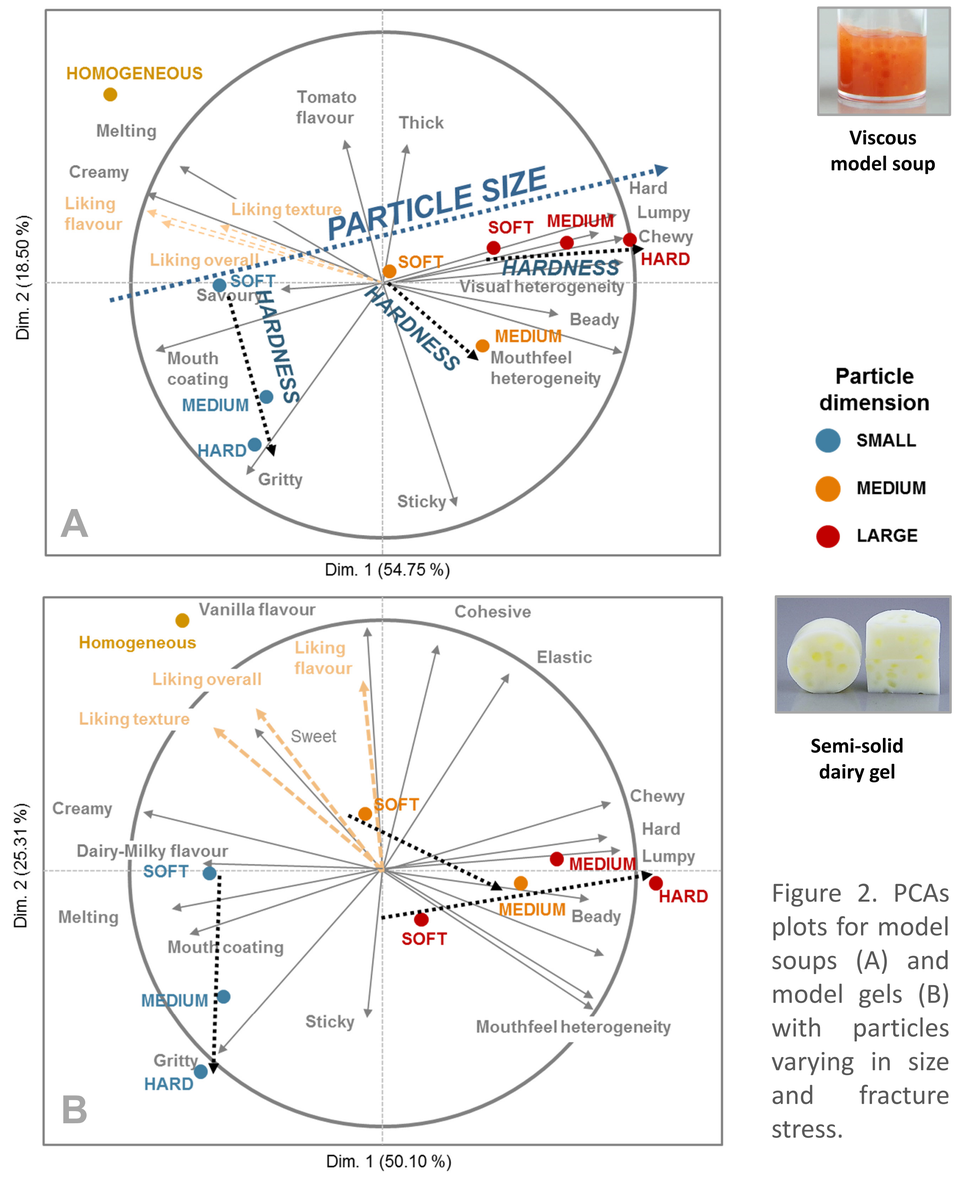


Figure 1. Study design with two matrix types, 3 particles sizes and 3 levels of fracture stress.

Results

The addition of mechanical contrast in the form of particles changed the sensory perception. Particle size mainly affected the type of selected sensory descriptors, whereas fracture stress of the particles determined mostly the perceived intensity of selected descriptors. Specific sensations, such as grittiness and lumpiness, were changed by varying particle size. By tuning the fracture stress of the embedded particles, the perception of some attributes was enhanced (i.e., chewy, lumpy, and beady for medium-large particles) or reduced (grittiness for small particles).



Viscous model soup

Semi-solid dairy gel

Particle dimension
SMALL
MEDIUM
LARGE

Figure 2. PCAs plots for model soups (A) and model gels (B) with particles varying in size and fracture stress.

Subjects found it more difficult to distinguish particles embedded in the semi-solid matrix compared to the liquid matrix. This suggests that the addition of particles in liquid matrices has a larger effect on texture perception than in a solid matrix. Overall, mechanical contrast decreased liking of model soups and gels probably due to the unpleasant texture of the flavourless K-carrageenan particles.

Conclusions

- **Sensory perception of heterogeneous** foods can be changed by varying the size and the fracture stress of their embedded components.
- The mere **mechanical contrast** is not sufficient to enhance food appreciation of model soups and gels, but a combination of changes in the flavour and texture might be required to boost food liking.

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