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Title:

Accelerating the characterisation of oral processing behaviour for food design

Authors & affiliations:

Name and surname Institution/ Department, University, Country
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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text into it.)

Preparation of Your Abstract

1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word **ONLY** (place names excluded). No full stop at the end.

2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.

Introduction: Clearly state the purpose of the abstract

Methods: Describe your selection of observations or experimental subjects clearly

Results: Present your results in a logical sequence

Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

Understanding oral processing behaviour, characterised by how consumers bite, chew, and swallow, is critical for designing foods that deliver targeted sensory experiences and meet the needs of specific populations. However, current analytical methods rely heavily on manual video annotation, which is time-consuming and limits scalability.

We developed an AI-driven tool that automatically detects bite, chew, and swallow events from video recordings by integrating facial landmark tracking for bite detection with colour-based dot tracking for chewing and swallowing. The tool was validated by comparing automated outputs with manual annotations of video recordings from 20 individuals consuming a range of solid and semi-solid foods (n=8). Automated detection showed strong agreement with manual counts for chewing ($R^2 = 0.99$), biting ($R^2 = 0.92$) and swallowing ($R^2 = 0.97$), with ongoing refinements to further improve robustness.

This approach substantially reduces the labour and cost associated with manual annotation, enabling scalable and objective characterisation of oral processing behaviour. It offers new opportunities for rapid screening of food prototypes, optimisation of texture, and applications in consumer testing. Future work will focus on advancing the system to detect oral events without relying on facial landmarks, enhancing its robustness and applicability in everyday eating contexts.