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How to use sensory criteria to control the production in breadmaking industry?

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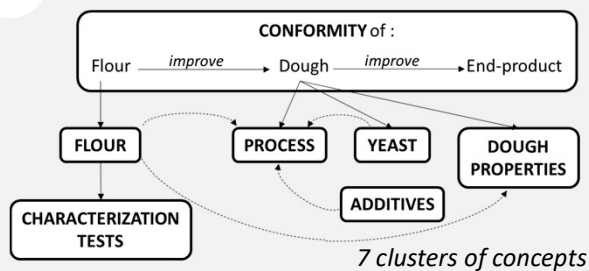
How to use sensory criteria to control the production in breadmaking industry?

Context & Objective

Operators in the industry rely largely on **sensory measurements to detect problems on-line**. In fact, experts have a rich **knowledge of the impacts of flour / ingredients / process conditions on dough/bread quality**, which they assess using sensory measurements. For example, the dough stretching test - carried out at the end of mixing - assesses the "extensibility" of the gluten network, an important quality criterion of dough. **Quality criteria** are generally expressed using **sensory** - such as

"consistent", "sticky", or "extensible" - mirror actual **rheological properties** of dough/bread, such as *viscosity*, *strain hardening index*, or *level of gluten crosslinking*. Determining the **relations between sensory quality criteria and measurements performed by scientists** is often a **challenging**. To be able to **connect the scientific understanding to know-how in the breadmaking domain**, it is necessary to first **relate semantically the empirical and the scientific vocabularies**.

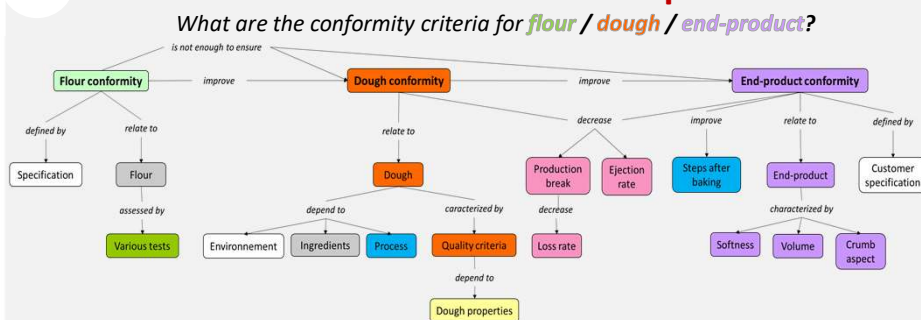
2 EXPERT INTERVIEWS ANALYSIS



➤ **Harmonization of the vocabulary** between expert bakers

- Identification of 890 concepts
- Classification in 7 interconnected clusters of concepts

3 CONCEPTUAL MODELIZATION of expertise



Example : Cmap Conformity flour / dough / end-product

➔ Creation of 11 Concept maps (Cmaps)

➤ Cmap Answers a specific question

1

KNOWLEDGE ACQUISITION

Baker experts (BCO)

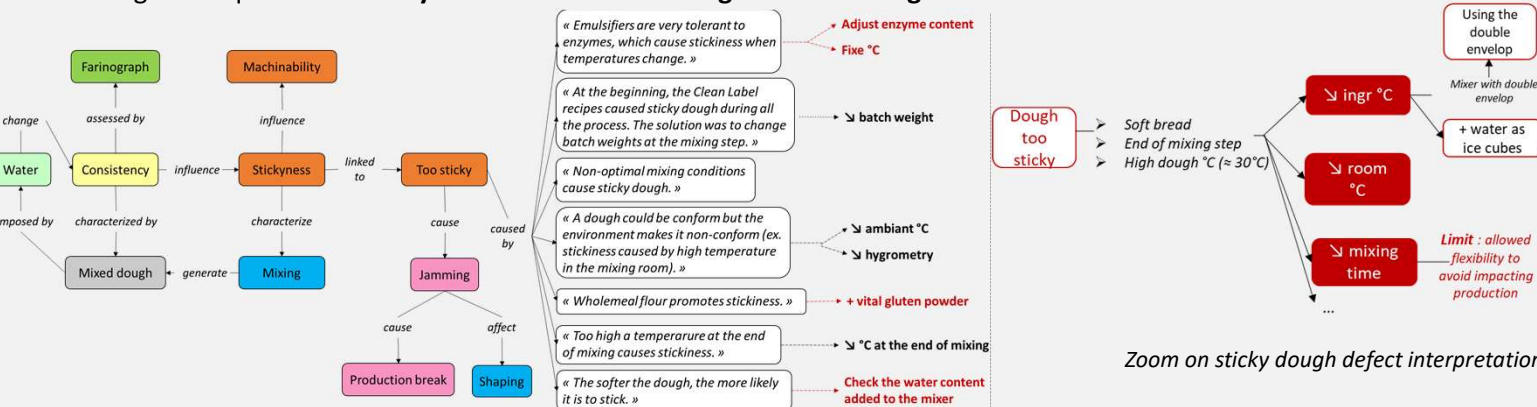
- ➔ 2 interviews / expert
- What are the problems linked to flour quality encountered?
- What sensory measurements are used to identify them?

Scientist experts (INRAE)

- ➔ Workshops to investigate dough mechanisms
- Rheology, Knowledge transfer, Biochemistry, Breadmaking*

4 Expertise vs science

- Linking between the **scientific and the expert knowledge domains**
- Following the sequence : **Sensory criteria > Understanding > Defect > Diagnostic > Recommendations**

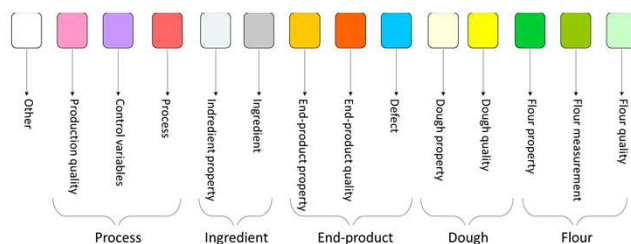


Zoom on sticky dough defect interpretation

Conclusions & Perspectives

This work proposes a **sequence of semantic links to combine concepts from expertise domain and concepts from the scientific domain**, from sensory observations to recommendations.

With this work, we link **sensory to scientific knowledges to better understand the breadmaking process on-line** with the aim to **provide recommendations informed with scientific understandings of the dough**. This will allow to **better diagnose dough and bread defects in the industry**. This will also **facilitate knowledge transfer** between research organization and industry.



References :

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