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How to measure food liking during the course of a meal in 8-10 year-old children? A new method

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Context

Food liking is most often assessed once after the consumption of a small amount of product.

Nevertheless, eating a food is not a matter of a single bite and liking may change over consumption as a result of satiation.

In adults, changes in liking can be assessed with a continuous approach - at any change throughout the consumption (at the discretion of the participant then) or with a discontinuous approach - at predefined time points or particular events (e.g. after swallowing) over the course of consumption (see for a review: Delarue & Blumental, 2015). To date, no dynamic methodology is available to assess liking through portion consumption over the course of a meal in children (Laureati, 2015).

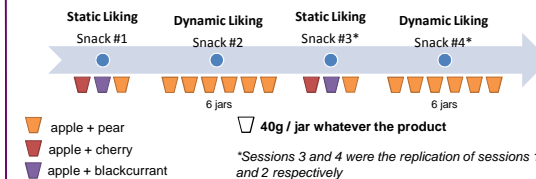
Method

Participants (N=47) 19 boys - 28 girls

- Two primary schools from Dijon - 16 children from school 1 and 31 from school 2
- Afternoon snack time (i.e. two rounds: 4:15 pm and 5pm)
- Children were split into 4 groups of 4 or 5 children, supervised by one experimenter each
- In the canteen of the school



Timeline of the study: Ethics committee of Est I Bourgogne (2016- A00498-43)



Timeline of each type of measure:

Static Liking

- 1- Level of hunger
- 2- Training liking
- 3- Static liking assessment
- 4- Preference ranking
- 5- Level of hunger

Dynamic Liking

- 1- Training changes in color brightness (video)
- 2- Level of hunger
- 3- Story to imagine how children would enjoy each supplementary portion of french fries for lunch + training changes in food liking (video)
- 4- Dynamic liking assessment: The children were informed about the number of jars and that it was the same fruit puree only if they asked the question.
- 5- Level of hunger

Measures:

Liking (both static & dynamic)

"You have just tasted a jar of purée, did you enjoy it?"

Liking score (0-10)



Level of Hunger

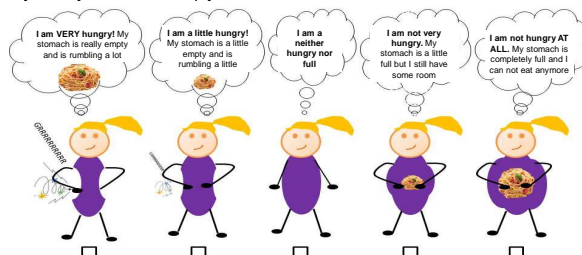
adapted from Faith et al., 2002 and Bennett & Blissett, 2014

2 scales one for girls, one for boys

"Right now, how hungry are you? Is your stomach empty or full?"

Hunger score (1-5)

Δ level of hunger = hunger after-before tasting (if > 0 = hunger decreases)



Conclusions

- A majority of children had a negative slope, denoting a liking decrease over consumption. At the group level, the dynamic liking assessment was reproducible over two snacks. The evaluation of the first jar with the dynamic liking method was not significantly different from the liking evaluation of the same puree with the static liking method.
- Although not strongly, the decrease in hunger is linked to the decrease in liking over consumption.
- The numerous pretests carried out in two leisure children centers with 25 other children aged 8-10 years old beforehand enabled to establish children-tailored scales and instructions together with the experimental conditions. Training with videos were very helpful to introduce children with the notion that liking may change over time. In this regard, the developed question to evaluate liking was "You have just tasted a jar of purée, did you enjoy it?" rather than "How much did you like it now". The former enabled children to evaluate liking several successive times.

Objectives

- 1/ To develop a new method to measure the temporal aspects of liking assessment in 8-10 year-old children in ecological conditions of consumption and to evaluate the reproducibility over two sessions (Dynamic liking).
- 2/ To compare a regular liking evaluation (static liking) with the newly developed temporal evaluation of liking (Static liking vs Dynamic liking).
- 3/ To explore the links between variations in liking (in the dynamic method) and variations in the level of hunger (Dynamic liking (individual slope) and Δ level of hunger).

Results

1/ Validation of the dynamic liking method

1.1 Static Liking

Linear mixed model (REML estimator) with children effect considered as random:

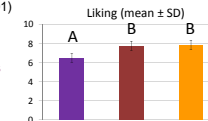
liking=intercept + order + snack + products+ experimenter + order*snack + product*snack + experimenter*snack

→ Significant differences in liking were observed among products ($F(2,194) = 11.73$; $P < 0.0001$)

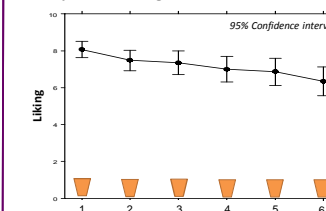
apple+blackcurrant was significantly less liked than apple+cherry and apple+pear

→ The product*snack interaction was not significant

→ Our liking scale enables to highlight differences in liking for different fruit purees ; this was reproducible over two sessions. Our scale can be used for the dynamic method.



1.2 Dynamic Liking



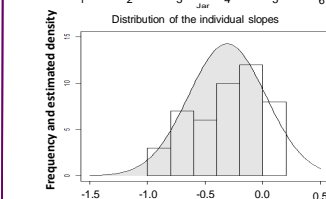
Linear mixed model (REML estimator) with children effect considered as random:

liking=intercept + jar + snack + jar*snack

→ The jar effect was significant ($F(1,465) = 23.52$; $P < 0.0001$)

→ The interaction jar*snack was not significant

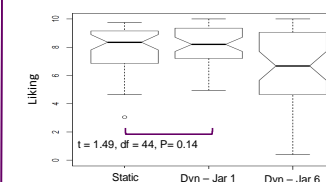
→ On average liking decreased over consumption. This was reproducible over two sessions.



→ 80% of the children have a negative slope (liking=-(number of jars)

→ The average individual slope is -0.31
The standard deviation of individual slopes is 0.34

2/ Static liking vs Dynamic liking



→ No significant difference in liking between static liking and liking for jar 1 with the dynamic liking for the same apple+ pear puree, but jar 6 was less liked

3/ Dynamic liking and Δ level of hunger **

Δ level of hunger: Mean= 1.48 ± 1.25 (min -2.5 ; max 3.5)

Δ in Liking: Mean= -0.30 ± 0.42 (min -1.1 ; max 0.6)

Regression:

Δ in Liking = -0.10 Δ level of hunger P=0.0475

→ On average, the level of hunger decreases so as the liking. The decrease in hunger is significantly associated with the decrease in liking

Δ in Liking = mean of the 2 individual slopes from the linear mixed model from the two snacks, for each child

** The analysis was restricted to children who participated in the two dynamic liking assessment snacks n=40

Perspectives

- Although the results are very encouraging, some refinements could be made to the dynamic liking assessment: children should be told that this is the same food product, more videos should be displayed with more examples of putative changes in liking.
- More research is needed to explore the relationships between the level of hunger and temporal liking evaluations in children. It would be interesting to evaluate dynamic liking in children with more or less satiating foods to observe whether this will impact dynamic liking over the consumption of a portion.
- More research is needed to explore the underlying reasons for a positive slope in some children. An exposure effect during consumption might explain this result.



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