Validating the EmoSensory® Wheel: comparison with traditional questionnaire format, between scaling formats and between countries

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Objectives

The study of emotional and sensory profiling with food products gain momentum to obtain a broader consumers' perspective on product performance beyond traditional hedonic measures. Recently, the EmoSensory® Wheel has been introduced as a new method which combines emotional and sensory assessments by consumers. However, questions arise about the methodological applicability of this method.

Therefore, a series of experiments were conducted to further examine the use of this method:

(i) comparison with the use of a traditional list-based questionnaire format;

(ii) comparing the use of Check-All-That-Apply (CATA) and Rate-All-That-Apply (RATA) scaling format;

(iii) examining its applicability in a cross-cultural setting by application in two different countries (Denmark and Belgium).
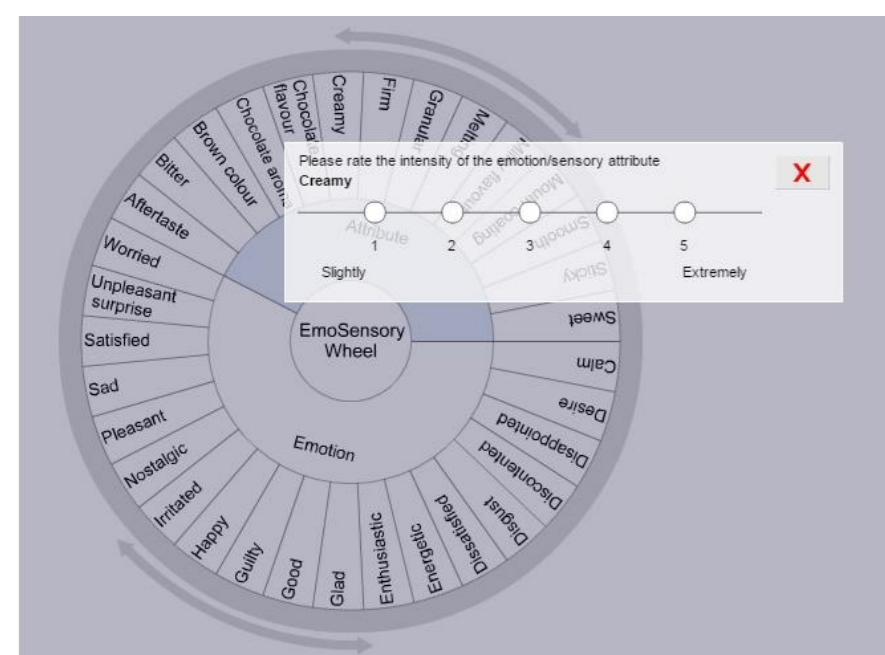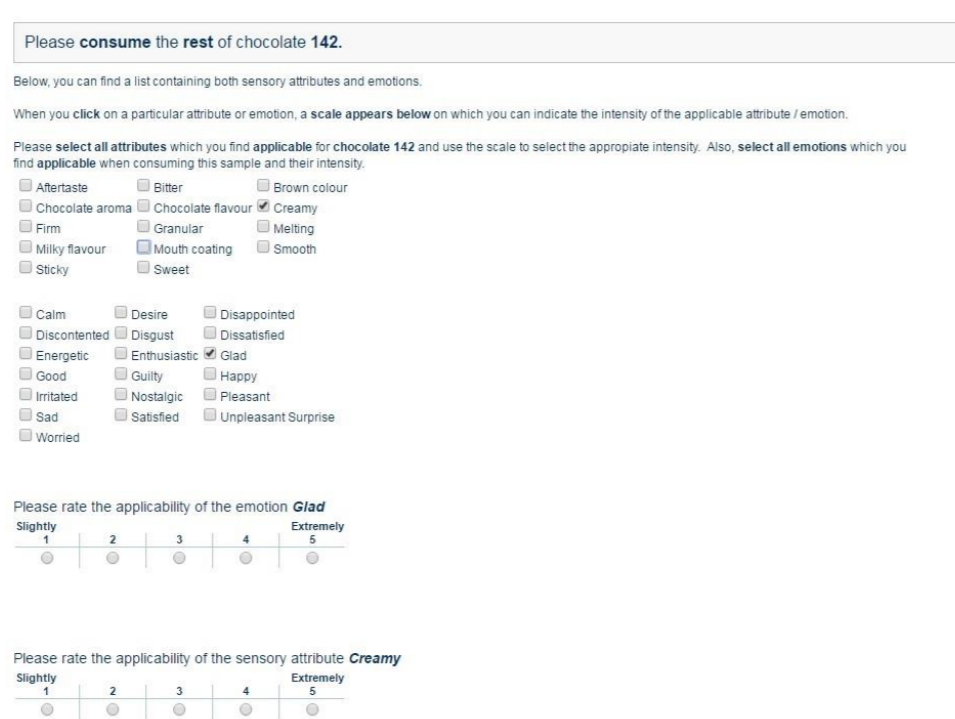
Materials & methods

PRODUCTS:

- Separate experiments were set up with two product categories: chocolate and yogurt
- 3 samples for each product category

Methods:

EmoSensory® Wheel

List-based format

CONSUMER TEST

(i) Comparison question formats (chocolate: n=50; yogurt n=50)

- Within-subjects design
- 3 Sessions:
  - 1st: introduction (training)
  - 2nd: evaluation with first method
  - 3th: evaluation with other method
  => Half of the participants first used the wheel format, other half list-based format

(ii) Comparison scaling formats (chocolate: n=117; yogurt n=105)

- Between-subjects design
- Evaluation of one product category
- Single session with one scaling format

(iii) Cross-cultural application (chocolate: n=117)

- Between-subjects design
- Evaluation of chocolate during single session

- **Software**: EyeQuestion v3.15.10 (Logic 8BV, Netherlands)

- **Location**: sensory lab at campus

STATISTICAL ANALYSIS

- IBM® SPSS 22 (USA)

Results

(i) Comparison questions formats

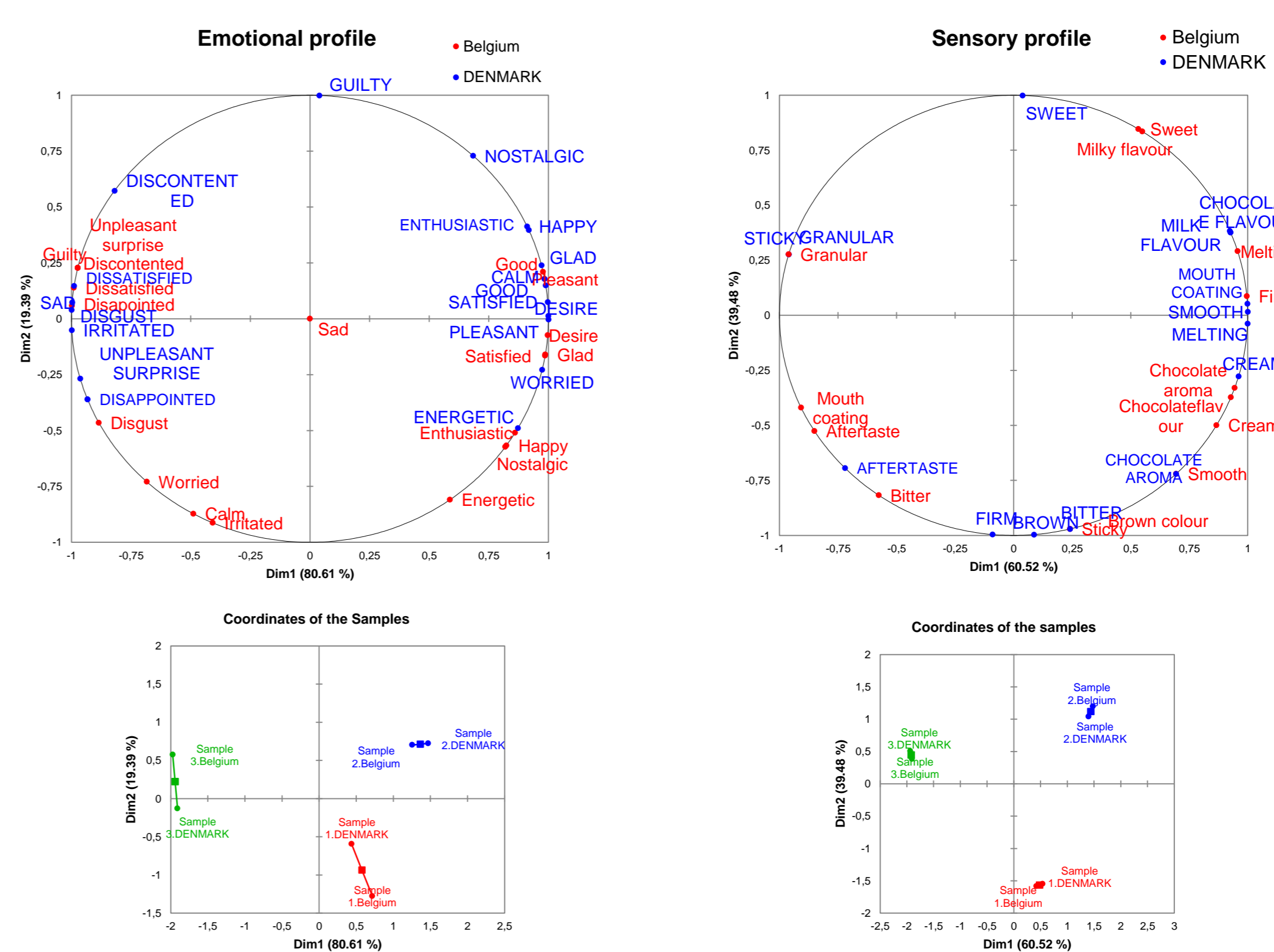|	Chocolate		Yogurt	
	List-based	EmoSensory® Wheel	List-based	EmoSensory® Wheel
Mean hedonic liking (SD)	C1: 6.0a(1.8) C2: 6.6a(1.6) C3: 4.0b(1.5)	C1: 5.7a(1.9) C2: 6.4a(1.7) C3: 4.0b(1.9)	Y1: 5.5(1.9) Y2: 5.7(1.9) Y3: 5.3(1.6)	Y1: 5.4(2.1) Y2: 5.6(1.9) Y3: 5.2(1.9)
Term usage				
Average percentage of emotional terms used to describe samples	19%	17%	16%	15%
Average percentage of sensory terms used to describe samples	41%	42%	38%	39%
Sample differences				
Number of emotional terms with significant differences among samples (p ≤ 0.05)	RATA: 13 RATA-S: 14	RATA: 14 RATA-S: 13	RATA:1 RATA-S: 2	RATA: 2 RATA-S: 2
Number of sensory terms with significant differences among samples (p ≤ 0.05)	RATA: 6 RATA-S: 9	RATA: 6 RATA-S: 11	RATA: 6 RATA-S: 6	RATA: 7 RATA-S: 6
Sample configurations				
RV between sample configurations obtained from CA of emotional data from list-based and wheel format	RATA: 0.99*** RATA-S: 0.99**		RATA: 0.99*** RATA-S: 0.99***	
RV between term configurations obtained from CA of emotional data from list-based and wheel format	RATA: 0.71*** RATA-S-: 0.91***		RATA: 0.76*** RATA-S 0.55***	
RV between sample configurations obtained from CA of sensory data from list-based and wheel format	RATA: 1.00*** RATA-S: 1.00***		RATA: 0.94 RATA-S: 1.00***	
RV between term configurations obtained from CA of sensory data from list-based and wheel format	RATA: 0.87** RATA-S: 0.87**		RATA: 0.82** RATA-S: 0.97**	

CA = Correspondence analysis;
RATA: data were analysed by only taking the frequency of selection into account; RATA-S: data were analysed by creating a summed index of the scores provided by all participants for each of the terms of the question;
Samples with different superscript letter in the hedonic liking scores differ significantly within a questionnaire format (p<0.05);
RV score significance level: **, p<0.01; ***, p<0.001.

(ii) Comparison scaling formats

	Chocolate		Yogurt	
	CATA (n = 58)	RATA (n = 59)	CATA (n = 51)	RATA (n = 54)
Hedonic liking				
Mean (S.D.)	C1: 7.2a(1.0) C2: 6.7a(1.6) C3: 5.0b(1.6)	C1: 6.7a(1.6) C2: 6.7a(1.4) C3: 5.2b(1.9)	Y1: 5.2(1.9) Y2: 5.4(1.9) Y3: 5.8(1.5)	Y1: 5.6(1.5) Y2: 5.7(1.7) Y3: 6.0(1.6)
Term usage				
Average percentage of emotional terms used to describe samples	14%a	19%b	15%	15%
Average percentage of sensory terms used to describe samples	30%a	36%b	25%a	37%b
Sample differences				
Number of emotional terms with significant differences among samples (p ≤ 0.05)	12	RATA: 12 RATA-S: 11	0	RATA: 2 RATA-S: 0
Number of sensory terms with significant differences among samples (p ≤ 0.05)	7	RATA: 6 RATA-S: 6	7	RATA: 8 RATA-S: 8
Sample configurations				
RV between sample configurations obtained from CA of emotion data from CATA and RATA questions	RATA: 1.00*** RATA-S: 1.00***		RATA: 1.00*** RATA-S: 0.99***	
RV between term configurations obtained from CA of emotion data from CATA and RATA questions	RATA: 0.68*** RATA-S: 0.71***		RATA: 0.83*** RATA-S: 0.79***	
RV between sample configurations obtained from CA of sensory data from CATA and RATA questions	RATA: 0.97*** RATA-S: 0.98***		RATA: 0.98*** RATA-S: 1.00***	
RV between term configurations obtained from CA of sensory data from CATA and RATA questions	RATA: 0.65* RATA-S: 0.57*		RATA: 0.94*** RATA-S: 0.94***	

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Samples with different superscript letter in the hedonic liking scores differ significantly within a questionnaire format (p<0.05);
RV score significance level: *, p<0.05; ***, p<0.001.

(iii) Cross-cultural application

Emotional profile

Sensory profile

Coordinates of the Samples

Coordinates of the samples

Conclusions

- ✓ Both questionnaire formats gathered similar findings, but two-third of the consumers preferred the wheel questionnaire format
- ✓ CATA and RATA scaling yielded similar performance
- ✓ Differences in the profiles were detected between the different countries, illustrating the potential for a cross-cultural comparison

The EmoSensory® Wheel is a method which can be of use for collecting both emotional and sensory data for profiling with consumers. The insights of these studies lend further support for its application in order to combine emotional and sensory measurements. This is of interest for food scientists and industry for instance in the scope of the SensoEmotional optimization of food products.