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Recording facial mimics and temporal dominance of sensations and emotions

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INTRODUCTION

- Recognized today as a reference method in temporal sensory analysis, the Temporal Dominance of Sensations (TDS; Pineau et al., 2009) has been extended to measure emotions (TDE; Jager et al., 2014) in a declarative way.
- Facial expressions analysis is a promising way for highlighting rapid and uncontrollable facial micro-responses that can explain consumer preferences (Leitch et al., 2015).

OBJECTIVES

- Test on three different product types (food products, cosmetics and video advertisements) if an implicit emotion measurement using facial recognition can capture a temporal emotion response.
- Compare results and conclusions from implicit measurements of facial recognition and TDS and/or TDE tasks.

MATERIAL & METHODS

Experimental design

<p>Home tested products:</p> <ul style="list-style-type: none"> -Food (session 1): 3 dark chocolates (tested 60s) -Video (session 2): 3 advertisements (48 to 54s) for coffee (of a same brand) -Cosmetic (session 3): 3 perfumes (tested 60s) 	<p>Face Reader procedure:</p> <ul style="list-style-type: none"> -Group A (42 panelists): recording facial mimics while testing -Recording 20 seconds « base line » (neutral emotion control) at the beginning of each session -Facial mimics were based on Ekman's theory 	<p>TDS and TDE procedure:</p> <ul style="list-style-type: none"> -Group B (45 panelists): performing TDS for chocolates or TDE for perfumes and advertisements -TDE emotions were based on the emotions of Plutchik's wheel -TDS attributes were based on previous studies
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Facial mimics analyses

1 second of video = 6 images to analyse, 1 image analysed = 8 emotion scores ranged between 0 and 1*
*computed by Emotion API of Microsoft Azure®

Individual base line
Base line 0.000 0.000 0.000 0.000 0.009 0.954 0.006 0.000

Individual emotion scores (base line removed)

Product	Panelist	Time	Anger	Contempt	Disgust	Fear	Happiness	Neutral	Sadness	Surprise
Product 2	S041	T ₁	0	0.005	0	0	0.161	-0.161	-0.005	0
Product 2	S041	T ₂	0	0.940	0	0	-0.009	-0.928	-0.005	0
Product 2	S041	T ₃	0	0.001	0	0	0.984	-0.919	-0.006	0

Removal of individual base line

Individual scores averaged over times by emotion for each sample*subject

Product	Panelist	Anger	Contempt	Disgust	Fear	Happiness	Neutral	Sadness	Surprise
Product 1	S001	-0.001	-0.009	-0.001	0	-0.242	0.208	-0.005	-0.047
Product 2	S041	0	0.001	0	0	0.106	-0.105	-0.005	0

2 tables for 2 types of analyses

Individual scores averaged over subjects by emotion for each sample*time

Product	Time	Anger	Contempt	Disgust	Fear	Happiness	Neutral	Sadness	Surprise
Product 1	0	-0.001	-0.001	0	0	-0.002	-0.004	0.043	-0.005
Product 2	60	-0.007	-0.001	0	0	0.547	-0.378	0.004	-0.002

ANOVAs based on mean emotion scores

Facial mimics emotion temporal curves

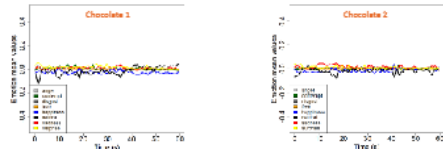
RESULTS

Analysis of facial mimics emotions (Group A)

ANOVA: Mean Emotion = Product + Subject (random Subject)
F table Table of Product Effect (Signif. codes: ** 0.001 *** 0.001 ** 0.01 * 0.05)
For each ANOVA, only facial mimics temporal curves of products the most discriminated are shown

	Anger	Contempt	Disgust	Fear	Happiness	Neutral	Sadness	Surprise
	0.5	1.17	0.85	1.58	0.51	0.59	0.87	1.02

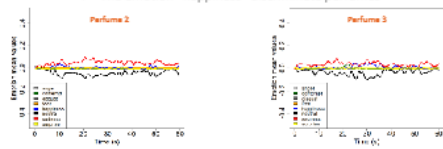
Facial mimics emotions do not discriminate chocolates



No temporality of emotions shown at panel level

	Anger	Contempt	Disgust	Fear	Happiness	Neutral	Sadness	Surprise
	0.1	0.27	0.39	0.12	3.84*	0.15	0.28	1.4

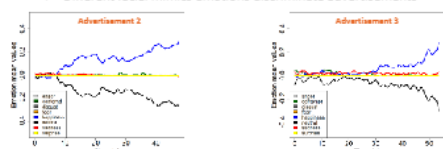
The emotion "happiness" discriminate perfumes



No temporality of emotions shown at panel level

	Anger	Contempt	Disgust	Fear	Happiness	Neutral	Sadness	Surprise
	0.18	0.64	0.14	1.29	9.23***	4.97*	8.15***	1.18

Different facial mimics emotions discriminate advertisements



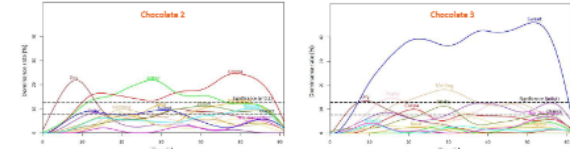
The emotion "happiness" peaks during key scenes of videos at panel level

Analysis of TDS and TDE (Group B)

ANOVA: Attribute duration = Product + Subject (random Subject)
F table Table of Product Effect (Signif. codes: ** 0.001 *** 0.001 ** 0.01 * 0.05)
For each ANOVA, only TDS/TDE curves of products the most discriminated are shown

	Sweet	Bitter	Cocoa	Fatty	Sour	Astringent	Woody	Dry	Melting	Fruity	Floral	Sticky	Nothing
	48.20***	13.28***	12.28***	7.77***	4.38*	3.81*	3.21	2.72	2.71	0.86	0.21	0.36	0.41

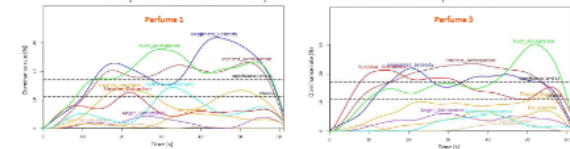
TDS sensations strongly discriminate chocolates



Specific sensation sequencially observed for each chocolate

	Surprise	Sadness	Anger	Interest	Disgust	Fear	Happiness	Trust	No Emotion
	4.35*	2.73	1.60	1.13	1.01	0.64	0.56	0.37	0.22

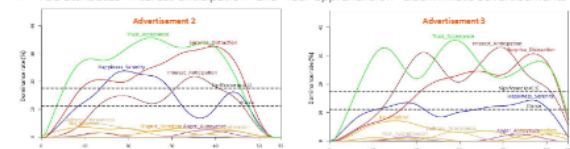
Only the TDE attribute "surprise-distraction" discriminate perfumes



Specific emotion sequencially observed for each perfume

	Surprise	Sadness	Anger	Interest	Disgust	Fear	Happiness	Trust	No Emotion
	0.22	0.38	1.18	5.84***	0.94	3.66**	2.61	2.58	1.21

TDE attributes "interest-anticipation" and "fear-apprehension" discriminate advertisements



Specific emotion sequencially observed for each advertisement

CONCLUSIONS

- Recording facial mimics enables perfumes and advertisements to be emotionally discriminated.
- Temporal patterns of emotions are observed at panel level only for advertisements.
- Declarative (TDE) and implicit (facial mimics) methods give different information.

PERSPECTIVES

- To better take into account facial mimics individual variability and protocol specificities, analyses should go deeper in data treatment.