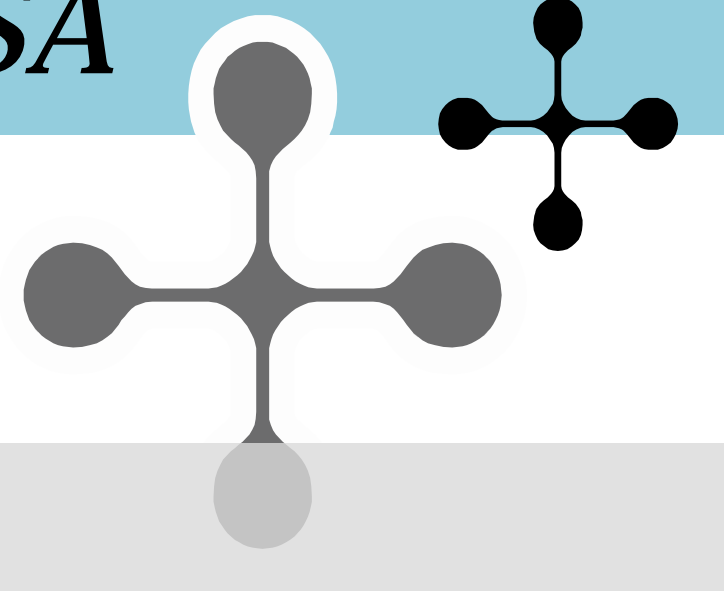


From abstract to recognizable: modeling tendencies of a basic salt solution based on affective reactions

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Abstract

Past research has demonstrated that salty taste is associated with subtle temporal characteristics. Therefore, the objective of this study was to understand the cross-modal interaction between taste and touch, specifically the relationship between consumer affective reactions to a basic salt solution and the resulting clay figure modeled to describe the sensory experience. Consumers (n=97) rated a 93 mM NaCl sample on a 9-point hedonic scale for acceptance of basic tastes and overall liking. Following evaluations, consumers molded a 1 oz piece of modeling clay into a shape that best reflected their sensory experience. Data were analyzed using a multinomial logit model, using the abstract shape as reference to evaluate the odds ratios of molding the five other shapes (p<0.05). Shapes molded were categorized into 6 groups: round (n=10), flat (n=11), long (n=8), pointy (n=11), abstract (n=15), and recognizable (n=42). Liking of saltiness significantly increased the likelihood of molding a recognizable shape over an abstract shape by 6.1, suggesting the more consumers liked the saltiness, the more likely they were to form a recognizable shape. Liking of the bitterness increased the likelihood of molding a long shape by 20.5, a round shape by 8.2, a flat shape by 6.2, and a recognizable shape by 4.2 over an abstract shape (p<0.05). Thus, when bitterness liking increased, participants were more likely to mold anything but a pointy shape compared to an abstract shape. Consumers differed in their affective reactions to a salt solution and subsequent translation of these reactions into physical shapes, supporting the existence of a cross-modal interaction between taste and touch. Information from this research will be useful in understanding the affective responses to salt, and its application in food product development by giving another avenue by which consumers can express the integration of perceptions.

Introduction

- Saltiness is accepted at different levels among consumers and can vary by food type (1).
- *Sensory Evaluation Instrument* (SEI), a non-verbal tool to elicit users' affective reactions, includes 8 objects with different shapes to create a flexible channel of communication (2).



SEI- 8 Objects with different shapes (2)

- When SEI was utilized to investigate affective reactions to a salty solution, participants wanted a shape that they could manipulate (3).

Objective

- To understand the cross-modal interaction between taste and touch, specifically the relationship between consumer affective reactions to a basic salt solution and the resulting clay figure modeled to describe the sensory experience.



Methods

- Salt Solution**
 - 97 consumers rated a 93mM NaCl solution
 - 9-point hedonic scale for acceptance of basic tastes and overall liking
- Clay**
 - Molded a 1 oz piece of modeling clay into a shape that reflected their sensory experience
- Analysis**
 - Multinomial logit model was used to analysis the data
 - Abstract shape= reference to evaluate the odds ratios of molding the other 5 shapes (p<0.05)

Participants

- 31 of panelists were males and 66 were females.
- The panelists were between the ages of 20 and 71 with an average age of 37.



Results

- The molded shapes were categorized into 6 groups: round (n=10), flat (n=11), long (n=8), pointy (n=11), abstract (n=15), and recognizable/functional (n=42).

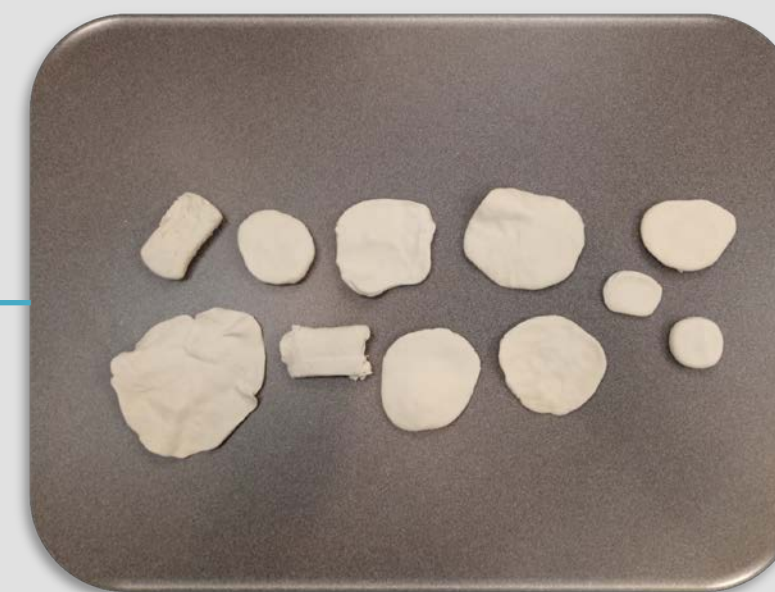
All



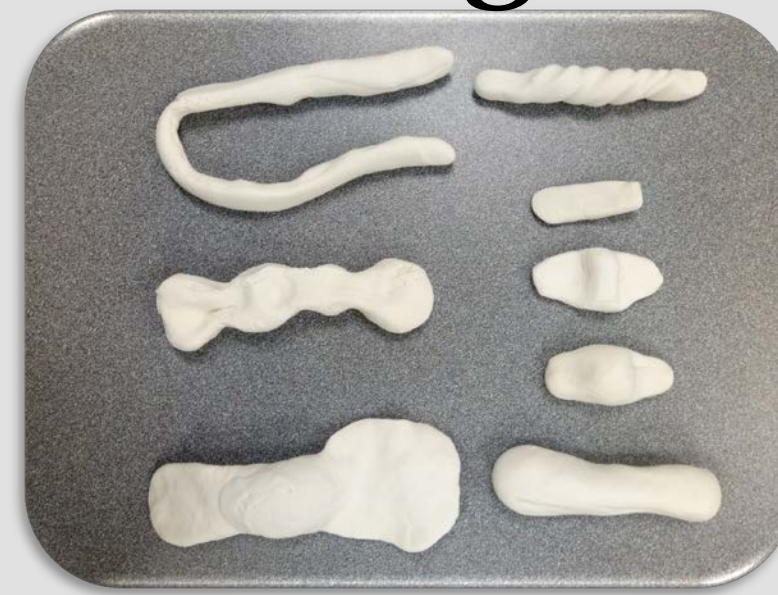
Round



Flat



Long



Pointy



Abstract



Recognizable



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Results continued

Table 1. Multinomial logit^a estimates from model^b predicting clay shape formed based on acceptance of basic tastes and overall liking by consumers (n=97).

Group ^c	Coefficient	Std. Error	P value	Odds Ratio
Round				
Salt	1.10	0.89	0.21	3.00
Bitter	2.12	0.81	0.01	8.30
Flat				
Salt	1.14	0.87	0.19	3.12
Bitter	1.81	0.81	0.03	6.11
Long				
Salt	-1.16	1.14	0.31	0.31
Bitter	2.93	1.09	0.01	18.78
Pointy				
Salt	0.88	0.83	0.29	2.41
Bitter	0.91	0.86	0.29	2.49
Recognizable				
Salt	1.82	0.71	0.01	6.20
Bitter	1.42	0.67	0.03	4.15

^aLR $\chi^2=60.52$ ($P=0.005$)
^bModel parameters included: age ($\chi^2=100.66$, $p<0.0001$), salt ($\chi^2=15.81$, $p=0.007$), sweet ($\chi^2=7.34$, $p=0.19$), sour ($\chi^2=7.04$, $p=0.22$), bitter ($\chi^2=12.37$, $p=0.03$), umami ($\chi^2=11.79$, $p=0.04$), and overall acceptance ($\chi^2=8.26$, $p=0.14$).
^cAll groups are in reference to the abstract group

- Consumers who liked the bitterness were significantly more likely to form a round, flat, long, or recognizable shape than an abstract shape.



Comments from panelists that formed above shape, "It has a good salty flavor without being bitter or sour. I tried to make a wave. This reminds me of saltiness of sea water, but in a good way. It's that pleasant taste of salt that you get in sea air."

- Forming more recognizable shapes was related to greater acceptance across many attributes, including saltiness, compared to forming an abstract shape.



Comments from panelists that formed above shape, "I liked this sample because it was very salty. I feel this solution would effectively allow food products to have the desired salty taste. I made the playdough look like a serving of French fries because this sample was very salty and reminded me of the taste of salty foods such as French fries."

Conclusion

- Consumers differed in their affective reactions to a salt solution and subsequent translation of these reactions into physical shapes, supporting the existence of a cross-modal interaction between taste and touch.

Industry Implications

- Information from this research will be useful in understanding the affective responses to salt.
- The application of modeling clay in food product development can give another avenue by which consumers can express the integration of perceptions.

References

- (1) Hayes et al. (2010) (2) Isbister et al. (2006)
 (3) Obrist et al. (2014)