



A Multisensory Approach: The Effect of Visual Cues Versus Odor on Flavor Perception



Anna Caputo and Helana Girgis
Stockton University

Introduction

- Flavor is a multisensory experience, one that is influenced by the integration of cues from all five senses: vision, smell, touch, taste, and hearing (Spence, 2015). Previous research has found that visual and odor cues can alter flavor perception. However, it has not been determined whether there are differential effects of one cue versus the other.
- To test this, participants identified the flavor of drink that either had a matching odor and color, a non-matched odor and color or had only color or odor.

This research investigated whether visual cues such as color or odor of a drink had a stronger effect on flavor perception.

Hypotheses

- Based on previous research, it is expected that odor will have a stronger effect than color for the nonmatch and single sense conditions.
- Flavor perception will be more likely to match the color and odor when both are presented as compared to single sense condition.

Methods

- Participants:** Adults: $N = 68$, $M_{age} = 21.79$, 57 Females

- Materials:** Odor: Berry, Orange, Grape
Color: Red, Orange, Purple

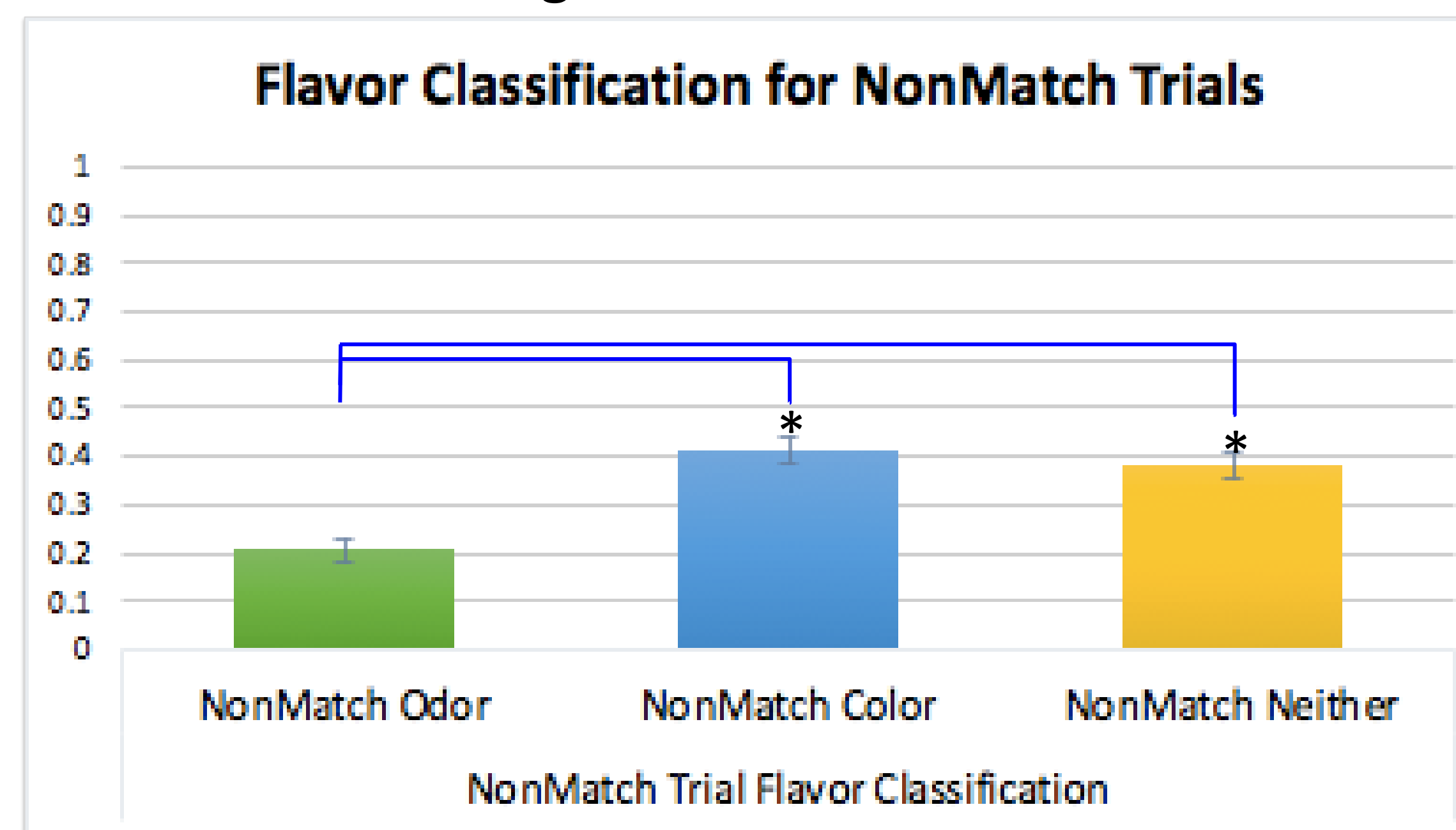


- Procedure:**
 - Participants tasted 16 drinks all artificially sweetened.
 - Asked for the flavor of the drink and their confidence on 5-point scale.

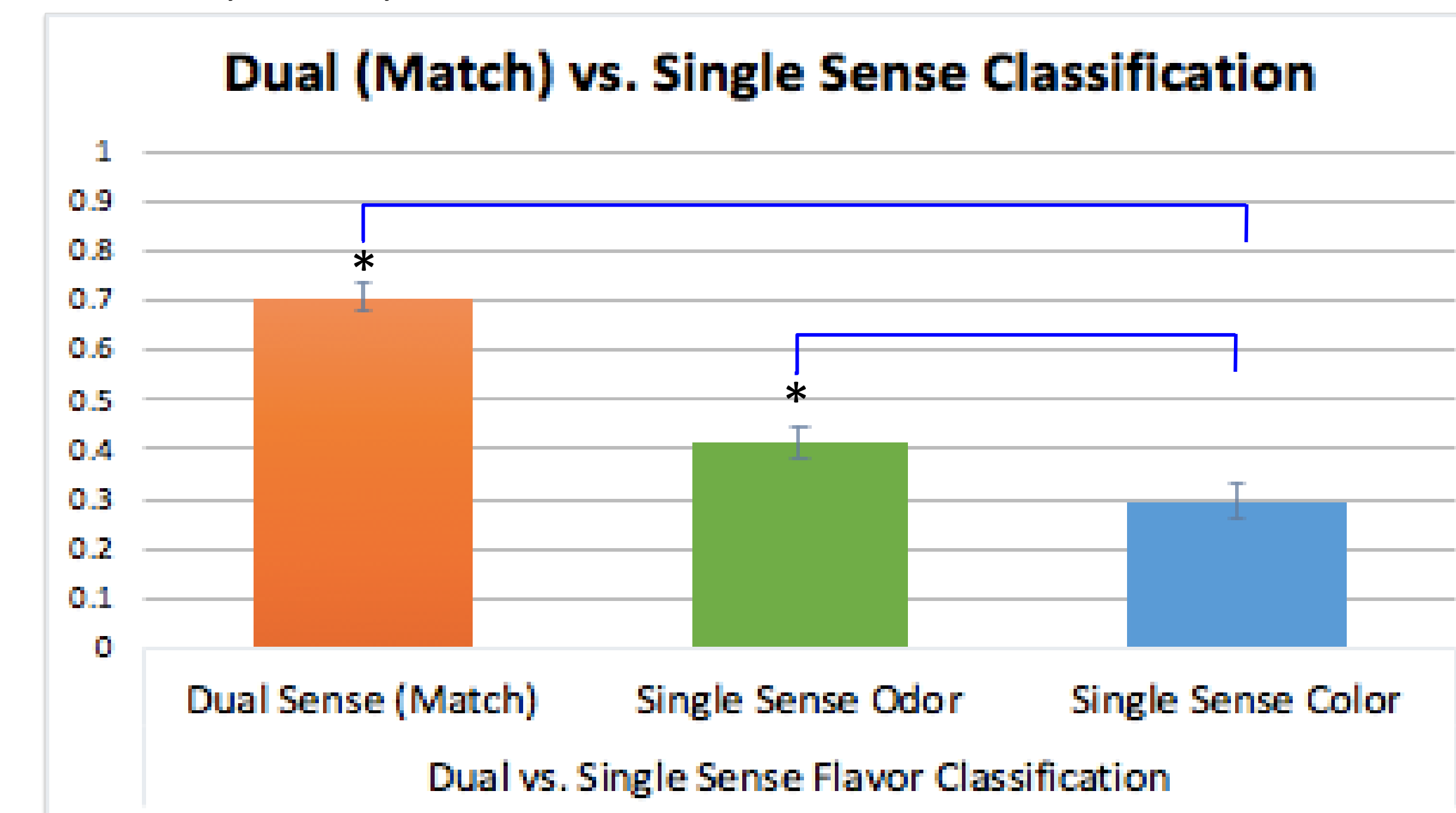
Match	Non-Match	Single Sense
Berry - Red	Berry - Orange	Berry - Colorless
Orange - Orange	Berry - Purple	Orange - Colorless
Grape - Purple	Orange - Red	Grape - Colorless
	Orange - Purple	Odorless - Red
	Grape - Red	Odorless - Orange
	Grape - Orange	Odorless - Purple

Results

A repeated measures ANOVA was conducted to analyze the effect of odor and color on flavor perception for the non-matched and the dual versus single sense conditions. Recorded flavor responses: odor, color, or neither.



Main effect of sense classification, $F(2,66) = 15.265$, $p < .001$. Post hoc analyses revealed flavor was classified by odor significantly less than color and neither.



Main effect of sense classification, $F(2,66) = 62.052$, $p < .001$. Post hoc analyses revealed that flavor perception was significantly more likely to match the color and odor when dual (two) senses were presented as compared to a single sense. For the single sense condition, flavor was classified by odor significantly more than color.

Pearson's correlation was conducted to examine if there was any correlation between trial conditions and confidence for flavor perception.

Correlations for Trial Conditions and Confidence

Variable	n	M	SD	1	2	3	4	5	6	7	8	9
1. Match Confidence	68	3.04	0.65	----								
2. NonMatch Confidence	67	2.76	0.62	.438**	----							
3. Single Sense Confidence	68	2.79	0.63	.481**	.560**	----						
4. NonMatch Odor	68	0.21	0.19	.178	.160	.172	----					
5. NonMatch Color	68	0.41	0.21	.090	.172	-.047	-.371**	----				
6. NonMatch Neither	68	0.38	0.23	-.234	-.290*	-.102	-.502**	-.617**	----			
7. Single Sense Odor	68	0.41	0.27	.106	-.023	.038	.477**	-.097	-.288**	----		
8. Single Sense Color	68	0.29	0.30	-.074	.001	-.163	-.060	.406**	-.328**	-.044	----	
9. Match	68	0.71	0.25	.311**	.095	.026	.296*	.206	-.443**	.176	.247*	----

There was a significant positive correlation between the match trials and the match confidence. ($r = .31$, $p \leq .01$) Participants who reported high confidence with match trials were more likely to select the flavor that matched the color and odor. There was a significant negative correlation between the neither response for non match trials, and for non match confidence. ($r = -.29$, $p \leq .02$) Participants who reported high confidence with non match trials were less likely to select neither for the non match trials.

Discussion

- There was partial support for the hypotheses. Flavor perception matched color and odor more when dual senses were presented, and odor was used more often to perceive flavor with one sense present. However, in the non match trials color was used to perceive flavor more than odor.
- Since it was observed for the non-match trials that color is used to classify flavor more often, and for single sense trials odor is used to classify flavor more often, it appears that not all senses are created equal.
- These results may support a stronger neural connection between the visual cortex of the brain and our gustatory system than was previously believed.