

Supplemental Online Content

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This supplemental material has been provided by the authors to give readers additional information about their work.

eTable. Performance of 45 Items on Household Survey

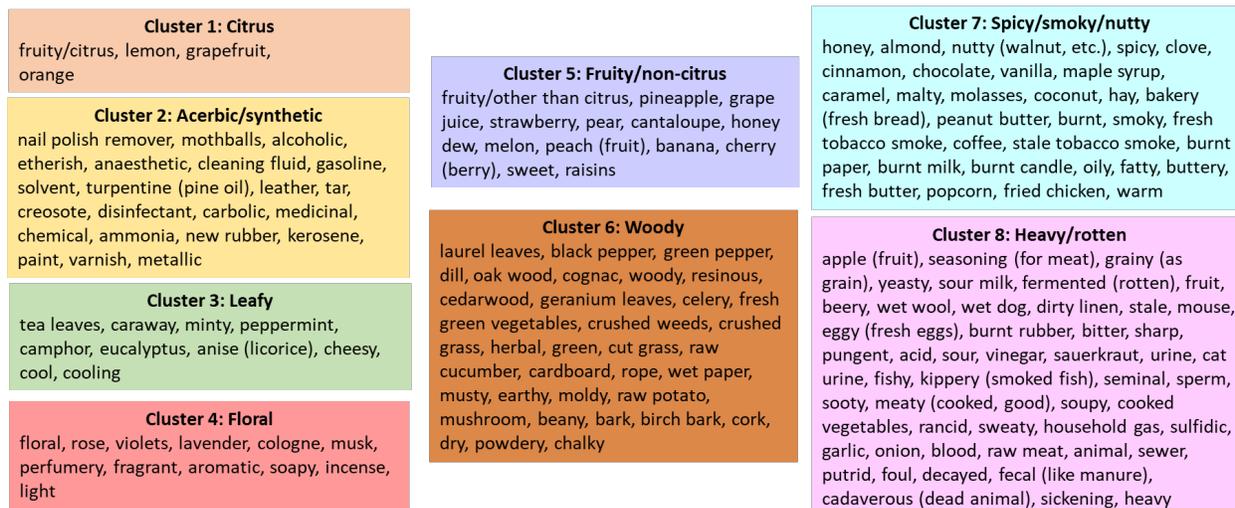
Cluster	Item	Availability of item (%)	Comparison to <i>UPSIT</i>			Comparison to <i>CGI-S</i>		
			Sensitivity ^a	Specificity ^a	Youden's J	Sensitivity ^b	Specificity ^b	Youden's J
4	soap	99%	0.67	0.93	0.60	0.86	0.92	0.77
2	disinfectant	98%	0.71	0.76	0.48	0.86	0.86	0.72
7	fresh butter	97%	0.89	0.29	0.18	0.94	0.36	0.30
8	vinegar	97%	0.62	0.93	0.55	0.73	0.95	0.68
6	black pepper	97%	0.75	0.88	0.63	0.69	0.82	0.50
7	peanut butter	97%	0.68	0.90	0.59	0.83	0.86	0.69
3	cheese	96%	0.81	0.68	0.50	0.80	0.65	0.45
6	herb (eg. rosemary, thyme, basil)	95%	0.67	0.93	0.60	0.71	0.91	0.62
7	cinnamon	95%	0.77	0.87	0.64	0.57	0.86	0.44
7	burnt candle	95%	0.82	0.85	0.66	0.86	0.80	0.66
8	garlic	95%	0.67	0.91	0.58	0.77	0.89	0.66
7	vanilla	94%	0.73	0.70	0.43	0.85	0.83	0.68
7	spice (eg. tarragon, turmeric, paprika)	93%	0.76	0.83	0.60	0.73	0.78	0.52
3	peppermint (or other mint, menthol)	92%	0.64	0.95	0.60	0.64	0.92	0.56
7	maple syrup	92%	0.92	0.75	0.67	0.62	0.76	0.38
8	seasoning (for meat)	92%	0.85	0.94	0.78	0.79	0.86	0.64
8	onion	91%	0.64	0.89	0.54	0.69	0.84	0.53
1	fruit/citrus additive	90%	0.75	0.92	0.67	0.82	0.86	0.68
7	honey	90%	0.92	0.61	0.53	0.92	0.66	0.57
7	chocolate	90%	0.86	0.65	0.50	0.83	0.72	0.56
1	lemon	88%	0.77	0.80	0.57	0.77	0.84	0.61
2	rubbing alcohol	88%	0.64	0.90	0.54	0.77	0.89	0.66
3	tea leaves	88%	0.80	0.75	0.55	0.69	0.77	0.46
7	coffee	88%	0.67	0.94	0.61	0.78	0.91	0.69
6	fresh green vegetables	85%	0.92	0.35	0.27	1.00	0.47	0.47
7	melted butter/buttery popcorn	85%	0.67	0.77	0.44	0.93	0.79	0.73
4	perfume	83%	0.62	0.92	0.54	0.92	0.94	0.85
2	nail polish remover	82%	0.47	0.89	0.36	0.91	0.96	0.86

5	banana	80%	0.77	0.76	0.53	0.92	0.80	0.72
2	gasoline	76%	0.62	0.87	0.48	0.89	0.88	0.76
8	apple (fruit)	75%	0.85	0.83	0.68	0.92	0.72	0.64
6	raw potato	73%	0.84	0.43	0.27	1.00	0.50	0.50
1	orange	72%	0.64	0.83	0.48	0.82	0.88	0.70
8	raw meat	71%	0.77	0.38	0.15	0.92	0.54	0.46
3	caraway (or fennel, cumin)	66%	0.82	0.86	0.68	0.70	0.82	0.52
4	cologne	65%	0.56	0.82	0.37	0.82	0.91	0.73
6	green pepper	64%	0.73	0.63	0.35	0.75	0.62	0.37
4	flowers	61%	0.83	0.14	-0.02	1.00	0.60	0.60
7	clove	58%	0.63	0.93	0.56	0.86	0.94	0.80
5	strawberry	55%	0.75	0.69	0.44	0.70	0.75	0.45
2	paint	53%	0.64	0.70	0.34	0.78	0.80	0.58
8	wet dog	46%	0.88	0.63	0.50	1.00	0.61	0.61
6	cut/crushed grass	43%	0.86	0.50	0.36	1.00	0.68	0.68
6	baby powder	41%	0.80	0.75	0.55	1.00	0.76	0.76
5	peach (fruit)	27%	0.75	0.60	0.35	0.75	0.67	0.42

UPSIT = University of Pennsylvania Smell Identification Test, *CGI-S* = Clinical Global Impression-Severity scale on current ability to smell, ^a Calculated by comparing participants with anosmia or normosmia on the *UPSIT* to participants who could not smell the item at all or smelled it normally on Household Survey, ^b Calculated by comparing participants who reported an absent sense of smell or not on the *CGI-S* to participants who could not smell the item or smelled it normally/less strong than normally on Household Survey

The items are ranked in terms of availability. Sensitivity, specificity, and Youden's J were calculated for each item in comparison to the *UPSIT* and the *CGI-S*. Items with less than 88% availability were excluded from consideration (gray). Face and content validity were used to exclude 10 more items (blue), leaving the final list of 14 used to develop *NASAL*.

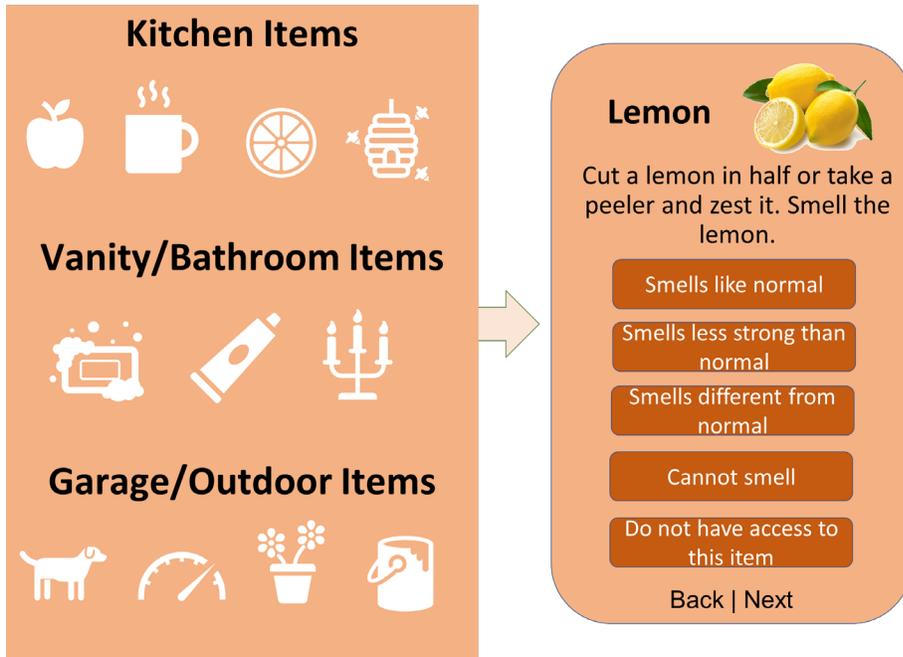
eFigure 1. Clusters of 174 Smell Descriptors



These eight clusters of smell descriptors were adapted from classification of a monomolecular odorant database derived from non-negative matrix factorization.

1. Castro JB, Ramanathan A, Chennubhotla CS. Categorical Dimensions of Human Odor Descriptor Space Revealed by Non-Negative Matrix Factorization. PLOS ONE. 2013;8(9):e73289.
2. Patnaik B, Batch A, Elmqvist N. Information Olfaction: Harnessing Scent to Convey Data. IEEE Transactions on Visualization and Computer Graphics. 2018;PP:1-1.

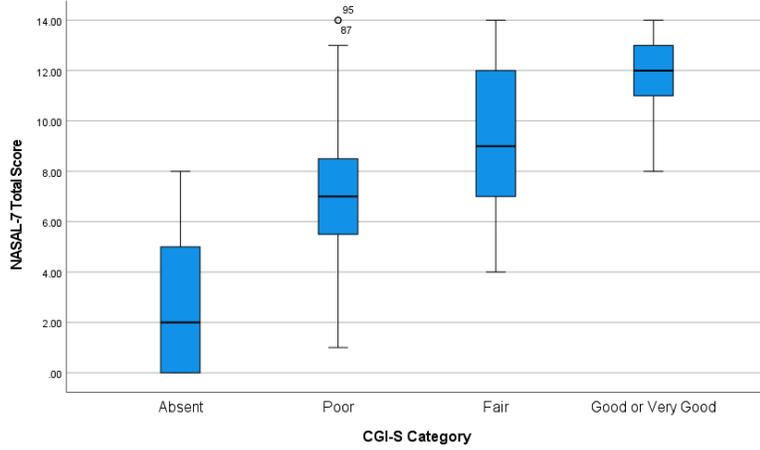
eFigure 2. 45-Item Household Survey Experience



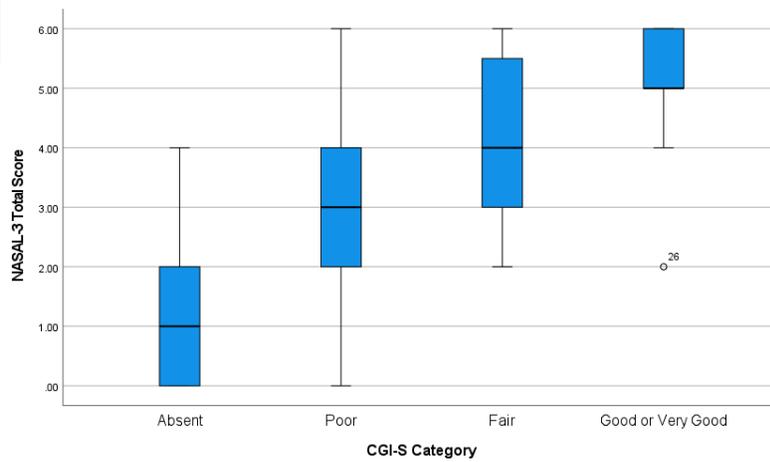
A household items survey was developed with 45 items, each with specific instructions on how to smell the item and with a standardized 5-option response. Items were separated by location: kitchen, vanity/bathroom, or garage/outdoor. Performance of each item was used to determine its usefulness in an at-home diagnostic tool for olfactory dysfunction.

eFigure 3. Boxplots of the CGI-S Response Categories with Total NASAL-7 and NASAL-3 Scores

A



B



The distribution of participant scores forms a natural gradient that helped to form the scaling system for each *NASAL* instrument.