

Deciphering the Language of Emotions to Develop an Emotion Lexicon

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Background: Recently, the investigation of consumer emotional experiences has been an area of active research^{1,2}. Understanding these experiences can provide insights that go beyond those provided by traditional liking ratings and preference responses. One challenge that can stand between researchers and the use of this new type of data is the choice of a lexicon of terms that will provide good coverage of the consumer emotion space while avoiding redundant information.

In this report, we describe a two-step approach to producing such lexicons. In the first step, we will map consumers' emotional responses using Landscape Segmentation Analysis® (LSA). LSA provides a visual but quantitative tool to study similarity between the emotions and the consumer responses. Once an LSA map has been generated, the second step is to use tools from the field of Graph Theory to find lexicons of emotions that span the emotion space with minimal redundancy. Practical considerations can then inform the choice of final lexicon, and this lexicon can then be used in future research to study emotional responses in as efficient a manner as possible.

Scenario: You work in a company that markets spray deodorants. You are interested in investigating the emotional responses generated by your main line of products, including musk, nature, and marine fragrances. You recruit 600 consumers who will each evaluate one of the three fragrances (200 per product). Based on focus group work together with past marketing experience, you also develop a list of 50 emotion terms that may be relevant to the consumer.

Respondents come to a central location on two successive days to evaluate their assigned fragrance on test strips in odor chambers. They are instructed to take one sniff and then rate a balanced set of 5 emotion terms for a total of five sets per day. Each emotion is rated on a 5-point scale, a higher score indicating that the fragrance conveys that emotion more strongly. The respondents take a two minute break in-between sets for olfactory recovery, and each session lasts approximately 30 minutes.

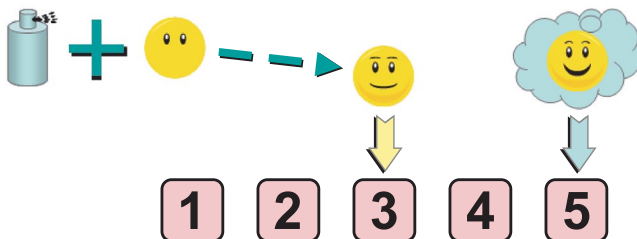


Figure 1. Visualization of a “3” on a 5-point scale for the “happiness” emotion elicited by a fragrance.

Unfolding Emotional Responses to Products: LSA is a multivariate mapping method that was originally developed to locate product and consumer ideal points using hedonic responses to product evaluations. But LSA is based on similarity, which makes it very versatile^{3,4,5,6}.

When investigating consumers' emotions, we can use LSA by considering a high score on a rating scale to indicate a high degree of resonance between the listed emotion and the consumer's emotional state. This process is illustrated in Figure 1. Upon smelling a fragrance, for instance, the respondent is asked to indicate her degree of happiness on a 5-point scale. A “5” will indicate that the term resonates well with her emotional state while a lower score indicates less. In this example, a score of “3” is generated, so the emotion resonates to a moderate but not strong degree.

Modeling the consumer emotion ratings for a single product or a set of products leads to a map in which consumers are placed close to emotions that resonated with their experiences and far from those that did not. Different terms may resonate with different consumers – if so, this fact will be revealed as segmentation within the LSA map. In addition, if two emotions carry similar information, they will elicit similar response patterns from consumers and hence be located close together. If several products are evaluated, this map will also reveal how different products elicit different emotions. And finally, using this map, the original full list of emotions can be reduced to a more manageable number to be used in subsequent research.

Step 1 – LSA Analysis of Emotions: Figure 2 shows the locations of the consumers' emotion states corresponding to their emotional responses to the fragrances. Figure 3 shows the same LSA map but with the emotion terms shown against a contour background of emotion state densities. In this figure, negative emotions appear in white and positive emotions appear in yellow. For clarity, only a few emotions have been identified. From these maps you notice that: the musk fragrance emotion states tend to be more in the top left area, the nature fragrance states tend to be more in the top right area, and the marine fragrance states tend to be more toward the lower area. From this analysis you conclude that the musk fragrance elicited the rapture, indulgence, and bliss

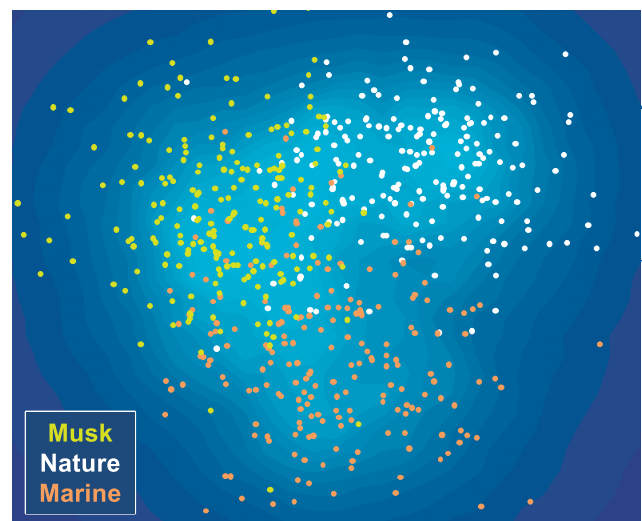


Figure 2. LSA map showing consumer emotional experiences within the unfolded emotion space.



Figure 3. The tested emotions within the emotion space. For readability, not all emotions are labeled.

emotions; the nature fragrance elicited the affection, relaxation, and fondness emotions; and the marine fragrance elicited the joy, exhilaration, and fun emotions.

You now use the LSA map to reduce the number of emotions in the lexicon, while preserving the underlying structure of the consumer emotion space.

Step 2 – Finding Lexicons using Graph Theory: Once the consumer's emotion space has been mapped, the relative location of each of the emotions can be used to reduce the total number of emotions in the lexicon. This can be done using Graph Theoretic Analysis (GTA). This technique, is useful when applied to problems involving extremely large numbers of possible combinations^{7,8,9}. For instance, if we want to select 30 emotions from a set of 50, there are more than 47 trillion possible lexicons. In this present application, GTA provides lexicons of a given size that spread the consumer emotion space as well as possible.



Figure 4. A maximally independent emotion lexicon.

Typically, several optimal lexicons will be uncovered. From this short list of optimal lexicons, a final choice of lexicon can then be made using other practical considerations, such as the maximal use of certain key emotions identified by marketing.

Choosing an Optimum Set of 30 Emotions: Based on an examination of the LSA map, together with the results of internal discussions, you decide to seek a lexicon of 30 emotions – 23 positive and 7 negative. You partition the positive emotions from the negative emotions, and use the distances between the emotions in the LSA maps as a measure of similarity between pairs of emotions. From this pairwise information, you conduct GTA on the positive and negative emotions separately, finding several optimal lexicons in each case. If needed, you could conduct the same analyses in search of larger or smaller lexicons.

Figure 4 shows an optimal lexicon of 30 total emotions highlighted on the LSA map of the consumer emotion space. In this figure, the selected negative emotions are white and the selected positive emotions are yellow.

Conclusion: Emotions are an inherent part of the consumer's experience – research that investigates how consumers react to beverage, food, or personal-care products has the potential to provide new insights on consumer perception and choice. However, the extensive number of possible emotions can make the scientist's task daunting. The two-step approach described in this report illustrates how this task can be simplified by first visualizing the space of consumer emotional experience and then selecting a lexicon that spreads this space as effectively as possible.

References and Notes

1. King, S. C., and Meiselman, H. L. (2010). Development of a method to measure consumer emotions associated with foods. *Food Quality and Preference*, **21**(2), 168-177.
2. King, S. C., Meiselman, H. L., and Carr, T. B. (2010). Measuring emotions associated with foods in consumer testing. *Food Quality and Preference*, **21**(8), 1114-1116.
3. Ennis, D. M. (2001). Drivers of Liking® for multiple segments. *IFPress*, **4**(1), 2-3.
4. Ennis, D. M., and Rousseau, B. (2004). Motivations for product consumption: Application of a probabilistic model to adolescent smoking. *Journal of Sensory Studies*, **19**(2), 107-117.
5. Ennis, D. M., and Rousseau, B. (2004). Product-concept fits. *IFPress*, **7**(3), 2-3.
6. Rousseau, B., Ennis, D. M., and Rossi, F. (2012). Internal preference mapping and the issue of satiety. *Food Quality and Preference*, **24**(1), 67-74.
7. Ennis, J. M., Ennis, D. M., and Fayle, C. M. (2010). Optimum product selection for a Drivers of Liking® project. *IFPress*, **13**(1), 2-3.
8. Ennis, J. M., Fayle, C. M., and Ennis, D. M. (2011). From many to few: A graph theoretic screening tool for product developers. *IFPress*, **14**(2), 3-4.
9. Ennis, J. M., Loss, C. R., Nestrud, M. A., and Rossi, F. (2011). Combinatorial tools in Sensory science and consumer research. *Workshop presented at 2011 Pangborn Sensory Science Symposium*.