#20 - What is the 'unique' contribution of correlated attributes to the consumer's overall impression of a product?

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Background

When consumers provide an overall reaction to a product such as an overall liking rating, they weight various sensory components of the stimulus differently e.g. appearance or flavor etc. The fact that liking of component sensory aspects often are correlated makes it difficult to isolate the individual contribution of any single component to overall liking.

It can be useful to determine the individual contribution of a single sensory component toward an overall impression. This can be an indicator of a priority of sensory dimension(s) to focus attention on from a product innovation or renovation aspect.

Objectives & Approach

The objective of this work is to establish a practical approach for determining the unique contributions of correlated sensory components to an overall consumer measure such as overall liking.

The approach uses linear regression to calculate the amount of variability in the overall measure (R^2) that is explained by each sensory component individually and by all possible combinations of components (2-way, 3-way etc.). The R^2s of the models are then used to calculate the unique contributions of all of the components and all of their combinations.
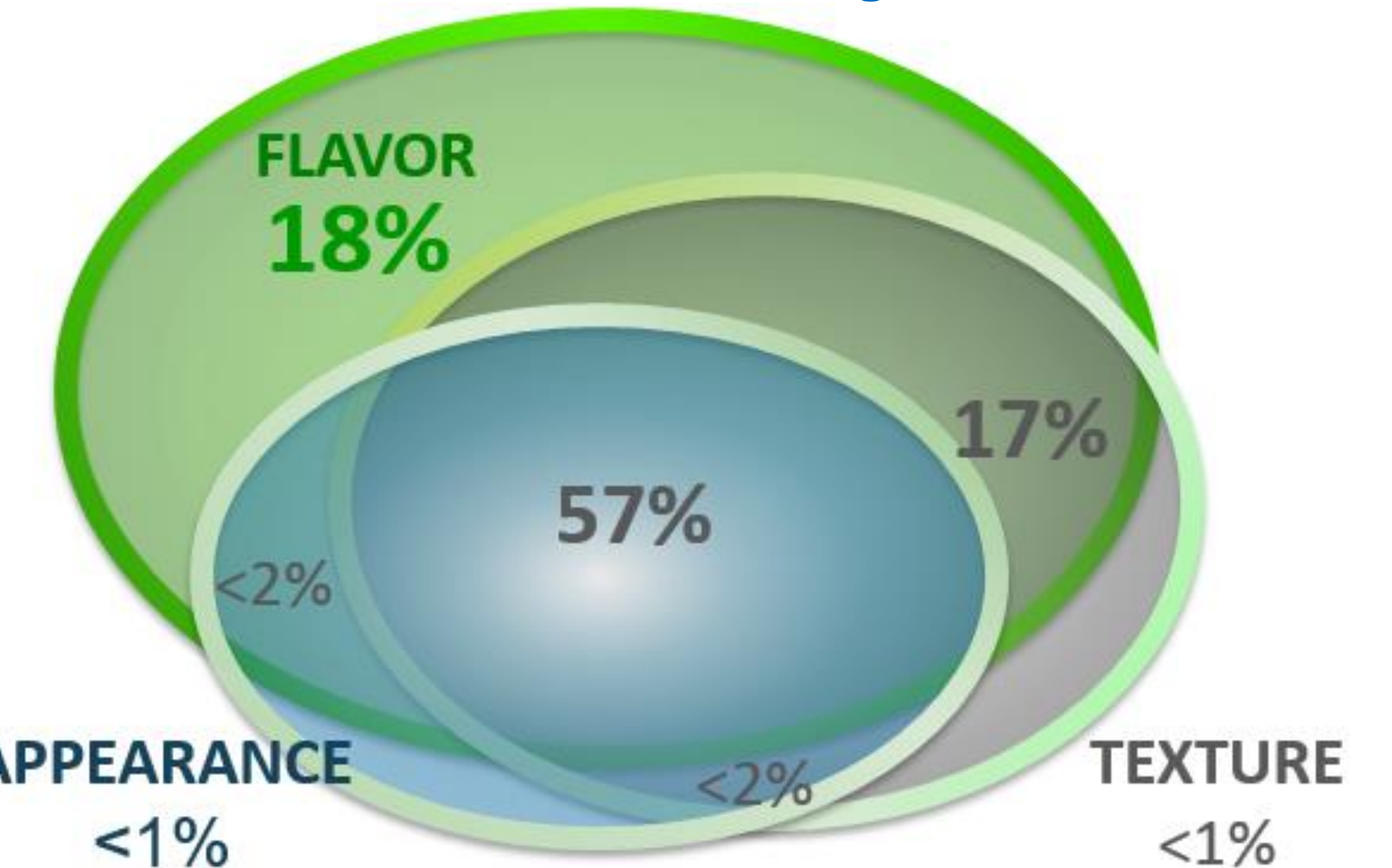
Example

In a ten-product category appraisal, regression analysis was used to identify the amount of variability in overall liking that was explained by the individual and combined effects of flavor, texture, and appearance. The unique contributions of the individual components and their combinations was then extracted from these R^2s.

For example, the unique contribution of appearance liking (APL) is $R^2_{Total} - R^2_{FL-TXL}$ (93.8 − 93.0 = 0.8). Similarly, the unique contribution of flavor liking (FL) is $R^2_{Total} - R^2_{APL-TXL}$ (93.8 − 75.9 = 17.9). The unique contributions of combinations of components, such appearance and flavor (APL-FL), for example, are then calculated as:
$R^2_{Total} - R^2_{TXL} - APL - FL$ (93.8 − 74.0 − 0.8 - 17.9 = 1.1).

Model	R^2		Effect	Unique Contribution
APL	60.1		APL	0.8
FL	91.3		FL	17.9
TXL	74.0		TXL	0.3
APL-FL	93.5		APL-FL	1.1
APL-TXL	75.9		APL-TXL	1.4
FL-TXL	93.0		FL-TXL	15.5
APL-FL-TXL	93.8		APL-FL-TXL	56.8

APL: Appearance Liking; FL: Flavor Liking & TXL: Texture Liking

For Product Category A, the largest unique contributor to Overall Liking is Flavor

FLAVOR 18%
17%
57%
<2%
APPEARANCE <1%
<2%
TEXTURE <1%

Conclusions

The complexity of products and concepts makes it difficult to determine the unique contribution of a single sensory component isolated from those of other sensory components. For example, in the present example, 57% of the variability in overall liking is shared among appearance, flavor and texture.

This method provides a simple and practical approach to calculating the unique contributions of individual components and their combinations to an overall impression. In the spirit of data before doing, this analysis is leveraged to provide insight into Key Sensory Attribute drivers by product category.