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Ipsos Marketing

Sensory Spatial Segmentation

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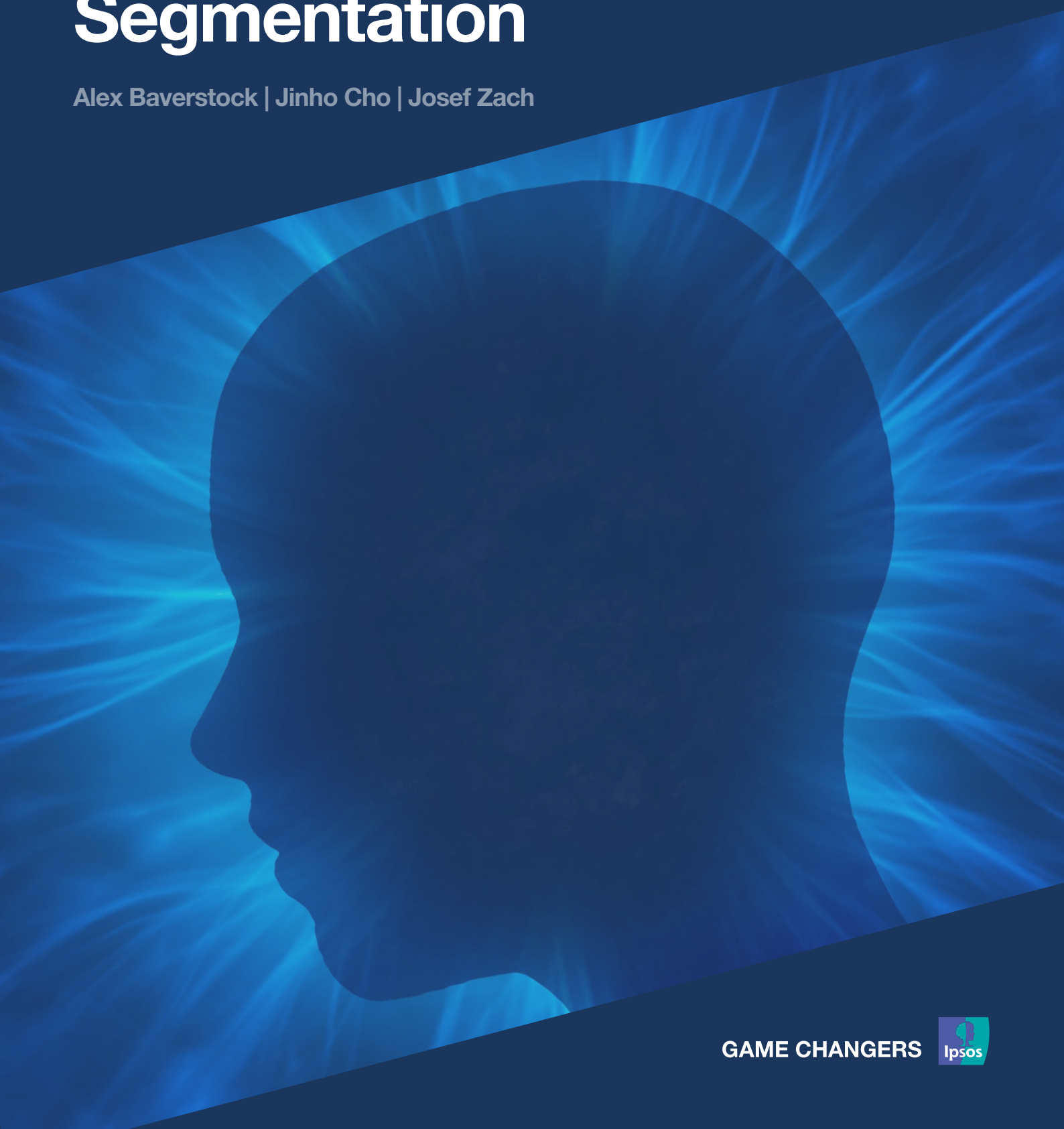


GAME CHANGERS

Consumer-based preference segmentation studies can be complex and costly undertakings. Prompted by this, Ipsos has developed a new approach – Sensory Spatial Segmentation (SSS) – to deliver a segmentation solution on a smaller incomplete test design. Not only does SSS meet this requirement, it also challenges the widely-held assumption that multi-day complete designs are necessary for the strongest results. By applying this approach, we can see that incomplete designs deliver us better consumer preference data, with the added benefits of significantly reduced study time and investment.

Consumer preference segmentation and the requirement for a new solution

Identification of consumer preference segments in product development research is of great use to R&D and Marketing functions. We know that products are not universally liked. For instance, some people like a sweeter soft drink while others prefer a less sweet or aromatic flavor profile; some people like a skin cream to be smooth and quickly absorbed while others are more concerned by its fragrance. Whatever the product, understanding how it delivers against the different consumer preferences that exist in its potential market is critical for understanding appeal and ultimately sales success. Furthermore, knowing the range of different preferences that exist within a given category enables a manufacturer to develop a portfolio of product variants and line extensions that can maximize the total buyer base.

The research methodology for identifying and understanding possible preference segments within a category is based on the combination of sensory profiling data (usually objective product descriptions from a trained sensory panel) and consumer liking data (based on product trial) for a range of products. The ability to identify different preference segments is contingent on testing a wide variety of products to represent the key sensorial attributes (e.g., flavor, texture, fragrance) present in the category.

Traditionally, segmentations are developed using a cluster analysis, which requires consumers to test all the products (i.e., a complete design). With too many products to test in one sitting, this usually means consumers having to come to a central location over several consecutive days to provide their feedback on all products. Although costly, this is possible for many product categories, particularly foods and drinks. However, manufacturers of personal care or home care products face the problem of either asking consumers to test all products in an unrealistic way in central location (e.g., sniff or patch testing of samples), or conducting a very long study with sequential in-home product placements. For the latter, an incomplete design is typically used because it is prohibitively expensive to recruit and maintain a representative sample of participants to test all available products.

The challenge to produce a reliable and meaningful consumer preference segmentation solution to satisfy all clients was the stimulus for Ipsos to develop our new approach, Sensory Spatial Segmentation (SSS). In doing this we have also learned that multi-day complete designs are not always necessary for the best understanding of consumer preferences. Our findings show that an incomplete design often gives us better discrimination and stronger segmentation solutions, with the added benefits of significantly reduced study time and investment.

Delivering robust segmentations even with incomplete designs

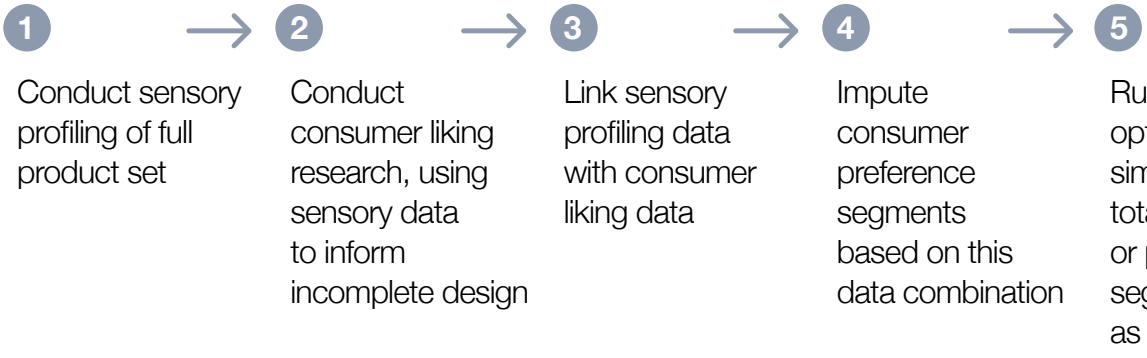
Sensory Spatial Segmentation uses the combination of sensory profiling data and consumer liking data. The sensory profiling data is based on the full range of products in the test, but the consumer liking data can be from either a complete or incomplete design. (In the case of an incomplete design, this should be checked with the sensory data to ensure each consumer tests examples from across the full sensory space.)

Our proprietary algorithm uses the positional information of the products on the multi-dimensional sensory space and links this with the consumer liking scores. Knowing each consumer's opinion of the products tested, in combination with the sensory inter-relationships between products, allows us to allocate consumers with similar liking patterns into segments. For incomplete designs, there is no filling-in or replacement of the missing consumer liking data.

Further, SSS can explore a range of possible segmentations, and allows us to consider the client's product portfolio and the competitive context in directing these possible solutions. This means that the learnings are more easily integrated into the client's business environment.

SSS ensures that a robust and relevant segmentation solution is possible, whether from a complete or an incomplete design.

Figure 1. Outline of basic project steps in a consumer preference segmentation using SSS



The case for adopting incomplete designs more widely in consumer preference testing

Our Sensory Spatial Segmentation approach has been validated on fifteen different multi-day consumer preference studies across multiple product categories and geographies. In these validations we applied the SSS approach to both the complete consumer liking data set and that derived from the first day consumer scores (i.e., mirroring a random incomplete design).

In doing this, we confirmed that the segmentation solutions from SSS based on the incomplete data set were stable and reliable. In addition, this validation also showed that the segmentation solutions from the first day consumer results were generally *more* discriminating than those based on the total data set.

Figure 2. Illustration of how the same segmentation solution from SSS discriminates between consumers based on their responses on the first day of testing (i.e., replicating a random incomplete design) and on the third day of testing. In the final day, consumer liking data has lower variance and the preference segments are significantly less well defined.

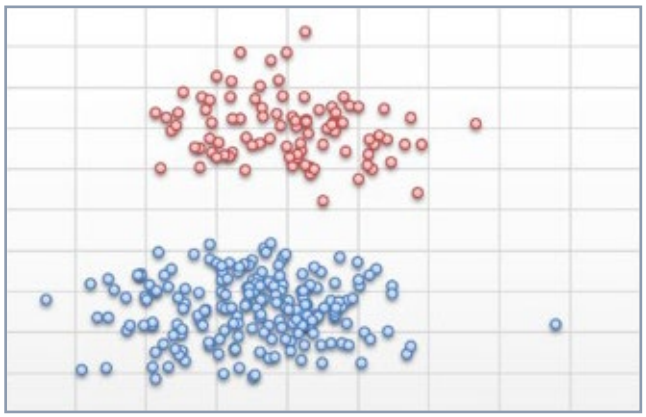


Figure. 2a: Consumers' position in the sensory space after day 1

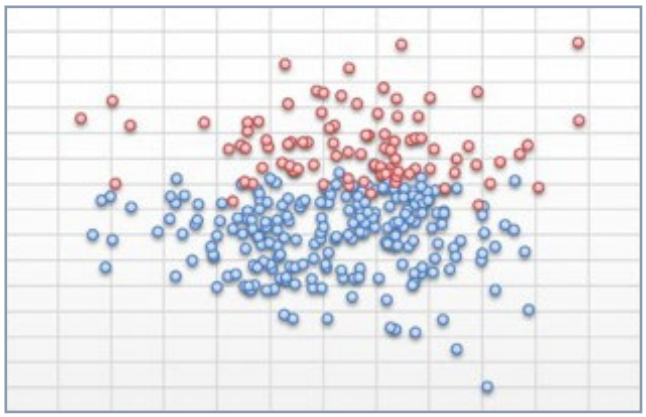


Figure 2b: Consumers' position in the sensory space after day 3

Figure 3. Range of mean consumer liking scores (difference between highest and lowest rated products) on the first day of testing compared with that across all three days, for the total test population and for a segmentation solution derived from SSS. The range for the first day of testing is significantly larger.

	Total Population	Segment 1	Segment 2
Day 1	2.47	3.64	2.97
Day 1+2+3	2.24	3.07	2.24

Based on three-day test of sixteen non-alcoholic beverages in Philippines, 2017

Our investigations show that on the first day of testing consumers react more strongly to products they like and dislike, and they better discriminate between products on the first day as compared to the second and third days of testing. This makes good sense. In tests such as these, consumers are exposed to a much wider range of products than they normally handle in their daily lives. Consequently, their preferences may adapt to a higher tolerance for products that were originally less liked (i.e., they get used to them), or a lower tolerance for products they originally preferred (i.e., too much of a good thing).

The result is that liking data captured in the second and subsequent days of testing becomes 'flatter' and less representative of consumers' true reactions. This data may be no more helpful to our overall understanding of the product set in question beyond the increased statistical reliability from the larger sample size.

If this is the case, and we are not forced into using complete designs by the limitations of traditional cluster analysis for segmentation, then why should we default to these large studies? By reducing the interview burden for each consumer, and reducing the costs of fieldwork and sample production / procurement, the total project investment can be reduced by as much as 50%.

Product Optimization can now be considered by more clients, and integrated into more product development programs, than ever before.

Appendix: Case study – Sensory Spatial Segmentation for incomplete designs

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Introduction & Objectives

To strengthen their competitive edge, L'Oréal wanted to identify the sensory drivers of consumer liking for a personal care product in a target country. Key objectives of the blind in-home usage test were to:

- understand the drivers of liking, strengths and weaknesses of the existing personal care products;
- identify new product opportunities / white space for the target consumer;
- provide guidance to product development for quality improvement.

Given the nature of the product, an in-home use test using an incomplete block design (three products out of five) was designed. With an incomplete design, a new segmentation analysis was needed since classic cluster analysis only works on a complete data matrix.

Methods

N=275 women, aged 16 -50 years old. Current users of target product. The sample is representative of a variety of women who have specific requirements to the given product.

Sensory descriptive, chemical-analytical and consumer acceptance data were collected on five L'Oréal personal care products in November 2016.

Blind usage test with in-home product placement.

Sequential monadic product appraisal: each respondent tested three out of a total of five personal care products for one week, using an incomplete design protocol (N=165 per product). All appraisal interviews were conducted after two days of each product use.

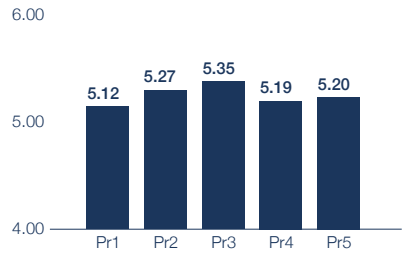
Data analysis: Sensory Spatial Segmentation (SSS)

By identifying the area in the multi-dimensional sensory space that individual consumers liked, they could be allocated to liking segments. SSS took individual consumer liking scores without filling in or replacing missing data, utilising the sensory descriptive information of all products. The positional information of the products on the multi-dimensional sensory space were linked with the individual liking scores. This allowed us to tell which specific product characteristics a consumer liked. Consumers with similar liking patterns were grouped into segments, which could be characterized by the sensory and analytical information available.

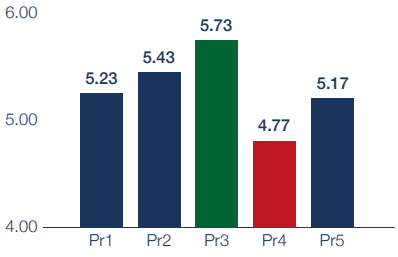
Sensory & analytical data

Attributes	Pr1	Pr2	Pr3	Pr4	Pr5
A1	1.5	4.0	3.0	0.5	5.0
A2	2.5	3.5	4.0	4.5	5.0
A3	3.5	1.8	2.8	3.0	2.5
A4	3.0	2.7	1.8	2.0	4.0
A5	2.3	2.0	1.0	1.5	4.0
A6	3.0	1.8	3.5	3.1	1.5
A7	3.8	3.5	3.3	3.4	2.7
A8	3.8	2.3	2.1	2.4	2.4
A9	4.0	3.8	2.5	4.0	2.9
A10	2.1	1.4	2.6	2.0	3.6

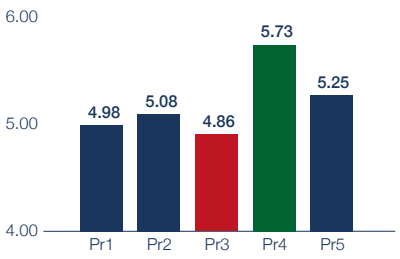
Overall Liking - Total



Overall Liking - Segment 1



Overall Liking - Segment 2



Sensory-wise, the five products differed in many attributes. For the total population, no significant difference was found between the five prototypes. After applying SSS segmentation, two distinct preference groups were found.

	Segment 1	Segment 2
Segment size	56%	44%
Segment profile	Slightly higher social grade	Slightly lower social grade
Product-related concerns	Normal state	Concerned about defects
Drivers of product preference	Low Functionality High Parameter A	High Functionality Low Parameter A

Conclusions & Next Steps

Sensory Spatial Segmentation has helped the client to identify two distinct preference groups with opposite desires as to the sensory properties of products, when currently there is only one product type in the market. As a follow-up exercise, consumers in the center of each segment were re-contacted for additional qualitative exploration to confirm the opposing drivers of liking. These findings have led to a new business opportunity: introducing an additional product in the market, leveraging quantitative and qualitative learnings to position both products according to consumer desires.

References: Cariou V., Wilderjans T., "Consumer segmentation in multi-attribute product evaluation by means of non-negatively constrained CLV3W", Food Quality and Preference, (2017). Article in press.

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Ipsos ProductQuest helps clients accelerate growth by putting the consumer voice at the heart of their business decisions. We understand the challenges of today's world and deliver solutions that help you get to the next step faster and develop better products that will win in market.

As the world's largest product testing advisor, we test 7,000+ products annually and have successfully launched 20,000+ products under the Ipsos product testing framework. Our team of experts is well-versed in all of the touch points that go into developing and launching successful products.

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