

ISMC 2019
15th International Strategic Management Conference

**USING MIND GENOMICS TO UNDERSTAND THE SPECIFICS OF A
CUSTOMER'S MIND**

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Abstract

Approaching customers with the right message has always been a key objective of companies selling products and services. Achieving this target demands understanding what customers think about specific ideas and messages, determining whether there are different mind-sets for the same topic, and if there are, assigning people to the right mind-set. The advent of Internet has increased the opportunities for the advertising component. Companies need to have the tools to conceptualize these mind-sets 'on-demand,' for any topic, collect the relevant data for this specific topic, followed by a way to uncover mind-sets and assign new people to the mind-set. The issue is to achieve the foregoing with low cost, on demand, in areas where there is no behavioral or psychographic data, and then apply the results in actionable way. Several approaches have been created and used to address the problem, but all require either behavioral or expensive psychographic data, and time to do the research. This paper presents the emerging new technology of Mind Genomics, a marriage of experimental psychology and data analytics. Mind Genomics reveals, through simple, affordable, iterative experiments the specifics of what features of a service or product appeals to an individual through the notion of mind-sets, and then a method for assigning any new person to the most appropriate mind-set. A simple set of questions, embodied in the PVI (personal viewpoint identifier), assigns the new person to the mind-set, doing so in 'real-time.' The results are both better knowledge of the topic, and better sales performance.

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Keywords: Digital marketing, mind genomics, personal viewpoint identifier.



1. Introduction

This paper presents a different approach to uncover consumer's mind. The approach is referred to as Mind Genomics (MG), a new technology which tries to understand the minds of consumers by their reaction to messages (Moskowitz, Gofman, Beckley, & Ashman, 2006; Moskowitz & Gofman, 2007). The objective is to create a scalable, cost-effective, rapid, archival, and scientifically powerful system, having application for the creation of NEW KNOWLEDGE and for the profitable use of this knowledge for social, educational and commercial use.

What it is discussed in this paper is the possibility to create a science-based system which creates a fundamental as well as action-oriented base knowledge in virtually any topic where human judgment is relevant. The objective is to use the system to populate the data-based of any topic, leading one to rapidly and profoundly understand the mind of the consumer regarding the specific topic. The objective is to create a 'Big Data of Relevant Information'.

2. Literature Review and Theoretical Framework

The standard for understanding subjective reactions to service or products has been to directly ask people in focus groups or other qualitative methods about a particular topic (Esmerino et al., 2017). The more advanced methods are reserved for the quantitatively oriented practitioners, who create surveys, present them to many consumers, and analyze the results using a simple average, or multivariate statistics. Often surveys begin with topics about what one does in general, such as food preferences and food habits (Lusk, 2017), now evolving down to a momentary survey after a relevant experience to ask '*How did we do?*, or '*Would you recommend us to someone with whom you do business?*' the now-ubiquitous NPS, (Net Promoter Score), analyzed by (Artz, 2017).

There are other approaches which have tried to understand the mind of consumers and the role of different marketing techniques. Efforts to understand the mind of consumers have been around since the early days of consumerism. Rindell, Korkman, and Gummerus (2011) analyzed the relevance and the role of brand images, in terms of how they impact consumer practices. They reported that that in order to identify and categorize consumer practice, consumers develop idiosyncratic systems, novel and personal practices related to brands.

Kniazeva (2008) analyzed the consumer perceptions of genetically modified food, in order to understand and to explore messaging to bring consumers closer to accepting the idea of this GMO food. The research used detailed interviews. Yarrow (2014), provides interesting insights about the new motivations and behaviors of shoppers, taking marketers where they need to be today. He focuses on what has come to be accepted as deeply psychological, often unconscious relationships, which people form with products, retailers, marketing communications, and brands, respectively (Zemel, Gere, Papajorgji, Zemel, & Moskowitz, 2018a). If Yarrow's suggestion is to be followed, Yarrow (2014), this will require that each problem eventually being solved by expensive, extensive, long, and tortuous experimentation. During the last two decades, the notion of mind-set segmentation has become increasingly clearer and used with success in different areas of business activities. Segmentation refers to the approach of dividing people in clusters by the pattern of their responses. Traditional segmentation gathers people in clusters based on individual attributes such as (e.g., age, gender, social class, income). This clustering approach

reflects “*Who they are*”. Another clustering approach is the so-called psychographic segmentation that is based on “*What they believe*” (Vij, 2012; Mitchell, 1994). With the advent of Internet, a new clustering approach started appearing widely and it is based on the pattern of “*What they do*” electronically when people use the internet say for shopping purposes (Gere, Zemel, Papajorgji, & Moskowitz, 2018).

3. Steps of Mind Genomics Research Process

MG relies on the concepts of inter-market variability and horizontal segmentation, ideas pioneered by American market researcher, psychophysicist, Moskowitz (Moskowitz et al., 2006; Milutinovich & Jacob, 2016), who suggested that in any area where “opinion holds sway,” one can discover different segments of consumer needs. In other words, there are always different consumer mind-sets whenever there are topics calling for an opinion (Zemel, Gere, Papajorgji, Zemel, & Moskowitz, 2018a).

Step 1 identifies a problem. As mentioned before ahead, the problem could be of any nature, be it business, social or political nature. Step 2 uses a tool empowering rapid collection of scientifically valid and robust information. Although this instantiation of MG appears to be nothing more than a survey, the reality is that the MG interview is really an *experiment*. The respondent is presented with a set of varied vignettes. By systematically varying the composition of the vignettes, and having respondents rate these vignettes as single test concepts, it becomes possible through statistical (regression analysis such as OLS) to identify the contribution of every element to the response. The regression analysis approach was originally created to understand how people make decisions, but has been applied extensively to many aspects of consumer behavior. In its original, the method was called “conjoint measurement”, a name which remains today, a half century later (Luce & Tukey, 1964).

The experiment design embodied in a MG study dovetails well with the topics being explored. The topic is made explicit and concrete by asking four relevant questions, driven by the requirement that the sequence of the four questions ‘tell a story.’ Each of the four relevant questions, is answered by four separate statements for each question, i.e. a total of 16 answers or ‘elements.’ The selection of the topic, the four questions, and the four answers to each question remains in the purview of the researcher.

An experimental design creates the 24 combinations of elements, with the property that the 24 combinations comprise 2-tuples of elements 3-tuples of elements, and finally 4-tuples of elements. Each answer appears equally often. No vignette ever comprises more than one answer from the same question. The 16 elements, embedded in the 24 vignettes, are combined in a way which makes the 16 elements statistically independent of each other, permitting regression analysis to be performed on the ratings, to relate the rating to the presence/absence of each answer.

The ratings are transformed to produce a binary scale. Even though a 9-point scale is used, managers have a difficult time with this type of Likert or category scale. By changing the scale to a binary scale, things are made easier for the manager, and for the interpretation. Ratings of 1-6 are converted to 0, and a small random number added to the converted value. Ratings of 7-9 are converted to 100, and again a small random added to the converted value. The experimental design ensures that the 24 elements are statistically independent of each other so that the coefficients, the impact values of the elements, have absolute value. The inputs are of 0/1 nature, 0 when the element is absent from a vignette, 1 when the elements is present in the vignette. The dependent variable is either 0 or 100.

The equation is defined as: $\text{Rating} = k_0 + k_1(A1) + k_2(A2) \dots k_{36}(D9)$. The equation can be estimated for each respondent, and the corresponding coefficients averaged (individual models averaged to create a group model), or all the data can be aggregated and then one regression analysis run (grand model.) The results will ‘tell the same story,’ even though somewhat different numerically. The equation says that the rating is the combination of an additive constant, k_0 , and weights on the answers. The answers appear either as 0 (absent) or as 1 (present), so the weights, $k_1 - k_{36}$, showing the driving force of the different answers.

The next step divides people into subgroups, mind-sets and then creates a PVI (personal viewpoint identifier), to assign a new person to the proper mind-set. MG results are generated based on the original research data and are used as a description of the sample. The pattern of coefficients is, in a sense, the ‘signature’ of a person’s mind with respect to a topic. MG clusters people based upon the patterns of their individual coefficients, putting people with similar patterns of coefficients into the same group, called a mind-set. The approach uses a combination of regression to obtain the coefficients, as explicated above, together with k-means clustering to divide the people into a parsimonious set of groups, with the nature of the group, the mind-set, defined by the meaning of the answers which score highest in that group. This criterion is referred to as the criterion of interpretability. The discovery of the mind-set is of prime importance, a major contribution of the science. Yet, the mind-set is limited to the respondents who participated.

To extend the power of the discovered mind-sets, MG projects these mind-sets into the general population, allowing the researcher to assign a hitherto unknown, new person, to one of the mind-sets. The method is a classification task, through which new participants are assigned to mind sets based on their response pattern to a limited set of questions emerging from the study (the PVI or Personal Viewpoint Identifier.) In order to create the PVI and determine the response pattern, the most discriminating elements from the original study are extracted. These elements are those which show the highest distant between the existing mind sets. These calculations can be done using different distance metrics, the metric being left up to the discretion of the researcher. The chosen answers are ordered, and the most discriminating are extracted to form the PVI.

From practical considerations, such as e-commerce and sequencing a person on many different topics with many PVI’s, it is vital to make the PVI as simple, robust and fast as possible. For each PVI, participants are asked to rate six elements separately on a binary scale, a 15-20 second task. The results from the PVI are analyzed immediately in a cloud server, and the mind-set membership stored, as well as ‘reward feedback’ given to the respondent. The content of the feedback might vary from a simple text describing the mind sets to links to mind set dependent web pages or designs of the same page. By recording the occurrence of the mind sets, a more detailed picture can be achieved from a broader sample within a short period of time.

3.1. Examples from Previous Mind Genomics Research

MG approach has been used to study many problems of different nature and complexity. The topics range from sensory perception of food to responses to law cases, studies of political situations,

studies of morality, studies of advertising specific products, the design of selling spaces and selling procedures in stores, and the information to be given to patients upon their discharge.

Below is presented the results of a few studies obtained using the MG approach. Note that in our explication of the MG approach four questions and four answers per question are featured. The power of MG has extended to many other experimental designs, comprising more questions, and more answers for each question. As shown below, some of the experiments used a similar design, albeit with five questions and four answers per question, or six questions and six answers per question. The ‘magic’ or ‘power’ comes from the ability to create the proper experimental design, and then to permute the design, so that each permutation has the same mathematical structure, but different combinations of the same elements.

3.2. Corruption in Education

One of the first studies undertaken using MG is “Using a Rule Developing Experimentation Approach to Study Social Problems: The Case of Corruption in Education” by the same team of researchers. A study including four countries (Albania, Hungary, India, US), was conducted to understand and evaluate the linkages between corruption by country, and by other factors such as social class.

Initially a set of questions were designed as follows:

Question A – Why is corruption so common and how does it happen?

Question B – Why does corruption happen in education (and not education alone)?

Question C – What happens when corruption infects education?

Question D – Who does corruption benefit?

Question E – What should I do about reporting corruption in education?

An example of set of responses for one questions of the experiment is designed as follows:

Question A: Why is corruption so common and how does it happen?

Potential answers are:

A1 - Often the power or money entrusted for education seems 'directed towards private gain'.

A2 - Underneath a lot of education spending one often finds BRIBERY.

A3 - The STATE doesn't ensure real & progressive reforms.

A4 - The public services function well only when there is a lot of corruption.

These answers were presented to respondents randomly to receive their feedback. This study shows the following results:

- a. Mind-Set 1 is the largest segment in terms of base size, 101 respondents, or one out of three participants. The model for Question 1, misbehaviour, begins with an additive constant of 101. In the absence of elements, Mind-Set 1 is willing to believe the worst, that all behaviour is an example of misbehaviour.
- b. Mind-Set 2 is the second largest Mind-Set in terms of base size, 63 respondents, or one out of five participants. Mind-Set 2 begins with an additive constant of 7. This very low value says that in the absence of elements, Mind-Set 2 believes that there is no misbehaviour. It is the specific activities which drive the perception of misbehaviour, and not all of them either.

- c. Mind-Set 4 is the third Mind-Set in size, with 45 respondents, or slightly less than one respondent in seven. The additive constant for Mind-Set 4 is 55, meaning that approximately half of the people will feel that a behaviour is misbehaviour, in the absence of specific elements.
- d. Mind-Set 3 is the fourth largest, and with 42 respondents, also about one out of every seven respondents. Mind-Set 3 begins with the same middle value for the additive constant, 58. To the respondents in Mind-Set 3, the issues defining misbehaviour are clear corruption (elements A1 and A2), and the destructive effects of the clear corruption (elements C1-C4).
- e. Mind-Set 5 is the smallest of the five mind-sets, with 35 respondents, about one out of nine. The additive constant is 23, meaning that Mind-Set 5 is not likely to assign the rating of 7-9, misbehaviour, in the absence of clearly communicating elements. Elements which drive the perception of misbehaviour come from silo C (what corruption DOES), and silo D (who benefits from the corruption).

3.3. What concerns healthy people about the prospect of cancer?

The second study where the Mind Genomics approach was used is “On the threshold: What concerns healthy people about the prospect of cancer?” (Gabay, Zemel, Gere, Zemel, Papajorgji, & Moskowitz, 2018). This study deals with all emotional and mental issues while letting know to a patient that he/she suffers from a terminal disease such as cancer. Initially a set of questions were designed as follows:

Question A – What aspect of daily living do you worry that you will lose?

Question B – What aspects of your social life do you worry that you will lose?

Question C – What physical aspect of yourself do you want to maintain?

Question D – What health issues do you think about or worry about?

Question E – What discomforts do you think about or worry about?

For each of the questions a set of responses were designed to present to respondents and let them choose and evaluate the answer. A sample of set of responses for the experiment is designed as follows:

(Question) A – What aspect of daily living do you worry that you will lose?

A1 - Be able to perform daily routine physical activity... walking...sleeping...eating...

A2 - Be able to cook for yourself and family

A3 - Be able to take the moderate physical work

A4 - Be able to spend time with family and friends

A5 - Be able to play and enjoy physical activity... gardening...bicycling...

A6 - Be able to fall to sleep fast.

This study shows the following results: there are two mind-sets regarding this problem presented as following:

- a) Mind Set 1 – Life-Quality Pursuer: They are concerned the result is temporary, and think cancer is chronic disease. They care about their family's feelings and worry about bringing sadness to their family.
- b) Mind-Set 2 – Outcome-Worrier: They worry about no recovery and fear the outcome. They are concerned a lot about physical pains and symptoms like nausea and joint pain. They also have

some concerns of coping with family when ask for help. But they care less about perceived autonomy in daily life.

Knowing the right psychographic messages before saying a word gives an undoubtedly huge advantage to doctors shaping effective communication and improving outcomes and well-being.

3.4. Candy is dandy' – the mind of sexuality

For this study the set of questions were designed as follows:

Question A – Who is in the scene?

Question B – Where is the scene taking place?

Question C – What fragrance is he/she wearing?

Question D – What are they eating/drinking?

For each of the questions a set of responses were designed to present to respondents and let them choose and evaluate the answer. An example of set of responses for the experiment is designed as follows:

Question A: Who is in the scene?

A1 - Private... just you two in scene

A2 - Group... out with friends

A3 - Double date...with a couple

A4 - Around strangers...no one familiar in scene.

These answers are presented to the respondents randomly without any repetition. Details about this study can be found at (Zemel, Gere, Papajorgji, & Moskowitz, 2018b). This study was conducted with respondents from Albania, Hungary and USA and considers the impact of country, age and gender. The results show four statistically relevant mind-sets:

Mind-Set 4B: Sensory. They respond strongly to the elements which talk about fragrance and about alcohol.

Mind-Set 4D: Setting. They respond strongly to the setting described in the vignette

Mind-Set 4C: Alcohol. They respond strongly when there is a mention of drinks.

Mind-Set 4A: Opportunist. They respond to nothing, other than the two people alone.

Without any additional information being provided, the respondents in the Opportunity Mind-Set believe 'more strongly' that an erotic encounter will occur within 12 hours.

4. Conclusion and Discussions

After using Mind Genomics in a number of cases of different nature the time is to make some important conclusions. Mind Genomics is a powerful tool that allows analyzing and understanding business, social and political issues. The Mind Genomics strategy dimensionalizes the issue (be it of social, business or political nature), dividing a complicated issue into a set of questions, and then providing alternative answers to these questions. Analyzing the response to combination of these analyses allows the deconstruction of the responses into the contribution of the individual answers on a person-by-person basis, and the discovery of different modal patterns, the aforementioned mind-sets. It is often the case that respondents are not be aware of their proclivities, but the Mind Genomics approach reveals their

mind-sets, confirming what they often say they ‘suspected was the case’. The Personal Viewpoint Identifier (PVI) is of scientific and commercial value as it classifies new people who have not participated in the study into one of the revealed mind-sets. In a typical application, e.g., for e-commerce, the PVI creates a personalized database for each person for a number of different products. For each product, the respondent’s mind-set for that product, obtained through PVI, reveals the mind-set segment for the individual, and suggests the most compelling message for that prospective customer.

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