Imbuing the Supply Chain with the Customer's Mind: Today's Reality, Tomorrow's Opportunity

Howard Moskowitz[1*], Attila Gere[2], Yeshaya Danny Moskowitz[3], Robert Sherman[4], Yehoshua Deitel[5], Divya Nagarajan[6], Petraq Papajorgji[7]

[1]Mind Genomics Associates, Inc., White Plains, New York, USA; mjihrm@gmail.com (H.M.).
[2]Szent István University, Faculty of Food Sciences, Department of Postharvest Sciences and Sensory Evaluation, Budapest, Hungary.
[3]Healables Inc., Jerusalem, Israel.
[4]Robert Sherman Programming, Laguna Niguel, California, USA.
[5]Sifra Digital, Jerusalem, Israel.
[6]MindGen PTE. LTD., Singapore.
[7]European University of Tirana, Albania.

Abstract: This paper introduces a new approach to understanding the mind of the customer with the goal of optimizing the supply chain by creating, marketing and then delivering what the customer(s) want. The underlying notion is that for every product one can discover groups of people with defined preferences for the product and defined messages which drive expected purchase. The approach divides into two parts, knowledge development through Mind Genomics experiments and mind-set sequencing through the PVI (Personal Viewpoint Identifier). The paper shows data for six flavored beverages, the creation of mind-sets and the creation of the PVI to drive the messaging and thus purchase of each product. The paper finishes with the prospects for the world of product design and marketing when one can rapidly discover these product-specific mind-sets and the messages which excite each mind-set.

1. Introduction

One could fill book after book with what we know about consumer preferences, ranging from simple tests of acceptance for specific products, to patterns of preferences for lifestyles [1-3]. The knowledge for such books emerges from business focus on a specific product, all the way to grand strategies for general marketing efforts and to the academic investigation of what consumers find interesting [4]. A great deal has been written about what consumers want, their preferences and even aspects of what we might call cognitive economics [5,6].

Most of these segmentation schemes work from the top down, dealing either with whom the respondent IS, the pattern of what the respondent does or how the response answers a detailed questionnaire about general attitudes towards many topics. There is little in the way of a bottom-up approach, with actionable knowledge emerging from specific topics, such knowledge then integrated into a larger structure of general knowledge. Or, if there is integrated knowledge basis going from the granular to the general, the knowledge base has not been shared with the general public. The lure of knowledge to provide a competitive advantage is increasing, year by year, with the massive increase in the ability to collect data (e.g., the internet of things, the shopping baskets, the purchase patterns of people), the decrease in cost to store and retrieve information about purchases and the exploding power of data analytics which correlate the data with publicly available information about a person. The temptation is to rely increasingly on data science, on so-called business analytics, with the rationale that the answer must be in there. In the world of foods, we see an increasing number of supermarket chains

making use of the information to understand trends in food. What took months with Nielsen audits now takes minutes. The question, however, is how to move from these lakes of data, masses of information in which one hopes the treasures of knowledge swim, into an actionable world of business decisions. It is no longer acceptable or even reasonable to wait months to analyze data, in the hopes of finding something which may allow a competitive advantage, no matter how temporary. Recent advances in computer technology, modeling, artificial intelligence and data acquisition by the grocery trade promises a new age for understanding the consumer. The new era of knowledge about the consumer can be described as from the outside in. That is the newly emerging technology can track what the supermarket customer looks at and what they buy [7-9]. When the shopping occurs on-line, it is easy to measure the response of the customer by what the customer chooses in the path, i.e., the click and note exceptions to typical behaviors [10].

Furthermore, the customers previous behavior may be analyzed to suggest the next items to be purchased [11]. These advances promise a new era of understanding the shopper first to the usually small group of early adopters who try new technologies and then later to the world of the supermarkets themselves, who take comfort in seeing others do the experimentation [12]. What is missing from all these efforts, these technological breakthroughs, is foundational knowledge about the mind of the customer. That is, the analyses can track eye movements, record market basket contents, measure clicks and by so doing get a sense of what is actually happening and what external, measurable factors co-vary with each other. But the failure is the lack of knowledge about the mind. The measures are similar to the efforts of Skinner, starting almost 80 years ago, at Harvard University and John B. Watsons efforts years before that. These Behaviorists in the world of psychology ignored the mind of the person (or animal), measured regularities in behavior and deduced what might be happening. They would not and could not understand the mind, relegating themselves as they did to observing externalities and hypothesizing. Of course, the animals with which they worked could not be interviewed to report what they were thinking.

1.1. Design Thinking-Precursor Steps to Knowing the Mind of the Specific Customer

As the grocery trade moves towards accepting new technologies in the increasingly competitive space of food sales, it is important to move towards a greater discipline in the knowledge we obtain and use. The knowledge-building efforts should create a competitive advantage for the current scenario and for new scenarios evolving through technology, through changes in product design, through changes in the competitive frame and most important, through the ever-present change in patterns of consumer preferences. What is a competitive advantage today in technology may become simply yesterdays news as competitors leapfrog one another at a pace which accelerates week-by-week. It no longer suffices to remain within ones comfort zone with the reassuring but deadly platitude which served so often in the past, namely people always have to eat. During the past decades, a new science has emerged to help the supply chain. The science is known as Mind Genomics. The underlying notion of Mind Genomics is that each person experiences daily life as a series of small experiences, reacting to different aspects of those experiences. When we map out those experiences, whether behavioral situations or information (messages) we discover regular or systematic individual-differences among people. The result is a structured science to approach the mind of people confronting the every day. The contribution of the Mind Genomics effort is a tool by which to increase the effectiveness of business communications by putting consumer mental demand into the supply chain as a key driver of upstream activities.

1.2. A Re-Conception of a Moment of Truth-Communicating to the Mind of the Customer

The thesis of this paper is that the supply chain may profitably begin with a deeper understanding of the last step, the person who buys the product and consumes it, whether the consumption be preparing it, eating it, or feeding to another. When we know that final step in depth, there is the possibility of a new form of supply chain optimization – reaching from the end of the chain, the customer/consumer, to the start of the chain, the production and even to the product design and product planning. The problem

is simple, one faced by every food manufacturer on the one hand, or the food wholesaler/retailer on the other. We illustrate the problem and Mind Genomics solution by a typical case history. The topic is the creation and selling of a new set of flavored beverages by a company which wishes to take advantage of the increasing penchant of consumers to explore the sensory characteristics of beverages beyond the initial limited array of flavors available only decades ago. The veritable explosion of flavors, so well documented by popular science writer Malcolm Gladwell in his TED Talk, Choice, Happiness and Spaghetti Sauce, has led to a public, searching for new experiences a lot of the time which explores sensory experience, choosing new ones all the time [13]. Indeed, rather than a limited array of less than optimal alternatives today we have what has been called the Paradox of Choice, wherein so many SKUs, shop-keeping units, are launched in order to gain shelf space. All too-often the pell-mell introduction of flavors backfires [14]. Let us look at how a company might approach marketing the above-mentioned flavored beverages, spanning the range of beer, cider, tequila, low alcohol beverage, hot coffee and ice coffee, respectively. The objective is with knowledge of the consumer, not yet developed, to message correctly and most important, drive the right message to the right person. We assume that the products have already been developed.

The formal problem is simple to state. We are considering the customer as a destination into which we put a product. We treat the customer as possessing a set of sensitivities toward each product, whether or not the customer is involved with the product. The sensitivities are to specific messages which attract the customer to the product or push the customer away from the product. Our objective to move the product to this receptacle, with the assumption that once the product reaches the consumer it will be consumed and thus the product journey will end. Most marketers and product developers would react in disbelief to the statement. It is as if we are treating the consumer as something whose dynamics are known, a simple but final conduit to our set of products. So much of marketing is a deep discussion of what consumers want, when they want it and the dynamics of competition that we seem to reduce the very humanness of a consumer to a set of factors to be determined and then expect the optimum to occur the product to be accepted. How can the depth of the customer experience be captured by a series of messages, much less messages which are determined through science, experimental design and simple experiments?

1.3. The Role of NO

Most optimization efforts assume the real problem in optimization is to identify WHAT to do. Here, with consumers, we may not even know either what to do or what to say. What are the features of the product which the consumer wants? When we solve that, what should the marketer say about the product to convince the buyer? This part of the supply chain, the ultimate buyer, has a mind of its own. The consumer can simply say NO. It is the emerging science of Mind Genomics to which we now turn. We assume zero knowledge for marketing, rather than assuming the marketer or advertising agency knows the single best message to drive purchase. One way to identify messages which work consists of mixing and matching message, present these mixtures to the person, get the reaction and determine which particular messages in the mix are responsible for the YES, the answer by prospective customers that, YES, I want that product.

1.4. Mind Genomics Thinking: Uncovering Mind-sets, i.e., Basic Patterns of Acceptance

Mind Genomics refers to a young science, about 30+ years by now, at the time of this writing (fall, 2019). Mind Genomics emerged from the efforts of experimental psychologists and marketing academics to understand the way people made decisions, moving beyond simply asking the people to describe their criteria, not always easy and often not at all possible. Rather than asking a person to reflect on HOW and WHY a specific decision is arrived at, Mind Genomics implements small experiments, on the computer to establish a causal relation. The respondent reads different vignettes or sets of messages, about a product or service and rates the vignette on some type of simple anchored scale, the Likert scale [15,16]. The analysis reveals what features of the vignette drive the decision,

reveals new groups (mind-sets) and shows how to discover those mind-sets among new people who had not participated in the study. The test materials of Mind Genomics phrases, known as elements or messages, are mixed according to experimental design to create a set of prescribed combinations.

The same element appears several times in combination with other of elements. After reading each individual combination the respondent integrates all the information in the vignette and assigns a single rating. The process is quick, lasting often only 1-2 seconds. Regression analysis deconstructs the individual contributions of each element, respectively, creating an additive model. The coefficients of the model or equation are the part-worth contribution, interpreted as the importance of each element to the respondent. Typically, the respondent is not even aware of his or her individual weighting scheme, but generally the data make intuitive sense to the respondent when the respondent is shown the coefficients of the one-person model emerging from his or her own ratings. One feature of Mind Genomics worthy of special mention is the attention given to ease of set-up, speed of data acquisition and rapidity of analysis and reporting, all facilitated by todays (2019) technology, Smartphones and a simple app called BimiLeap (www.BimiLeap.com). The app leads the respondent through the sequence of ideation, study setup and moves to respondent acquisition through a link and associated sample providers for respondents. The app finishes with an automatic analysis done with 2-3 minutes of the end of the study. The output is a Microsoft Powerpoint® report of the results in a formatted template, ready for immediate use and publication.

1.5. Demonstrating The Mind Genomics Science by Sequencing Patterns of Individual Preferences

We now move to the experiment which provides the necessary data. The data from this study were collected more than ten years before, funded by the Wild Corporation, a flavor supplier, under the name Drink It! We report the data, show the results and then show the PVI for the six products and representative mind-set membership data for two respondents on each of the six flavored beverages after the two respondents each used the PVI.

Step 1-Define the topic and select the beverages: The topic is what drives interest in buying a beverage for consumption. The original study (Drink It!) funded by Wild Flavors and focused on 30 beverages, with a goal to understand the broad spectrum of drivers of interest in the beverage category. **(Table 1)** shows the beverages. The six flavored beverages are those chosen to demonstrate the creation of the six-beverage PVI and its deployment. They are shown in the shaded cells.

Table 1.
The 30 beverages tested in the Drink It! Project. (Courtesy of It! Ventures, Inc.)

Carbonated spritzer	Coffee	Cola	Coolers	Energy drinks	Enhanced water
Fiber-containing beverage	Flavored beer	Flavored cider	Flavored hot coffee	Flavored coffee beverage	Flavored low alcoholic beverage
Flavored tequila	Juice	Hot chocolate	Hot tea	Iced tea	Kids drinks
Lemon lime soda	Meal replacement drink	Milk	Milk smoothie	Red wine	Shakes
Smoothie	Soup	Soy beverage	Sports beverage	White wine	Yogurt

Table 2.
The four questions and the nine answers to each question, the brand names are part of the initial
data acquisition (Mind Genomics) but discarded for the PVI (personal viewpoint identifier).

	Primary Attributes?
E1	Juice with just a little bit of carbonation …so easy to drink
E2	Bold delicious fruit flavors with a touch of spritz
E3	Juice spritzer …lightly carbonated…made with 30% real fruit juice
E4	Seltzer blended with exotic and tropical flavors
E5	Spritzers made with juice and a splash of milk to give you a creamy taste
E6	An alcoholic spritzer with natural fruit juice and great flavors
E7	Iced tea lightly carbonated with superb flavors and a hint of spice
E8	A sweet tingly flavor, fizz and some juice … it goes together to create a sensation for your senses
E9	Ice cold frozen spritzers … tart lemon, fizz and cold slushy ice
	Secondary Attributes/ Mood?
E10	Spritzers hit the spot on a hot summer day
E11	With Calcium, Vitamins A and the energy releasing B vitamins…or whatever you need
E12	with real fruit pulp and nectar
E13	Premium quality
E14	So refreshing you want to savor how it makes you feel
E15	100% natural
E16	Berry, citrus, punch, peach and tropical flavors … whatever you're looking for
E17	You can imagine the taste even before you drink it
E18	So refreshing … you have to drink some more
	Emotion and experience?
E19	Quick and fun … ready to drink
E20	When you think about it, you have to have it … and after you have it, you can't stop drinking it
E21	Simply the best
E22	Relaxes you after a busy day
E23	A great way to celebrate special occasions
E24	Looks great, smells great, tastes delicious
E25	A wonderful experience … shared with family and friends
E26	Pure satisfaction
E27	It quenches THE THIRST
	Brand / Benefit (Brands not part of the subsequent PVI)
E28	From Lipton (not used in the PVI)
E29	From Minute Maid (not used in the PVI)
E30	From Dole (not used in the PVI)
E31	From Tropicana (not used in the PV)
E32	From Capri Sun (not used in the PVI)
E33	Multi serve containers … so you always have enough!
E34	Icy cold
E35	Resealable single serve container … to take with you on the go
E36	With the safety, care and quality that makes you trust it all the more

Step 2-Develop the structure of messages that will be used to identify what to say: The structure of the It! Studies was set up to investigate four questions, and nine answers to each question. **Table 2** shows an example of these elements for one product, juice spritzer.

Step 3-Run relatively small-scale studies and extract mind-sets from each study: The actual Mind Genomics process is straightforward. A basic experimental design is developed so that each of the 36 elements or answers appears an equal number of times, in this case five times. The experimental design for this specific array of questions and answers (4x9) generates 60 combinations or vignettes, each vignette comprising 2-4 elements or answers, at most one answer from a question in each vignette. That is, the vignettes are not always complete, since some vignettes comprise three elements and other vignettes comprise two elements. The experimental design ensures that all 36 elements are statistically independent of each other, allowing for regression analysis to relate the presence/absence of each of the 36 elements to the rating. The incompleteness of the design further ensures that statistical independence, so that the coefficients from the regression model (explained below) have ratio-scale properties. The underlying experimental design produces 60 combinations, tested by a single respondent. The next respondent receives vignettes, the combinations, created by the same experimental design, but for this new respondent the combinations are changed. The strategy called permuted experimental design ensures that the experiment tests many, if not most of the possible combinations that can be created [17]. The strategy of Mind Genomics thus differs from the strategy of other studies using experimental design. Mind Genomics permutes the combinations. The knowledge about how people respond comes from a wide range of different test vignettes, i.e., a fuller picture not from a limited number of test vignettes evaluated by many people, i.e., a less noisy but far more incomplete picture.

Step 4-Transform the ratings and create individual-level regression models: The analysis relates the presence/absence of the 36 elements to the 9-point rating scale of interest in the product as described by the vignette. In deference to the consumer-research heritage of Mind Genomics, the ratings on a 9-point scale are converted to a binary scale, with ratings of 1-6 converted to 0 and ratings of 7-9 converted to 100. For each respondent the OLS (Ordinary Least-Squares) regression program computes a simple model: Binary $0/100 = k_0 + k_1(A1) + k_2(A2) \ldots k_{36}(D9)$ Each respondent generates a set of coefficients, k_0 and $k - k_{36}$. The additive constant, k_0, shows the likelihood of a respondent assigning a rating of 100 to a vignette or combination lacking ny elements. The additive constant is strictly a theoretical, computed measure because by design all vignettes comprised 2-4 elements. The additive constant is useful a baseline of interest, however, each of the 36 elements generates a coefficient, either positive or negative. The size of the coefficient tells us the incremental percent (positive coefficient) or decrement percent (negative coefficient) that would be added to the additive constant. The sum tells us the likely percent of responses of magnitude 7-9 for a specified composition of the vignette.

Step 5-Create mind-sets by clustering: The mind-sets for a beverage are simply those people whose patterns of responses to the 36 elements for a beverage are similar. We can think of these mind-sets as mental primaries for the beverage, primaries which emerge when we have a reasonable number of respondents participating. The approaches to developing these primaries have been described in detail elsewhere [18]. We need only keep in mind that to discover these primaries we apply the well-accepted statistical procedure of clustering to the respondents in each study, dividing the respondents into homogeneous groups, based upon the pattern of their 36 coefficients for that beverage. Clustering is a well-accepted statistical method which creates groups of objects (people), based upon a definition of distance, specifically distance between two profiles of coefficients $k_1 - k_{36}$. Clustering is the general name given to a set of statistical procedures which divide objects, our respondents, into groups with the property that the patterns of the 36 coefficients are similar to each other within a cluster and the pattern created by the average of all respondents to create 36 average coefficients are very different from cluster to cluster [19]. In the language of Mind Genomics, the clusters are mind-sets (**Table 3)** shows the six sets of coefficients for three mindsets, one set for each flavored beverage. For each study we pulled out three mind-sets, shown in columns labelled MS1, MS2, and MS3, respectively. We sort each table, first by MS1, then by MS2, then by MS3, respectively. All coefficients of 9 and above are shaded. It is clear from Table 3 that the mind-sets differ and can be interpreted by looking at the coefficients that are darkened.

For table 3 please go through the below link

Table 3.
The coefficients for the relevant elements for each Drink It! Study, with the source of the coefficients being the three mind-sets extracted separately for each study. The brand names are not part of the input data for the subsequent PVI, and are not shown.

#1 Flavored Beer		MS1	MS2	MS3
	Base Size	58	67	60
	Additive Constant	-4	50	71
A8	Michigan cherries with a generous portion of wheat malt for a bright lively ale with a crisp finish	38	-31	-13
A9	Brewed with 5 specially roasted malts for a deep red color and hearty robust taste with the crisp finish of mixed berries	32	-28	-6
A7	Amber ale with blue agave nectar and a natural flavor of Mexican tequila and lime	30	-32	-5
A2	A beer mixed with real fruit juices and lightly carbonated	27	-36	-3
B7	Raspberry, Berry, Lemon and Lime, Cinnamon, Honey flavors… whatever you're looking for	26	-6	-18
A4	A lager with a citrus hop flavor throughout for a fruity assertive flavor	24	-39	0
A5	Amber ale with Nutmeg and Raspberry flavors	24	-40	-22
A3	A beer blended with exotic tropical flavors	23	-34	-6
A6	Smooth rich cream pilsner with roasted chocolate flavor	20	-41	-28
B1	Hits the spot on a hot summer day	11	5	-3
B6	100% natural	10	8	-8
B9	So refreshing … you have to drink some more	4	9	-12
B4	Premium quality	4	7	-9
B2	Goes down smooth and easy	6	6	-7
B5	So refreshing you want to savor how it makes you feel	6	5	-14
B8	You can imagine the taste even before you drink it	5	4	-14
B3	Made in the tradition of Pubs all over the world	7	2	-8
A1	A delicious flavored beer	7	-3	-8
#2: Flavored Cider		MS1	MS2	MS3
	Base Size	62	60	32
	Additive Constant	-4	71	48
A8	Cider with apple, cinnamon and nutmeg flavors	50	2	-8
B7	Raspberry, cherry, lemon and peach, cinnamon, honey flavors … whatever you're looking for	27	-8	10
A9	A splash of cider, a sweet tingly flavor, fizz and some citrusy juice … it goes together to create a sensation for your senses	26	6	-17
A3	Hot Cider … warm and satisfying	22	13	-19
A6	A flavored alcoholic Cider that's not too sour, not too sweet … just a refreshing sensation!	19	-8	-22
A4	A mix of juice and cider… clear and clean	18	10	-22
A2	A Draft Cool Cider with a hint of apple	17	1	-4
A7	Cider with a twist of lemon … a bit of sweet and tangy flavor	17	0	-26
A5	Hot or cold … a mix of natural nectar and hard cider	13	2	-20
A1	Delicious amber colored cider	11	4	-19
B6	100% natural	8	-6	17
B9	So refreshing … you have to drink some more	7	0	12
B1	Hits the spot on a hot summer day	5	-7	12
B5	So refreshing you want to savor how it makes you feel	3	-13	11
B4	Premium quality	5	-7	8
B8	You can imagine the taste even before you drink it	-1	-7	7
	B3 Made in the tradition of Pubs all over the world	0	-13	5

B2	Goes down smooth and easy	6	-10	2
#3: Flavored tequila		MS1	MS2	MS3
	Base Size	67	44	43
	Additive Constant	75	-3	10
B7	Raspberry, Berry, Lemon and Lime, Cinnamon, Honey flavors ... whatever you're looking for	-20	18	50
A9	A mix of the freshest fruits from real juice, the best spirits and natural nectars	-8	37	31
A4	A mix of tropical exotic flavors and tequila ... clear and clean	0	46	21
A6	Tequila from blue agave nectar mixed with the natural flavor of Mexican tequila and lime	-5	48	20
B2	Goes down smooth and easy	0	10	15
B1	Hits the spot on a hot summer day	-2	12	13
A5	Tequila and juice that's not too sour, not too sweet ... nice refreshing sensation!	-3	37	11
A8	Real tequila blended with natural flavor and a hint of carbonation	-2	25	11
B6	100% natural	3	10	10
B9	So refreshing ... you have to drink some more	5	10	8
A3	Tequila already mixed with salt, natural lime flavors and triple sec	-5	47	6
A7	Mandarin and Lime flavored tequila ... so tart and refreshing	-9	41	0
A2	Lemon/ Lime and Tequila ... a bit of sweet, tangy flavor	-2	38	0
A1	Naturally flavored tequila	6	22	4
B5	So refreshing you want to savor how it makes you feel	-3	10	7
B4	Premium quality	6	1	7
B3	Made in the tradition of Pubs the world over	2	-1	5
B8	You can imagine the taste even before you drink it	-2	2	-1
#4: Flavored Low Alcohol Beverage		MS1	MS2	MS3
	Base Size	78	65	53
	Additive Constant	58	-2	70
B7	Raspberry, Berry, Lemon and Lime flavors ... whatever you're looking for	9	36	-1
A6	Vodka and juice... not too sour, not too sweet ... just a refreshing sensation!	-14	34	18
A4	A splash of beer, a sweet tingly flavor, fizz and some juice ... it goes together to create a sensation for your senses	-45	12	12
A9	A mix of the freshest juice, the best spirits and natural flavors	3	36	8
A2	Wine based coolers or breezers in so many flavors	8	40	1
A1	Hard cider, alcoholic lemonade and all types of coolers and breezers	-13	27	-6
B1	Hits the spot on a hot summer day	3	9	0
B8	You can imagine the taste even before you drink it	1	8	-4
A7	Lemonade with a lite hit of malt whiskey ... cool and refreshing	-33	8	-2
A5	A malt beverage with a light crisp flavor	-29	7	-2
B6	100% natural	3	6	-3
A3	Lemon and a touch of beer, just the right touch	-43	6	0
B2	Goes down smooth and easy	0	6	-9
A8	Flavored alcoholic energy drinks with a little buzz	-8	5	-6
B4	Premium quality	2	3	-9
B5	So refreshing you want to savor how it makes you feel	3	3	-8
B9	So refreshing ... you have to drink some more	2	2	-6
B3	Made in the classic way	0	2	-7
#5: Flavored Coffee		MS1	MS2	MS3
	Base Size	70	72	66
	Additive constant	55	15	64

		MS1	MS2	MS3
B1	A hot cup of coffee is warm and inviting	13	2	3
B7	Hazelnut, French vanilla, white chocolate, caramel, amaretto and mocha … whatever your looking for	13	45	6
B4	Premium quality	9	2	1
B3	To keep you going through out your busy day	9	1	-3
B6	100% natural	8	6	-4
A9	A special blended coffee with the rich taste of white chocolate and cream … served either as a frothy hot drink or over ice	-9	50	6
A8	Brewed coffee blended with cream and caramel then topped with heavy whipped cream	-14	44	5
A4	Coffee with chocolate flavors … so smooth and warm	-3	43	3
A1	Hot coffee with warm nutty flavors	-7	20	-6
A6	Flavored cappuccino with foam	2	19	-1
A5	Coffee and milk … blended just right for the perfect latte	7	14	-10
A2	Decaffeinated coffee with delicious flavors added	-45	1	2
B8	You can imagine the taste even before you drink it	6	-5	0
B9	So refreshing … you have to drink some more	5	1	0
B5	So refreshing you want to savor how it makes you feel	6	3	-2
B2	With a cookie or a biscuit to dip into the mug for added flavor	2	4	-10
A7	The rich taste of flavored espresso	-1	1	-12
A3	Hot coffee with lots of fruity flavors … raspberry, cherry or orange	-41	-6	-21
#6: Flavored Ready to Drink Coffee Beverage		MS1	MS2	MS3
	Base Size	86	56	75
	Additive Constant	61	-7	51
A9	Iced coffee blended with hot chocolate flavors and caramel … then topped with heavy whipped cream	-5	47	-9
A4	Iced coffee with chocolate flavors…so cold yet so smooth	6	37	-8
B7	With all the milk, cream and toppers you want … cinnamon, nutmeg, chocolate sprinkles, sugar cubes, whipped cream … whatever	-4	33	7
A8	Hearty iced cappuccino, frothy with foam … with the rich taste of espresso	-3	32	4
A6	Iced Coffee and milk … blended just right for the perfect cold latte	7	21	-5
A2	Iced fresh coffee with warm nutty flavors	-6	16	-14
A3	Iced coffee with lots of fruity flavors…raspberry, cherry or orange	-31	14	-49
A1	Cool and refreshing Iced Coffee	5	14	-4
B5	So refreshing you want to savor how it makes you feel	-7	11	6
B2	With a cookie or a biscuit to dip into the cup for added flavor	-15	10	8
A7	A real iced coffee blended with light refreshing flavors and a hint of carbonation	-13	9	-37
B8	You can imagine the taste even before you drink it	-2	9	3
A5	Flavored decaffeinated iced coffee … ready to drink	-2	7	-34
B1	Iced coffee is so inviting	-5	7	3
B3	To keep you going throughout your busy day	-2	7	4
B9	So refreshing … you have to drink some more	-5	5	8
B4	Premium quality	0	4	6
B6	100% natural	-7	3	5

Step 6-For each beverage; create a PVI (Personal Viewpoint Identifier): The objective is to assign a new person to the appropriate mind-set, for each beverage. Up to now, we have looked at the respondents who participated in each study in terms of who they say they ARE (e.g., age, gender product usage and so forth). The discovery of mind-sets produces a new way to define who a person is, namely the pattern of elements to which the person responds, i.e., the mind-set. The only problem is

that people cannot easily tell an interviewer who they are in terms of the mind-set with respect to a product. They may know, but most likely they have never even thought of mind-sets with respect to the product. It becomes vital to create a simple tool, a PVI, which can quickly assign a NEW person to one of the two or three mind-sets for a specific beverage, these mind-sets empirically uncovered in a Mind Genomics experiment.

A variety of statistical tools have been developed to assign objects to predefined groups. These tools use the property of the objects along a vector of different variables to create a classification tool. The tool weights the individual variables and combines them. The result is then a number or set of numbers which map to one of the clusters, defined as the most appropriate cluster for the pattern of responses. The tools require the raw data and statistical back testing. The most common of these is known as DFA, discriminant function analysis [20]. Often, however, we only have the summary data, such as the profiles in Table 3. Authors Gere and Moskowitz have developed an algorithm which uses Monte Carlo simulations and response patterns to assign a new individual to one of the mind-sets or cluster. The tool, PVI, allows presents the respondent with six questions taken from the most discriminating elements from the study. The questions are selected after a Monte Carlo simulation of 20,000 data sets, based upon the original data, but perturbed with noise. The outcome is a set of six questions, each answered by the same two answers, appropriate for the product. The six questions generate 64 possible patterns. Each of the 64 possible patterns maps to one of two mind-sets, or where appropriate, one of three mind-sets. **Figure 1** shows part of the PVI for this study. Figure 1 show three of the six sets of questions The PVI begins with requisite information about the respondent and two opt-ins. The full PVI continues with six sets of questions, one set for each study. The PVI varies the order of studies across participants and the order of questions within a study. In this way the PVI attempts to minimize order bias. The PVI takes about 30-45 seconds for the up-front basic information and about 15-20 seconds for each product. The full set of six products thus takes about 2-3 minutes. As in all on-line studies, it is best to offer an incentive to the respondent to participate. Otherwise, the process to obtain many respondents can take days or weeks, rather than minutes and hours.

Figure 1.
The PVI for the study, showing the self-profiling classification and three individual PVIs for three of the six products. The full PVI comprises six such PVIs, in randomized order, with the questions within the PVI in random order as well.

The PVI returns with six records for each respondent, one record for each product and each respondent, as shown in **(Table 4)**. The PVI data is laid out in the form of a flat file, with the relevant information about each respondent and each product as a separate record. Each respondent generates six records. The flat file allows individual analyses of each product, as well as subsequent creation of a master record for each respondent. The PVI has no place for the respondent name. The respondent is identified by name or home address. The respondent is completely informed about the data being collected. The respondent can opt-out entirely, or opt-in but request no further contact. Every effort is made to adhere to the current privacy rules [21].

1.6. Discussion-Mind Genomics +PVI to Create Opportunities for a New Type of Integrative Research

The vision of the PVI is not simply a set of typing tools, allowing the consumer researcher to assign a given individual to a set of different mind-sets, based upon the pattern of ratings. Such a limited vision would constrain the use of the PVI to marketing efforts. The reality is that the combination of Mind Genomics with the PVI offers dramatic advances for our understanding of the human mind. Beyond this understanding is the looming an enticing prospect of correlating the mind of people (pattern of mind-sets) with other behaviors and even with physiological features such as genes. It is worthwhile exploring the potential in a bit of detail. We begin with the precursor of the PVI, BimiLeap and a do-it-yourself technology to understand the mind of people.

Table 4.
The PVI output for two respondents, the table shows some of the data, but does not show email, phone number, respectively, which remains confidential.

Study name	Sex	Ethnic	Co,	Mind sets in study	Mind set	Feedback given to the respondent or to the researcher
Respondent #1						
Flavored beer	M	White	Usa	3	Ms2 traditionalist, not flavor	You like beer, just plain beer, nothing exotic
Flavored cider	M	White	Usa	2	Ms2 cider and splash	You want cider with a fruit splash
Flavored hot coffee	M	White	Usa	3	Ms3 - traditionalist,	You want coffee, plain coffee. You will accept some traditional flavors, but that's it.
Flavored ice coffee	M	White	Usa	3	Ms3 - you like it, if it's high quality	You like coffee. You want premium in your ready to drink. But for flavors, not really for you
Flavored low alcohol beverage	M	White	Usa	3	Ms3 - give me a splash'	You like a splash of alcohol, the rest traditional drinks. It's the splash which does the trick
Flavored tequila	M	White	Usa	3	Ms3 - flavor explorer	You love new flavors. They are just great. The more exotic the better
Respondent #2						
Flavored beer	F	Other	Ata	3	Ms 2 traditionalist, not flavor	You like beer, just plain beer, nothing exotic
Flavored cider	F	Other	Ata	3	Ms3 natural and refreshing	You want natural and refreshing so you can drink as much as you want
Flavored hot coffee	F	Other	Ata	3	Ms3 - traditionalist,	You want coffee, plain coffee. You will accept some traditional flavors, but that's it.

Study name	Sex	Ethnic	Co,	Mind sets in study	Mind set	Feedback given to the respondent or to the researcher
Flavored ice coffee	F	Other	Ata	3	Ms3 - you like it, if it's high quality	You like coffee. You want premium in your ready to drink. But for flavors. Not realy for you
Flavored low alcohol beverage	F	Other	Ata	3	Ms3 - give me a splash'	You like a splash of alcohol, the rest traditional drinks. It's the splash which does the trick
Flavored tequila	F	Other	Ata	3	Ms3 - flavor explorer	You love new flavors. They are just great. The more exotic the better

The data reported above come from a precursor of BimiLeap, a technology known as Idea Map. BimiLeap is an accelerated, simplified, inexpensive and far more rapid tool, which can be set up, deployed and full results obtained in a matter of a few hours. Todays BimiLeap technology has been optimized for four questions, each with four answers rather than nine answers, in the interest of speed, cost and ease. The BimiLeap project follows a series of simple steps, paralleling the approach but in a do-it-yourself format. The study for a single topic (e.g., any topic) begins with the statement of the topic, the creation of four questions and four answers to each question. The BimiLeap program makes it easy to set up the study on a smartphone or on a computer or laptop.

The program then requires the researcher to write an introduction to the respondent about what is expected and provide a rating scale. Finally, the researcher selects the target population, pays by credit card, the study is launched and each respondent who participates evaluates 24 unique combinations. The analysis is the same as presented here, with the addition of modeling both for the rating and for the response time between the presentation of the stimulus and the rating assigned. The results are returned in 1-2 minutes after the end of the fieldwork. The results, sent by email, comprise templated, pre-formatted Microsoft PowerPoint® presentation with the data incorporated and the tables and raw data in an accompanying Microsoft Excel® file.

The speed of the set-up and data acquisition, often within a few hours for a single study, make it possible for the researcher to deeply investigate an entire vertical, comprising 2-20 or more topics, related to each other, either in terms of alternatives (e.g., types of products in a supermarket), or in terms of what researchers call The journey (e.g., sequence of activities in ones from entering a hospital to discharge, from entering school on the first day to leaving school on the last day). Each study may require as few as 100 respondents and can be completed within the aforementioned 2-4 hour time span. The final activity, creating the PVI for the 2-20 topics in a vertical, takes 3-4 hours, launching the PVI takes five minutes. Deployment a matter of distributing the PVI to the correct individuals who will participate.

2. Conclusions

What then does this capability of Mind Genomics +PVI mean for science and for application?

- At the very simplest level, the above-mentioned process produces an integrated library of data for a vertical, with the information archived, relatable to each other in terms of metrics.
- The next level comprises the analysis of alternative populations by the PVI to understand the distribution of mind-sets under different situations, whether these situations be geography, culture, health versus disease, economics and so forth. The sheer simplicity of implementing the PVI with todays communications makes it reasonable to obtain millions, tens of millions, or even hundreds of millions of respondent. The consequence is a rich database of the mind of people, at one time, with the ability to identify the covariation of mind-sets with exogenous factors (age, gender, market, behavior) across many different, related topics, in the vertical. In other words, for food, the mind-set of 100 million people versus who they are and versus what they purchase.

- At an even deeper level, with services specializing in genetic typing, there may be a way to relate genetic profiles of people to mental profiles obtained from the PVI and the two of them to behavior. The PVI is the missing piece, as is the need to scale up the data acquisition to millions. It is the PVI, the operational structure of the mind in terms of RELEVANT topics which is the linchpin, holding both sides together, the measured genetic profile and the behavioral and social profile.

References

[1]   M. Brower, "Claritas (formerly Nielsen) Segmentation and market solutions," *The Charleston Advisor*, vol. 18, no. 4, pp. 15-20, 2017. https://doi.org/10.5260/chara.18.4.15

[2]   A. Weinstein and D. Cahill, *Lifestyle market segmentation*. United States: CRC Press, 2014.

[3]   W. Wells, *Life style and psychographics*. USA: Marketing Classics Press, 2011.

[4]   M. B. Holbrook, "Market clustering goes graphic: The Weiss trilogy and a proposed extension," *Psychology & Marketing*, vol. 18, no. 1, pp. 67-85, 2001. https://doi.org/10.1002/1520-6793(200101)18:1%3C67::aid-mar4%3E3.0.co;2-1

[5]   D. Kahneman and P. Egan, *Thinking, fast and slow*. United States: Farrar, Straus and Giroux, 2011.

[6]   H. Moskowitz and A. Gofman, *Selling blue elephants: How to make great products that people want before they even know they want them*. Pearson Education. https://doi.org/10.1111/j.1540-5885.2008.00327_3.x, 2007.

[7]   G. Cowburn, "The front of pack nutrition information panel: using novel methods to explore consumer decision making at point of choice during routine supermarket shopping," PhD Dissertation, University of Oxford, UK, 2016.

[8]   J. Turow, *The aisles have eyes: How retailers track your shopping, strip your privacy and define your power*. United States: Yale University Press, 2017.

[9]   V. Sigurdsson, N. M. Larsen, and A. Fagerstrøm, "Behavior analysis of in-store consumer behavior," in *The Routledge companion to consumer behavior analysis*: Routledge, 2015, pp. 40-50.

[10]   E. Huyghe, J. Verstraeten, M. Geuens, and A. Van Kerckhove, "Clicks as a healthy alternative to bricks: How online grocery shopping reduces vice purchases," *Journal of Marketing Research*, vol. 54, no. 1, pp. 61-74, 2017. https://doi.org/10.1509/jmr.14.0490

[11]   J. C. Londono and R. Castano, "Supermarket suggested shopping lists (SSSL), promotions and grocery purchases," *The International Review of Retail, Distribution and Consumer Research*, vol. 27, no. 2, pp. 146-163, 2017. https://doi.org/10.1080/09593969.2017.1288650

[12]   D. J. Faulds, W. G. Mangold, P. Raju, and S. Valsalan, "The mobile shopping revolution: Redefining the consumer decision process," *Business Horizons*, vol. 61, no. 2, pp. 323-338, 2018. https://doi.org/10.1016/j.bushor.2017.11.012

[13]   M. Gladwell, "Ted talks," 2004.

[14]   B. Schwartz, *The paradox of choice: Why more is less*. United States: Harper Perennial, 2004.

[15]   P. E. Green and V. Srinivasan, "Conjoint analysis in marketing: New developments with implications for research and practice," *Journal of Marketing*, vol. 54, no. 4, pp. 3-19, 1990. https://doi.org/10.2307/1251756

[16]   H. R. Moskowitz, A. Gofman, J. Beckley, and H. Ashman, "Founding a new science: Mind genomics," *Journal of Sensory Studies*, vol. 21, no. 3, pp. 266-307, 2006. https://doi.org/10.1111/j.1745-459x.2004.00066.x

[17]   A. Gofman and H. Moskowitz, "Isomorphic permuted experimental designs and their application in conjoint analysis," *Journal of Sensory Studies*, vol. 25, no. 1, pp. 127-145, 2010. https://doi.org/10.1111/j.1745-459x.2009.00258.x

[18]   H. R. Moskowitz, "'Mind genomics': The experimental, inductive science of the ordinary, and its application to aspects of food and feeding," *Physiology & Behavior*, vol. 107, no. 4, pp. 606-613, 2012. https://doi.org/10.1016/j.physbeh.2012.04.009

[19]   R. Dubes and A. K. Jain, "Clustering methodologies in exploratory data analysis," *Advances in Computers*, vol. 19, pp. 113-228, 1980. https://doi.org/10.1016/s0065-2458(08)60034-0

[20]   S. Wang, J. Lu, X. Gu, H. Du, and J. Yang, "Semi-supervised linear discriminant analysis for dimension reduction and classification," *Pattern Recognition*, vol. 57, pp. 179-189, 2016. https://doi.org/10.1016/j.patcog.2016.02.019

[21]   General, "General data protection regulation," n.d.