

## Review Article

# Empowering Students in a University through Rapid Design: A Demonstration Involving the Creation of Messaging about Elderberry Wine

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## Abstract

54 respondents from an internet-based panel across the United States each evaluated uniquely different sets of 24 systematically varied 'vignettes,' (combinations of messages) about elderberry wine. The messages were created by artificial intelligence (Idea Coach), and afterwards combined into the vignettes according to an underlying experimental design which prescribed the appropriate combinations to use for subsequent regression analysis. Respondents rated each vignette using a two-dimensional rating scale, one dimension representing fit to the respondent (for me vs not for me), the second dimension representing understandability of the message. The data reveal three mind-sets. The study demonstrated the simplicity, speed, and economics of combining artificial intelligence, experimental design, and subsequent human evaluation. The output becomes a scalable bank of subjective information on a topic which is unfamiliar (elderberry wine), with this bank of information combining Socratic learning in a new topic coupled with feedback from real consumers about the information developed through artificial intelligence.

## Introduction

The development of new products in the world of commerce is often costly, error-filled, and unduly long. Some of the issues may result from risk-avoidance, a phenomenon rampant in corporations, especially in slow-moving categories such as foods and beverages. When a company in electronics, for example, fails to avail itself of important technology to create new products that company is likely to suffer, often quickly, as its competitors rush to overtake it, doing so at hot speed. Not so in the world of food, even the world-of-food start-ups, where the feeling is that there is not really much risk, that the competition moves slowly, and the technology is really not as valuable as the instincts and intuitions of the entrepreneur or the corporate president. The foregoing holds in classic, multi-layer multi-nationals as well as in the starts powered by the ingenue entrepreneur.

At the same time that the world of food development moves cautiously, there is an evolving world of speed, at almost any price. This world has emerged during the past decades due to the confluence of three factors, respectively the computer for processing, the internet for connection, and most recently artificial intelligence (AI) for rapid 'thinking' or at least rapid and seeming intelligent processing of text information in a way which seems intelligent. These three factors are making it possible to create ideas, test these ideas, and even expand

them in what figuratively be an 'eyeblick' in the corporate timeline. What took hours, days, weeks, now can take minutes and seconds.

With the foregoing paragraphs as background, the author has begun a series of studies, small studies to be sure, on topics of daily life. The approach uses experimental design of ideas, mixtures of ideas presented to the respondent, the ratings of these mixtures revealing how each idea or message 'drives' the interest of the respondent. Using these tools of computer, internet, and now artificial intelligence, the author has pushed the study of ideas in the food industry down from a pedestal of scientific perfection to an act that even a grade school student can do, and even master after a moderate amount of practice [1-3].

## The Mind Genomics Approach – Steps Towards Rapid Ideation

In order to demonstrate the power of new methods for product design, the author conducted a class experiment in April 2023, with students from the University of Florida in Gainesville. The approach was a DIY (do-it-yourself) approach for an advanced version of conjoint measurement, Mind Genomics. The specifics of Mind Genomics have been presented in detail in various papers published since the early days of the 21<sup>st</sup> century. The reader is encouraged to look

at the different topics covered. This paper will once again present the method, and the new development enabled by popular and available methods for artificial intelligence using the popular Chat GPT [4-6].

The ingoing, perhaps heretical and counterintuitive assumption, was that one could do a study within two hours, a study beginning with little or no knowledge about a field and emerge after those two hours with deep information about a topic. The topic chosen during the active initial back and forth was ‘elderberry wine,’ a wine of Asian origin (No et. al., 1980). The students who designed study had heard of elderberry wine, but were not familiar with the wine, making the exercise a challenge and enjoyable learning experience. The choice of elderberry wine emerges after about an unmoderated, 20-second class ‘discussion’ about ‘a topic, any topic having to do with foods.’

There is a modest-sized literature about elderberry wine, but a growing one, because of due to evolving consumer interest. At the same time, elderberry has received attention by horticulturists as well in part because of the increasing recognition of its health properties [7-11].

Table 1 presents the input information about the study. The table comes from a summarized report of the study automatically generated at the completion of the field work. The table provides the study title, date, purpose of the study as the researcher defines it, keywords for later sorting, self-profiling attitude questions, the respondent orientation (kept very simple), and the rating scale. All of this information is automatically incorporated into the Excel report.

The Mind Genomics process is templated, following choreographed sets which set up the experiment, run the actual experiment, and automatically analyze the data.

### Introduce to the Process and Select the Topic (Elderberry Wine)

The exercise was set up so that the students would be introduced to the Mind Genomics process through a two-minute ‘elevator pitch’. The class was told that they would choose a topic, run a study, get results, and discuss the preliminary results. The students we unprepared, but as noted above, the decision was made to study elderberry wine. It is important to note that in no way was the topic to be focused on a so-called ‘burning issue’ or ‘hole in’ literature. The topic was selected almost randomly. It was at this point that the study had been registered as ‘elderberry wine,’ the class as researchers filled out some checklists on using English as the language, and agreeing to not obtain information that could identify the respondents, except with the permission of the respondents.

### Create Four Questions through Idea Coach

Mind Genomics works by a Socratic method, posing questions to obtain answers, combining the answers, and having respondents evaluate the combinations. Figure 1 shows the screen requesting the four questions (left panel), and the four questions actually selected (right panel).

To generate the four questions in Table 1 is generally a function of one’s familiarity with the topic, and the predilection of the research group to come to an agreement. Often the group is unfamiliar with the topic, necessitating what ends up being interminable discussion and delay as the individuals in the group grapple with the appropriate questions to ask. The issue becomes even more vexing when the parties feel that they only have ‘one chance’ to run the experiment. It is at that point, the feeling of one-chance-only, that the participants

**Table 1:** Information about the study provided by the Excel report returned to the researcher at the end of the field work.

Study Title	Healthful Elderberry Wine
Identification Number of the study:	04182023.Health
Date when the study was run:	(04/18/2023-04/18/2023)
Number of respondents:	54
Purpose of the study:	We’re interested in elderberry wine for Prof. Sim’s class. This is our first effort. We’ve been at this for 21.5 minutes. Now see what we get.
Keywords:	elderberry wine
Preliminary question:	Do you drink novel alcoholic drinks? 1=Never 2=Sometimes when offered 3=Occasionally when I’m feeling curious 4=Yes, if i don’t have to pay for it 5=Of course... I’m a wine maven ... what else!!
Preliminary question:	What is the most important thing about trying this new wine? 1=I gotta try things .... that’s me. 2=I want to know what’s happening 3=I’m just curious 4=I like elderberry products 5=I like new things that I can talk about to my friends
Respondent orientation	Read this description about a new elderberry wine. How do you feel
Rating question	Tell us what phrase best fits ...after you read this. 1=Not for me ... AND just don’t get it 2=Not for me ... BUT I do get it 3=Can’t answer 4=For me ... BUT just don’t get it 5= For me ... AND... I do get it.

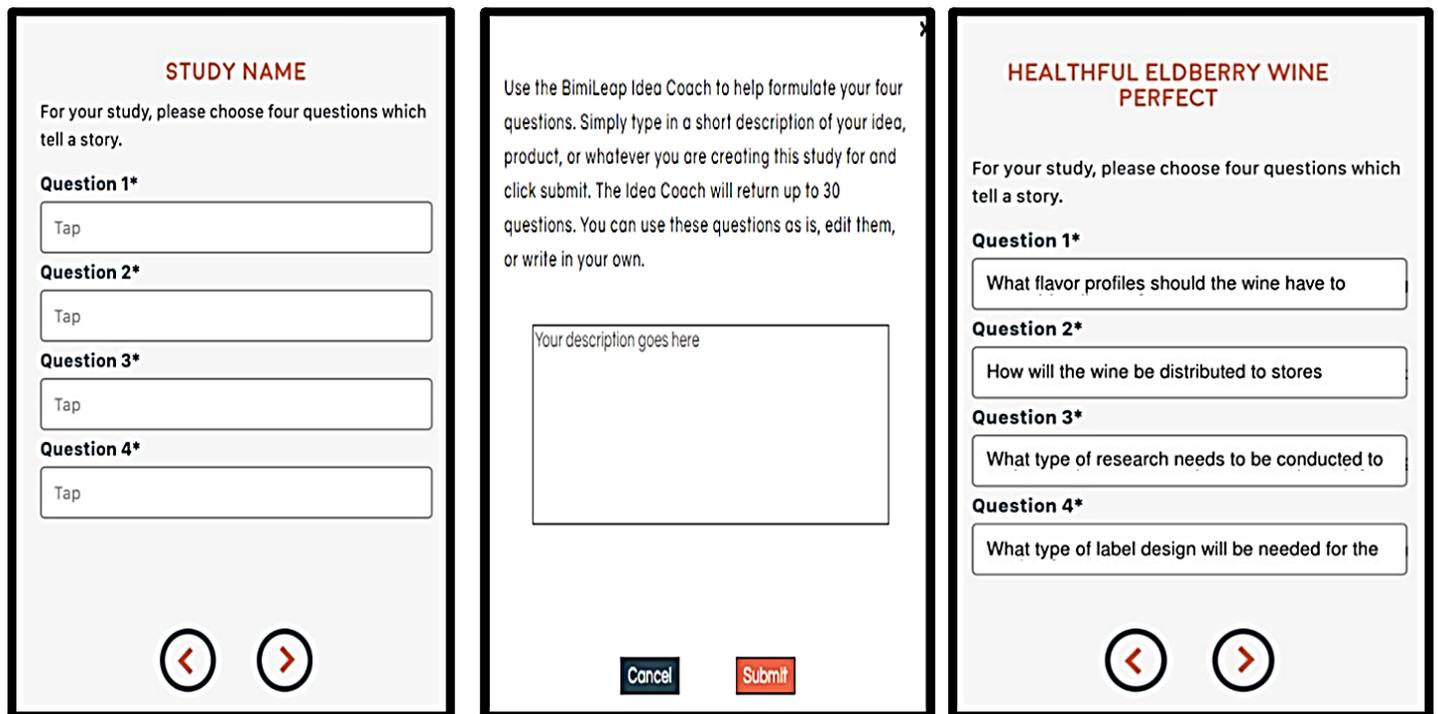


Figure 1: The request for four questions dealing with elderberry wine (left panel), the Idea Coach for generating questions through AI (middle panel) and the four questions selected from the AI suggestions (right panel).

in the research program end up ‘freezing’, often with the unhappy consequence that the project falls apart.

During the past several years users have continued to request, and eventually insist that the set-up of a Mind Genomics experiment be more ‘user-friendly’. Almost all suggestions have included something about making it easier to generate questions, and to a lesser degree, to generate answers to the questions. As an aside, it appears that instead of trusting their own intuition and thinking, many individuals prefer ideas that have somehow been ‘vetted.’ This desire to have assistance in creating questions and answers, that assistance provided by an electronic ‘third party’, led to the creation of the Idea Coach. The Idea Coach is simply a set of AI prompts, based upon the ‘squib’ written about the topic. The squib is submitted to the AI program embedded in the setup, and generates 25-30 questions. Table 2 shows 60 unique questions emerging from four passes through the Idea Coach. With 30 questions there should have been 120 questions, but only 60 were different from each other.

### Create Four Answers to Each Question through Idea Coach

Idea Coach once again uses artificial intelligence to generate sets of 15 answers to each question. The researcher can select the answers of interest and edit them. Table 3 shows the answers for the first question (flavor profile) from three consecutive iterations of answers. In this case the 45 answers differ from each other. Figure 2 shows the screenshots of the final set of answers to the four questions selected.

The mechanism by which Idea Coach provides the questions and answers remains a trade secret of the company providing the AI system. What is important, however, is the rapid ‘learning’ by the

Socratic method, question-and-answer, although here the learning might be in from parallel questions and answers, as the squib generates 25-30 questions, and the question generates 15 answers. One might happily imagine the potential of educating oneself on a topic such as elderberry, simply by two, three, four, or even five iterations of squib → 25-30 candidate questions → 15 candidate answers for each candidate question.

### Create an Experimental Design Which Specifies the Combinations of Elements (Answers)

Rather than instructing the respondent to rate each of the 16 elements, one element at a time, the Mind Genomics approach presents combinations of these elements, short descriptions of the wine. Short descriptions are easier to judge because they tell a more complete story than do single elements. The respondent will evaluate a set of 24 vignettes, the aforementioned combinations.

In the experimental design element (viz., answer) appears five times in the 24 vignettes and is absent 19 times. No vignette comprises more than one element from any question. As a consequence, 20 of the 24 vignettes contain one answer from a question, whereas four vignettes of 24 are absent answers. Finally, across all 24 vignettes there are combinations comprising two answers, three answers, and finally four answers, but no vignette with only one answer. This specific design ensures that the researcher can analyze the data using standard statistical tools such as OLS (ordinary least squares) regression [12].

A unique, patented aspect of Mind Genomics is that each respondent evaluates a different set of combinations. The mathematical structure of the combination remains the same, but the specific

**Table 2:** 60 unique questions emerging from four runs of the Idea Coach, each run returning a set of 30 questions about elderberry wine.

1	What are some common flaws or mistakes that can occur during the elderberry wine production process?
2	What are some common aging techniques used to enhance the flavor and complexity of elderberry wine?
3	Are there any particular characteristics that distinguish elderberry wine from other berry wines?
4	Can elderberry wine be made in small batches or is it typically produced on a larger scale?
5	Can different yeast strains be used to create different flavor profiles in elderberry wine?
6	Are there any specific regions or countries where elderberry wine is particularly popular?
7	What are some of the unique challenges or rewards associated with making elderberry wine?
8	What are some common strategies for balancing sweetness and acidity in elderberry wine?
9	How does the preparation of elderberries before fermentation affect the resulting wine?
10	How long does elderberry wine typically need to age before it is ready for consumption?
11	What are some common variations or adaptations of traditional elderberry wine recipes?
12	Can elderberry wine be made using a combination of wild and cultivated elderberries?
13	How can aging in different types of barrels influence the flavor of elderberry wine?
14	Are there any particular strains of yeast that work best for making elderberry wine?
15	What are the main differences between homemade and commercial elderberry wine?
16	How does the terroir of the elderberries used affect the flavor of the wine?
17	How does the aging process of elderberry wine differ from other fruit wines?
18	What are some common practices for clarifying and filtering elderberry wine?
19	Can elderberry wine be enjoyed without any food pairings or accompaniments?
20	How does the alcohol content of elderberry wine affect its aging potential?
21	What additives or preservatives may be used in commercial elderberry wine?
22	Should elderberry wine be filtered or bottled directly after fermentation?
23	How do climate and growing conditions affect the taste of elderberry wine?
24	How does the acidity level of elderberry wine affect its aging process?
25	Can elderberry wine be produced using biodynamic or organic practices?
26	What is the ideal sugar level for elderberry wine during fermentation?
27	How can consumers tell whether an elderberry wine is of high quality?
28	Are there any unique health benefits associated with elderberry wine?
29	Can elderberry wine be used as a base for cocktails or mixed drinks?
30	What are some common mistakes to avoid when making elderberry wine?
31	Can elderberry wine be used as a cooking ingredient or flavoring?
32	Can elderberry wine be made with organic or biodynamic practices?
33	What are some common types of oak used for aging elderberry wine?
34	How does the tannin content of elderberry wine affect its flavor?
35	How do the aroma and flavor of elderberry wine change over time?
36	What makes elderberry wine unique compared to other berry wines?
37	What are some common flavor compounds found in elderberries?
38	Can elderberry wine be blended with other fruits or flavors?
39	What are some potential health benefits of elderberry wine?
40	What kind of mouthfeel does elderberry wine typically have?
41	What kind of yeast is best for fermenting elderberry wine?
42	Is elderberry wine popular in certain regions or cultures?
43	How should elderberries be prepared prior to fermentation?
44	How long does elderberry wine typically keep once opened?

45	What are some common flavor pairings for elderberry wine?
46	What are some typical food pairings for elderberry wine?
47	How does the color of elderberry wine change over time?
48	What kind of vessel is best for aging elderberry wine?
49	How important is the acidity level of elderberry wine?
50	What temperature should elderberry wine be served at?
51	Can elderberry wine be made using wild elderberries?
52	What are the key flavor notes of elderberry wine?
53	What is the history of elderberry wine production?
54	Can elderberry wine be used in cooking or baking?
55	What are the key flavor notes of elderberry wine?
56	What is the alcohol content of elderberry wine?
57	Can elderberry wine be aged in the bottle?
58	Does elderberry wine tend to be expensive?
59	Should elderberry wine be sweet or dry?
60	Should elderberry wine be oak-aged?

**Table 3:** Three sets of answers to the first question (flavor profile).

	Set #1	Set #2	Set #3
1	Fruity and tart	Sweet and fruity	Sweet
2	Sweet and syrupy	Tart and tangy	Tart
3	Smooth and dry	Rich and robust	Fruity
4	Light and refreshing	Earthy and full-bodied	Rich
5	Bold and robust	Floral and aromatic	Robust
6	Earthy and rustic	Spicy and complex	Bold
7	Floral and aromatic	Musky and woody	Earthy
8	Spicy and warming	Dry and crisp	Spicy
9	Tangy and zesty	Mellow and smooth	Floral

combinations differ from one respondent to another. This difference is created by a permutation scheme described by [13]. The benefit of the permutation scheme is that the researcher need not know anything about the topic. The experiment allows the researcher to explore a great many combinations, analyze the data at the level of the individual respondent, and as a result uncover patterns that might not even have been imagined at the start of the study.

**Create an Orientation and then Create the Rating Question that the Respondent Uses to Evaluate the Vignette. The Orientation is Simple: Read this Description about a New Elderberry Wine. How Do You Feel?**

The rating scale actually comprises two dimensions. The first dimension is interest (Not for me vs For me). The second dimension is understandability (don't get it versus get it). The two dimensions allow the researcher to understand the mind of the respondent more deeply, both in terms of emotion (for me / not for me) and intellect (get it / don't get it).

*Tell us what phrase best fits ...after you read this.*

*1=Not for me ... AND just don't get it*

*2=Not for me ... BUT I do get it*

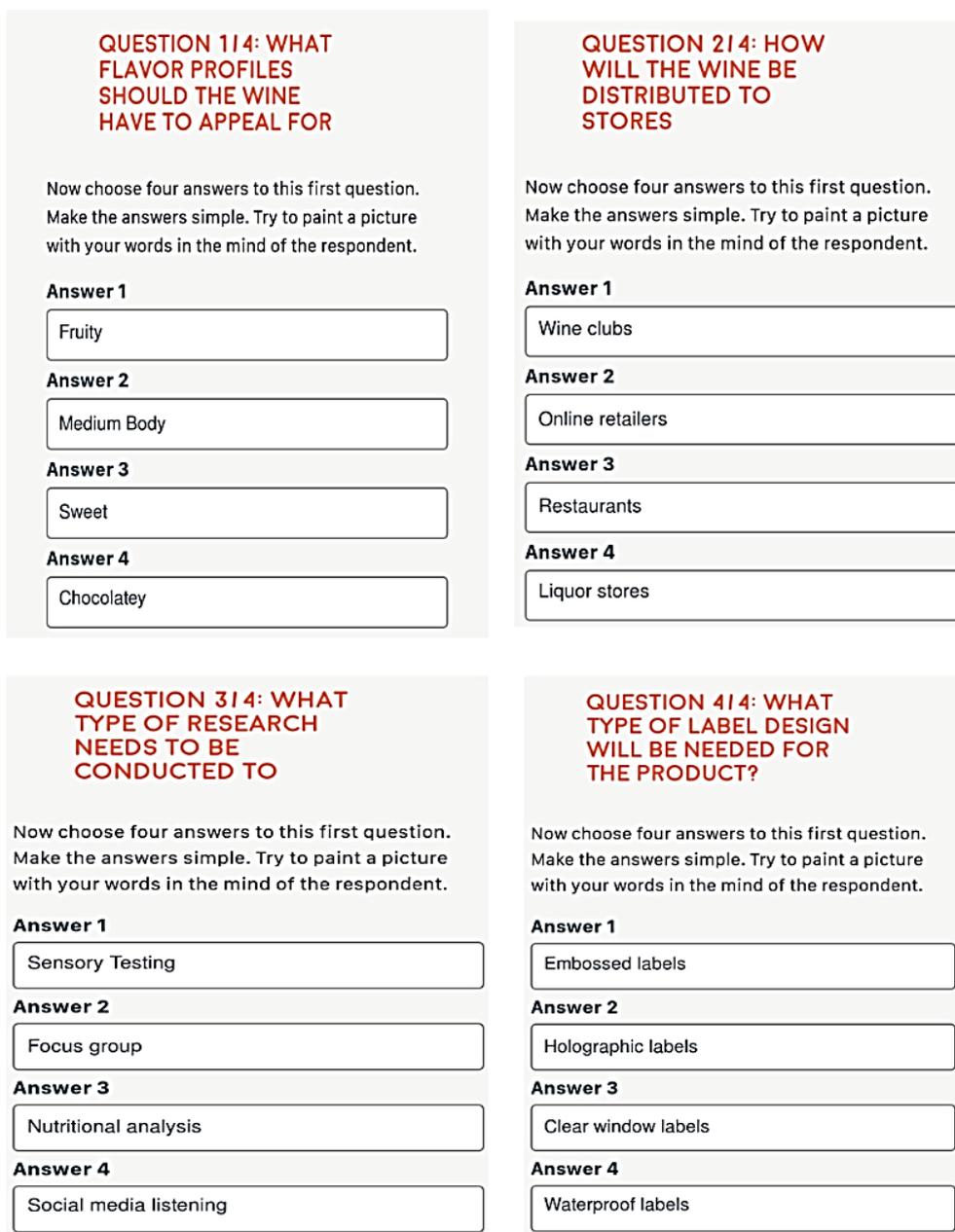


Figure 2: Screen shots of the four answers to each question.

3=Can't answer

4=For me ... BUT just don't get it

5=For me ... AND... I do get it.

### Create Self-profiling Questions

The Mind Genomics process enables the respondent to profile herself or himself on attitudes that would not be known from knowing who the response IS. At the start of the study the researcher can create up to eight such self-profiling questions. In addition, the Mind Genomics process automatically asks the respondent's age and gender. The foregoing information (self-profiling as well as age and gender) are attached to the data provided by the respondent when rating the vignette. The self-profiling information will be used to create

subgroups. Figure 3 shows an example of a self-profiling question. The Mind Genomics program allows the researcher to create up to eight such self-profiling questions, each with eight answers.

### 'Field the Study' with Respondents

Figure 4 shows the information that the researcher provides to the Mind Genomics program. This information includes the number of respondents, how the respondents will be sourced, and whether or not the researcher wants to 'privatize' the respondent data. As of this writing (May 2023), the Mind Genomics platform is very low cost for the artificial intelligence (Idea Coach and summarization in the results). The researcher can either provide her or his own respondents at a low cost (\$2/respondent for processing), use a third-party group (\$2/respondent for processing), or use a Mind-Genomics approved

**3RD CLASSIFICATION QUESTION**

Along with being asked for age and gender, you can ask your respondents an additional question. Follow the example below with your question. Three answers are required, the fourth answer is optional.

Do you drink novel alcoholic drinks

Never

Sometimes when offered

Occasionally when I'm feeling curious

Yes, if I don't have to pay for it

For the purposes of linking databases, we are going to ask the respondent this question: What is your birthdate? (MMDD) and what are the first four letters of your first name? If you absolutely don't want the question, check the box

Figure 3: One of the self-profiling questions.

**DONE!**

How many respondents would you like for this study? (4 - 9,999)

54

Press Preview to see what your study will look like on the web.

**PREVIEW**

Check only one box below:

I want my study public (Learn More)

I want my study kept private. (requires purchase - Learn More)

Just before you finalize the study and publish:

I agree to the terms of service

**PUBLISH!**

Figure 4: The researcher specifies parameters about the field execution.

supplier (Luc.id), with an approximate per respondent fee of \$4-\$6 for recruiting and processing. The researcher can make the data fully private for an extra \$2/respondent. In this way the Mind Genomics fees can be kept very low, a boon to students who can explore a topic in depth, and actually run a small (or large study) on elements of interest, if desired.

Not shown is the set of screens which allow the researcher to specify country, age range, gender, education, income, children, and

so forth for the respondent. The typical 'field time' to execute the experiment is about 60 minutes for 100-200 easy to find respondents.

### Create the Database

Each record of the database corresponds to a vignette. The record has these columns:

Column 1 – Study name

Column 2 – Respondent identification number

Columns 3,4 – Age, Gender Columns 5-6 – Answers to the two self-profiling questions created by the researcher

Columns 8-23 – One column for each of the 16 elements. When the element is absent from the particular vignette, the cell has the value 0. When the element is present in the particular vignette the cell has the value 1. This is called 'dummy coding'.

Column 24 – Test order of the vignette. Each respondent rated 24 vignettes, so the test order ranged from the first vignette tested (coded 01) to the last vignette tested (coded 24)

Column 25 – Rating assigned by the respondent to the vignette.

Column 26 – Response time in 100<sup>ths</sup> of a second, defined as the elapsed time between the presentation of the vignette on the screen and the time that the respondent assigned the rating.

Column 27-30 – Create four new binary variables by a re-code of the rating to a binary value 0 or 100 (as well as the addition of a vanishingly small random number to the newly created binary variable)

Column 27 – Create variable 'For Me.' Ratings 5, 4 re-coded to 100, rating 3, 2, 1 re-coded to 0.

Column 28 – Create variable 'Not for Me.' Ratings 1, 2 re-coded to 100, 3, 4, 5 re-coded to 0.

Column 29 – Create variable 'Get It.' Ratings 5, 2 re-coded to 100, rating 4, 3, 1 re-coded to 0.

Column 30 – Create variable 'Don't Get It.' Ratings 4, 1 re-coded to 100. Ratings 5, 3, 2 re-coded to 0.

The database is set up for dummy variable regression analysis, either at the level of the individual respondent or at the level of the group. The original experimental design specified 24 different combinations, with the combinations being precisely those which ensure that each element appears equally often, and that each of the 16 elements are statistically independent.

The analysis will focus only on the 'For Me' ratings.

### Create Equations (Models) Relating the Presence/Absence of Elements to Ratings

The equations are estimated using OLS (ordinary least squares) regression. For this analysis we express the equation in the standard way, using an additive constant:

$$\text{Binary Variable} = k_0 + k_1(A1) + k_2(A2) \dots k_{16}(D4)$$

The additive constant,  $k_0$ , shows the expected percent of responses to be assigned if there were no elements in the vignette. Of course, by design, all vignettes comprise a minimum of two and a maximum of four elements so that the additive constant should be considered a baseline.

### Search for the Patterns

The patterns should emerge from the coefficients for the dependent variable 'For Me' (ratings 5 and 4 converted to 100, ratings 1,2 and 3 converted to 0). Table 4 shows the coefficients for total panel and for binary gender (male vs female). Mind Genomics returns with a great many coefficients. Table 4 and the remaining tables of coefficients (for mind-sets) show only the positive coefficients, viz, those 2 or higher.

The additive constant gives a sense of the percent of responses that would be 5 or 4 for vignettes that were empty, viz, absent elements. By design this is not possible, but the regression process can estimate this additive constant, which is typically considered to be a correction factor (Burton, 2021). Table 4 shows the additive constant to be about 46-47, suggesting that half of the time we can expect a rating of 4 or 5 for vignette or concept about elderberry wine, even when no elements to deeper detail.

Table 4 suggests that in terms of 'interest' (viz., For Me), a few elements perform strongly, and in fact elements that might not have been even thought of without the use of the AI-powered Idea Coach. These are 'sensory testing' for males, and 'restaurant' and 'holographic

**Table 4:** Performance of the elements by total and gender using R54 (For me) as the dependent variable. Only positive coefficients, 2 or higher, are shown.

	Group (Binary Ratings) 'FOR ME'	Total	Male	Female
	Base Size	54	27	27
	Additive Constant	46	46	47
C1	Sensory Testing	3	8	
B3	Restaurants	7	3	10
D2	Holographic labels			8
A1	Fruity			6
B4	Liquor stores	2		6
D1	Embossed labels			4
D3	Clear window labels			3
B2	Online retailers	3	3	2
B2	Online retailers	3	3	2
B2	Online retailers	3	3	2
C2	Focus group		6	
C3	Nutritional analysis	2	6	
B1	Wine clubs		4	
D4	Waterproof labels	2	3	
A2	Medium Body			
A3	Sweet			
A4	Chocolatey			
C4	Social media listening			

labels' for females. The benefit of creating elements with the assistance of AI is just this 'out of the box' thinking, with the researcher having the power to accept the suggestion or reject the suggestion by simple choice, and indeed to test the suggestion again in an easily run of the study with some new elements, new respondents.

### Uncovering New-to-the-World Mind-Sets through Clustering

It is in the DNA of the scientific mind to look for basic causes, fundamentals of a situation. Although scientists and consumer researchers have attempted to develop profiles of archetypes, idealized profiles, these archetypes are too general, and fail to capture the granularity of everyday experience. Indeed, any attempt to divide people from the 'top down' is destined to fail because at the level of actual experience there are so many idiosyncratic factors that the archetypes simply do not have the ability to address [14].

The Mind Genomics approach works in the opposite direction, starting at the level of granular for a specific issue or situation, looking at the different dimensions of that granular situation, testing alternatives or expressions of each dimension, and then uncovering parallel groups of individuals or clusters for that situation. The clusters can be thought of as archetypes, not general ones, but archetypes of a specific situation, mind-sets in the language of Mind Genomics.

The statistics of Mind Genomics readily enable the researcher to discover these mind-sets, even without any ingoing knowledge. The approach simply creates individual level models of the type above shown for the total panel, or for any subgroup. Each individual generates a model, a model which is statistically valid because the 24 vignettes for each respondent had been created according to an underlying experimental design. The 24 vignettes are precisely arrayed to allow for OLS regression to be done on the data from each respondent. Each respondent produces 16 coefficients and an additive constant. Afterwards, the respondents are clustered by k-means clustering [15] first into two non-overlapping and exhaustive groups, (2-mindset solution), and then into three non-overlapping and exhaustive solutions (3-indset solution).

Clustering it follows purely mathematical criteria, e.g., minimize the sum of 'distances' between people in a cluster while at the same time maximize the distances between the centroids of the different clusters. It is left to the researcher to choose the number of clusters or mind-sets, and to name each cluster. Two good criteria are *parsimony* (fewer clusters are better), and *interpretability* (the clusters must tell a reasonably clear story).

For Mind Genomics studies, the measure of distance is the expression (1-Pearson Correlation). The Pearson Correlation coefficient measures the strength and nature of the linear relation between two sets of numbers, in our case the numbers coming from the 16 coefficients. The distance is small, viz., 0, when the Pearson correlation is +1 (1-1 = 0), occurring when the two sets of coefficients are parallel to each other. The distance is greatest, viz., 2 when the Pearson correlation is -1 (1 - 1 = 2), occurring when the two sets of coefficients go in precisely opposite directions.

**Table 5:** Performance of the elements by total and both two and three mind-sets, gender using R54 (For me) as the dependent variable. Only positive coefficients, 2 or higher, are shown.

	Dependent Variable = Rating 54 FOR me	Total	MS 1 of 2	MS 2 of 2	
	Base Size	54	29	25	
	Additive Constant	46	47	47	
	Strong for MS 1 of 2 – Venue				
B3	Restaurants	7	15		
B2	Online retailers	3	11		
B4	Liquor stores	2	10		
	Strong for MS 2 – Flavor				
A1	Fruity			11	
A2	Medium Body			7	
	Not strong for either MS				
A3	Sweet			2	
A4	Chocolatey			4	
B1	Wine clubs		5		
C1	Sensory Testing	3	2	5	
C2	Focus group		2	2	
C3	Nutritional analysis	2	4		
C4	Social media listening				
D1	Embossed labels	2	5		
D2	Holographic labels		3		
D3	Clear window labels		2		
D4	Waterproof labels	2	5		
	Dependent Variable = Rating 54	Total	MS 1 of 3	MS 2 of 3	MS 3 of 3
	Base Size	54	23	14	17
	Additive Constant	46	59	28	47
	Strong for MS 1 – Label				
D2	Holographic labels		9		
A2	Medium Body		8		
D4	Waterproof labels	2	7		
	Strong for MS 2 Information,				
C1	Sensory Testing	3		17	8
C2	Focus group			15	5
C3	Nutritional analysis	2		12	15
C4	Social media listening			11	2
A1	Fruity		5	8	
D1	Embossed labels	2	3	7	
	Strong for MS 3 – Venue, information				
B2	Online retailers	3			22
B3	Restaurants	7	2		21
B4	Liquor stores	2			15
C3	Nutritional analysis	2		12	15
B1	Wine clubs				14
C1	Sensory Testing	3		17	8
	Not strong for any MS				
A3	Sweet		2		
D3	Clear window labels		3		
A4	Chocolatey				

Mind Genomics clustering usually reveals quite simple groups, the patterns often clear, ‘jumping out’ at the researcher. Table 5 shows the strong performing elements for the two and then the three mind-sets (abbreviated MS). The two mind-sets solution shows a very simple pattern, namely that which is familiar (venue for MS1 versus flavor for MS2). The three-mind-set solution is more intriguing, suggesting Label, Information, Venue, respectively. The three-mind-set solution is not perfect, since there are some strong-performing elements appealing to the mind-set slightly ‘off’ from the main interest of the mind-set.

Table 5 once again shows the ability of the OLS regression to uncover relevant coefficients, often coefficients which ‘make sense’ in their similarity to each other for a specific mind-set.

### How Good are the Results?

Experienced researchers working in the world of inferential statistics and hypothesis testing measure their ‘performance’ by the likelihood that their hypothesis has not been falsified (Sprenger, 2011). The hypothetico deductive system of science is geared toward the creation, testing, acceptance/abandonment of hypothesis as the science moves slowly along. As famed scientist Max Planck opined ‘*science advances one funeral at a time*’ [16]. an experienced-based aphorism similar to the somewhat longer, more poetic but equally powerful idea from Tennyson’s *Le morte d’Arthur* “*The old order changeth, yielding place to new, ... Lest one good custom should corrupt the world*” (Sider, 2013).

With the evolution of research and its introduction into the world of education and application, the introductions often geared to ‘newbies’ (people without research experience), a common question is ‘*how did we do?*’. These newbies, students, others, do not have the wealth of experience, the years of data analysis, and the know-how about going to the extant ‘literature’ to compare their findings with what has been done. These newbies, aspiring researchers, need reinforcement about their work, e.g., a ‘score’ which tells them just how good their data are. In our over-measured society people use scores as an index of performance and a measure of growth.

One of the developments of Mind Genomics is the IDT, the index of divergent thought. The organizing principal underneath the IDT is that the positive coefficients, or more correctly the weighted positive coefficients, show how strongly the element ‘drives’ the rating. In other words, the IDT show how ‘on target’ the researcher has been by choosing elements to drive a dependent variable, that dependent variable here being ‘For Me’.

The IDT computations appear in Table 6. The total panel results account for 1/3 of the weight; the two mind-sets together account for 1/3 of the weight, and finally the three mind-sets together account for 1/3 of the weight. The stronger the performance of the coefficient for the total panel, the higher will be the IDT because that single high coefficient will in turn be multiplied by the value 0.33 for the total panel. In contrast, consider the value of that same high coefficient, but this time for MS 2 of 3, with 14 respondents, and a weight around 0.10. The contribution will be a lot lower. For this study the IDT is 46, reasonable. Unpublished values for the IDT in other studies have ranged from a high around to a low around 20.

**Table 6:** The IDT (Index of Divergent Thought).

	Total	MS 1 of 2	MS 2 of 2	MS 1 of 3	MS 2 of 3	MS 3 of 3
Base (number of respondents in this group)	54	29	25	23	14	17
Fruity			11	5	8	
Medium Body			7	8		
Sweet			2	2		
Chocolately			4			
Wine clubs	1	5				14
Online retailers	3	11				22
Restaurants	7	15		2		21
Liquor stores	2	10				15
Sensory Testing	3	2	5		17	8
Focus group	1	2	2		15	5
Nutritional analysis	2	4			12	15
Social media listening					11	2
Embossed labels	2	5		3	7	
Holographic labels	1	3		9		
Clear window labels		2		3		
Waterproof labels	2	5		7		
Sum Total of All Positive Coefficients	24	64	31	39	70	102
Average of All Positive Coefficients (sum coefficients/base)	0.4	2.2	1.2	1.7	5	6
Number of respondents in the column (in the subgroup)	54	29	25	23	14	17
Weight = Proportion of the respondents in the subgroup	0.33	0.18	0.15	0.14	0.09	0.10
Weighted Total (Weight x Sum Total of All Positive Coefficients)	7.9	11.5	4.6	5.5	6.3	10.2
Final Score = sum of weighted total	46					

Were the researcher to systematically vary aspects of the study and then measure the IDT for each aspect, the studies would move beyond informing about the world, and become a measure of the ‘impact’ of the different variables. Perhaps, most important for students is a measure of how well they understand the topic based upon the elements they select, the rating scale they use, the respondents they choose, and their experience as they iterate from one study to the next with clear human feedback. Much remains to be done.

### Summarizing the Results Using Artificial Intelligence

The original objective of the study was to demonstrate the speed, power, and cost of Mind Genomics. As such, one of the goals was to see how quickly the key insights could be given to the reader in a format immediately ready for further efforts, including application or follow-on research. The first requirement was that the insight to be presented had to emerge in a robust way from the data, thus linking the insights to the actual experiment. The second requirement was that the insight had to be multifaceted, produced by clearly stated queries. The third requirement is that the insights had to be scalable, emerging from a few to many queries (many being > 10), with the insights emerging automatically. The effort stopped short of automatically creating a preliminary summarization document in the form of a ‘working paper,’ but that next step is increasingly within reach. This first step to summarize the results used six queries provided to the AI program,

with the instruction to look only at elements scoring +6 or higher for the subgroup.

The six summarization queries were submitted to the AI program, with the summarization done for each defined subgroup in the population, and done twice, once for the ‘TOP’ (ratings 5,4 → 100), once for the ‘BOT’ (ratings 1,2 → 100). The defined subgroups were gender, age, response to the various questions in the self-defining questionnaire at the start of the study and finally to the two and the three mind-set solutions. Table 7 shows the summarization of the results for each of the three mind-sets for the TOP values (Rating 5,4, for ME).

### Discussion and Conclusions

The tradition of scientific research has become increasingly professionalized during the past centuries. What started out as the explorations of amateurs into a world hardly known has evolved into the world of science and academe that we know today, replete with societies, with journals, with the inevitable issue of who can publish what, and of course what exact constitutes publishable work. If that is not sufficient, the issues emerging involve the invisible networks of researchers who know each other and give each other help or in some unhappy cases just the opposite. And finally, there is the issue of funding research, funding publication and the need to survive the publish-or-perish world. In the words of an unnamed colleague, ‘we are all fighting for a sliver of the unpredictable funding pie.’

**Table 7:** AI summarization of the three mind-sets.

<b>Mind-Set 1 of 3 – FOR ME</b>
Interested in: Fruity; Medium Body; Holographic labels; Waterproof labels;
Create a label for this Mind-Set: Fruity Mediums - Holographic & Waterproof Labels
Describe this Mind-Set: This Mind-Set is comprised of consumers who are looking for products with fruity flavors, a medium body, holographic labels, and waterproof labels. These consumers are most likely drawn to products with an eye-catching, unique design that can withstand the elements. They value both the taste and visual appeal of the product and are looking for a product that stands out from the crowd.
Describe the attractiveness of this Mind-Set as a target audience: This Mind-Set of consumers appears to be looking for unique and modern products that stand out from the crowd. The fruity flavor and medium body of the products suggest a preference for a balanced and refreshing taste, while the holographic and waterproof labels indicate a desire for a product that looks stylish and durable. As a target audience, this Mind-Set of consumers could be attractive to brands and businesses that are looking to create a memorable and visually appealing product.
Explain why this Mind-Set might not be attractive as a target audience: This Mind-Set might not be attractive as a target audience because fruity flavors and medium body wines may not appeal to all consumers. Additionally, holographic labels and waterproof labels may be cost prohibitive for certain budgets. This Mind-Set may also be difficult to market to because it is too narrow and specific in its tastes and preferences.
Which messages will interest this Mind-Set? 1. "Experience the delicious taste of our fruity wines!" 2. "Enjoy the perfect balance of medium body and great flavor!" 3. "Stand out from the crowd with our holographic labels!" 4. "No wet labels here! Our waterproof labels keep your labels looking fresh!"
<b>Mind-Set 2 of 3 – FOR ME</b>
Interested in: Fruity; Sensory Testing; Focus group; Nutritional analysis; Social media listening; Embossed labels;
Create a label for this Mind-Set: Fruity-Sensory Mind-Set
Describe this Mind-Set: This Mind-Set is comprised of consumers who are interested in a range of product characteristics, including fruity taste, sensory testing, focus groups, nutritional analysis, social media listening, and embossed labels. This Mind-Set may represent a broad range of customer demographics, including those who are health-conscious, those who are looking for a specific texture or flavor in their food and beverages, or those who are interested in the latest trends in product packaging.
Describe the attractiveness of this Mind-Set as a target audience: This Mind-Set appears to be an attractive target audience due to the wide range of characteristics that can be used to understand and appeal to their needs. Through sensory testing and focus groups, marketers can garner insights on how consumers perceive their products. Furthermore, nutritional analysis and social media listening can provide further information on what types of products resonate with this particular Mind-Set. Finally, embossed labels can help create a sense of perceived quality and value, further boosting the attractiveness of this Mind-Set.
Explain why this Mind-Set might not be attractive as a target audience: This Mind-Set might not be attractive as a target audience because the attributes selected do not indicate a particular target demographic or customer Mind-Set. Fruity and embossed labels could suggest that the target is likely to be a consumer of food or beverage products, but the other attributes are too broad or vague to narrow down the focus. Sensory testing and nutritional analysis could be used to assess product quality, while focus groups and social media listening could be used to gain insights into consumer preferences, but without additional information these attributes do not provide a clear indication of who the target audience should be.
Which messages will interest this Mind-Set? 1. Try our new fruity flavors – they're sure to tantalize your taste buds! 2. Join our sensory testing panel and help us develop products that are just right for you! 3. Take part in our focus group and be the first to experience our newest creations! 4. Get the nutritional benefits you need with our nutritional analysis services. 5. Get the full story of what people are saying about us on social media with our social media listening services. 6. Make your product stand out from the crowd with our custom embossed labels.
<b>Mind-Set 3 of 3 – FOR ME</b>
Interested in: Wine clubs; Online retailers; Restaurants; Liquor stores; Sensory Testing; Focus group; Nutritional analysis;
Create a label for this Mind-Set: Wine Industry Consumers.
Describe this Mind-Set: This Mind-Set consists of individuals who have an interest in wine clubs, online retailers, restaurants, liquor stores, sensory testing, focus groups, and nutritional analysis. These individuals are likely to be knowledgeable about alcohol-related topics and may be involved in the production, distribution, or promotion of alcoholic beverages. They are likely to have a wide range of experiences and preferences when it comes to drinking and purchasing alcohol. As a result, their opinions and insights will be invaluable for any research study centered around the alcohol industry.

Within this world of discomfort and competitive behavior, the efforts of students, aspiring professionals, end up being crushed more often than not by an invisible college and rules of what makes science valid. All too often, the focus on being safe and correct ends up discouraging the researcher. Within this world, the Mind Genomics effort produces a system which expands the vision and hope of the amateur researcher, providing the potential of systematized, scientific, often even interesting exploration. It is within that spirit that this paper is presented, not so much as the convenient but hardly explored topic of elderberry wine as much as the exploration of what people just might do if given tools to empower their curiosity.

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