Mind-Sets of Worried Citizens and the 'Real-World Experiment' of Covid-19: A Mind Genomics Cartography

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Abstract: Two groups of 51 US respondents each evaluated combinations of statements about the problems and solutions that a country might face. The two studies were run a year apart, May 2019 (before the Covid-19 pandemic) and May 2020 (at the then current height of the pandemic). The problems and solutions were combined by experimental design, creating a unique set of 24 vignettes for each respondent. The responses to the vignettes (negative versus positive outcome, based on the vignette) were deconstructed to the contribution of each of the 16 elements (four problems, 12 solutions). Three mind-sets emerged, based on clustering the pattern of responses to the 16 elements from each of the 100 respondents: MS1–Startups, students; MS2–Change and Investment; MS3–Family social. Each mind-set shows a specific pattern of responses to problems, solutions, and the effect of Covid-19. The granularity afforded by Mind Genomics allows the researcher a new and profoundly deeper understanding of the mind of the citizen, opening a new area of psychological science. The three mind-sets distribute similarly through the population, requiring short intervention, the Personal Viewpoint Identifier, a set of six questions, the pattern of response to which assigns a new person to one of the three mind-sets.

1. Background

Those who study political science, history, economics, sociology, and indeed all of the different social sciences know that it is the nature of countries to experience both good times and bad times, prosperity and difficulties, respectively. We know that difficulties may stem from many causes, economic, social, physical (example: climate), and so forth. We also know that people respond differently to the difficulties facing them, whether these difficulties are of global sort, plaguing their country or the world, or whether these difficulties are of the local sort, plaguing individuals. Each discipline of social science looks at the situation and the data from its own discipline-appropriate point of view.

Economists working on the behavior of people and nations call these issues micro-economic when the topic is the individual and macro-economic when the topic is the nation. Sociologists look at the social structures within the country. Political scientists look at the nature of man's motivates within the society, and how those manifest themselves in terms of power and activities. Social issues with which a country must deal vary from those outside of its control and emerging from the 'world order', both political and economic, as well as issues within the country, also political and economic.

The typical social science study looks for the 'nomothetic,' the recurrent patterns over time which generate 'rules. Psychologists working with these national-level problems must work with the nomothetic, and supplement the information with interviews from the ordinary citizen, or, if fortunate, from key players, those responsible for the situation, or at least in power. The topics with which we deal in this study are some of the problems faced by a country today, including slow growth, corruption, young people leaving the country, and political instability, respectively. The literature of each of these topics is writ large in both the academic and popular presses. Studies of slow growth talk about ways to stimulate the economy, which work and which don't. Studies of corruption abound in the literature, perhaps because corruption is a topic appealing to many people from the vantage points of morality, legality, economics, etc. Studies of young people leaving a country in search of a better life are the warp and woof of stories of people writing their autobiographies, but also today of concern in many countries with low growth which face losing the young population. Finally, political instability is a mainstay of historians, sociologists, political scientists, economists, and psychologists, each of whom approaches the effects of political instability on the actions of the country with respect to other countries, the social fabric of the country, and the minds of the citizens.

One can get a sense of paradox in social science, from excerpts from a few studies. For example, dealing with corruption one gets a sense of the mind of the citizen, but not a deep sense [1]. Borrowing theoretical insights from the information-processing theory of voting, this study finds that political corruption becomes a formative electoral factor when the regime fails to sustain a sufficient level of economic growth. Otherwise, political corruption is not a significant factor that shapes electoral outcomes, irrespective of the level of perceived corruption, because the economy occupies voters' minds as the most important issue, making it a more accessible issue than political corruption A second example of the psychological approach comes from the National Bureau of Economic Research, which considers 'gross' psychological measures, rather than refined, in-depth measures [2].

Assessing the economic impact of the COVID-19 pandemic is essential for policymakers, but challenging because the crisis has unfolded with extreme speed. We identify three indicators-stock market volatility, newspaper-based economic uncertainty, and subjective uncertainty in business expectation surveys-that provide real-time forward-looking uncertainty measures. We use these indicators to document and quantify the enormous increase in economic uncertainty in the past several weeks. This paper presents a new approach to studying national problems, albeit from the point of view of the individual. The objective is to incorporate the mind of the ordinary citizen into an experiment about alternative situations, specifically combinations of problems and solutions. How does the ordinary citizen respondent to these problems and solutions, when they are presented in a situation (vignette)? Can we deconstruct the data to reveal the mind of the citizen, even if that mind been only revealed through a pattern of responses, and through direct questioning? Finally, does unique situation, a 'Black Swan' event, such as the Covid-19 pandemic, affect the mind of the citizen [3].

Our first topic, from a set of planned topics, how people in the United States feel about problems and solutions for issues which involve their country. These problems range from corruption to slow growth to loss of population (e.g., the young people leaving the country for lack of opportunity). The solutions range from what can be done for workers to what types of education opportunities can be created. The problems are not stated with respect to the United States, but rather stated as general problem facing a nation. The

paper represents a year-on-year comparison of the responses to the same stimuli, with the intervention produced by the recent t Covid-19 pandemic. The pandemic has affected people world-wide, forcing them to shelter in place, and changing the reality of their futures as the dismal economic news emerging in the wake of this pandemic applied to many of the people in the population.

The original study, responses to problems/solutions for a country was run in May, 2019, with 51 respondents in the US, sufficient to reveal patterns. The second, exactly parallel study with the same material but with 51 new respondents was run in May 2020, one year and one week later, with the same type of respondents. The data from these two studies can be directly compared, as well as merged, to understand how a pandemic might affect the mind of a person as the person responds to different vignettes about the situation of one's country.

The research protocol followed the steps used for Mind Genomics, an 'experimenting science,' which focuses on the response to people to compound stimuli presents situations (e.g., problems and solutions). The ingoing bases of Mind Genomics are the belief that experimentation may provide stronger linkages between problems and solutions than might a non-systematic, cross-sectional analysis of problems and solutions. Mind Genomics traces its history of experimental psychology, with the study framed as an experiment whose outcomes reveal linkages and causations [4, 5] Mind Genomics also traces back to statistics, specifically experimental design and finally to the focus of market research, which deals with the everyday aspects, and the rules for decision making [6, 7] Mind Genomics follows a specific set of choreographed steps, along with a technology (BimiLeap®), which provides rapid, automatic, and affordable analyses of research data from the experiments. A statistical graphics software package was used named SYSTAT, Inc, 2009.SYSTAT® 13: Statistics.

Step 1: Set up the raw material, questions and answers (elements): The Mind Genomics process works in a Socratic fashion, requiring the researcher to think of four questions, relevant to the topic, questions which tell a story. The focus of this study was on problems and solutions that a country might face. Table 1 shows the four questions, with Question A (what is the country situation now?) dealing with the problem, and Questions B-D dealing with alternative types of solutions. The answers to the questions (henceforth called 'elements') reflect different alternatives addressing and answering the problem. Altogether there are 16 such elements, four elements dealing with the problem, and 12 elements dealing with solutions **(Table 1).**

Table 1.
The 'raw material' comprising the four questions, and the four answers to each question.

Question A: What is the country situation now	
A1	Economy is growing slowly
A2	The country is very corrupted
A3	Young people are leaving the country
A4	Political situation is unstable
Question B: What should the government do about business	
B1	Invitation to foreign investors
B2	Create new startups
B3	Reduce taxes for innovations
B4	Help small businesses to compete
Question C: What should the government do about families	
C1	Offer free healthcare
C2	Support family oriented social services
C3	Increase the minimum wage
C4	Workers should be retrained
Question D: What should the government do about students	
D1	Sponsor education labs students' development
D2	Free online courses students' development
D3	Invest in increasing student creativity
D4	Create better understanding for student talent

Step 2: Construct the test vignettes: Mind Genomics works with combinations of elements, rather than working with single elements in the manner of a survey. The ingoing world view is that for most of their lives navigate through oceans of information, typically mixtures, and with a low level of attention [8].

The construction of the vignettes is dictated by a plan called an experimental design [6]. The specific design calls for 24 combinations, the vignettes. Each combination comprises 2-4 elements, at most one element or answer from a question. The experimental design calls for many of the vignettes to be absent elements or answers from one, and sometimes from two questions. Furthermore, the vignette can never have more than one element or answer from any question. Finally, each respondent evaluated a unique set of 24 vignettes. The mathematical structure underlying the 24 vignettes was maintained from respondent to respondent, but the actual combinations changed. This strategy allows the research to 'cover' a great deal of the so-called 'design space,' defined as the world of possible combinations [9].

Step 3: Respondent evaluated the vignettes in an internet-based experiment lasting 3-5 minutes: The respondents were members of a panel operated by Luc.id, and had previous agreed to participate in all types of studies sent to them. Membership in on-lie panels is very popular because the respondents are compensated for participation. Occasionally, an objection will be raised that such respondents are biased.

Mind Genomics is fairly immune to such objections because the vignettes are put together in a way defying one's ability to understand the underlying structure. Respondents answer at a 'gut level,' in the same way that they live their ordinary lives, without paying deep attention to the world around them. The respondent began the experiment by providing gender, age, and then one of four answers regarding feelings about the government. In the actual experiment, quickly following the classification and orientation, the respondent was presented with each vignette one at a time, in a randomized order, meaning that not only were the combinations of elements different for each respondent, but the order of the vignettes in the set of 24 vignettes was varied. The respondent each vignette, and rated the vignette as a totality. The instructions were sparse and simple. The key information is contained in the vignette, not in the instructions: Read this vignette-what will be the outcome in 6 months if this happens? 1=disaster, 2=simple failure, 3=no change, 4=improvement, 5=prosperity.

Step 4: Recode the data to prepare for OLS (ordinary least-squares) regression modeling: The ratings for the five-point scale were recoded twice. The first recode, Top2 or Positive Outcome, transformed ratings of 1-3 to 0 to denote a non-positive outcome, whether a negative outcome or no change. In turn, ratings 4-5 were transformed to 100 to denote a positive outcome. The second recode, Bot2 or Negative outcome, transformed ratings of 1-2 to 100 to denote a negative outcome. In turn, ratings 3-5 were transformed to 0 to denote a non-negative outcome.

Step 5: Select three dependent variables: Step 4 created two new variables by recoding the ratings. These two variables show responses which are either clearly positive (Top2), or clearly negative (Bot2). The third dependent variable was the response time, defined as the number of seconds to the nearest tenth of a second, elapsing between the appearance of the vignette on the screen and the rating assigned by the respondent. All elapsed times beyond 9 seconds were converted to 9 seconds.

Step 6: Create individual-level models for Top2 and for Bot2, and then cluster the respondents: Each respondent evaluated a full set of 24 combinations, conforming to an experimental design for the respondent. The design allowed the OLS regression to estimate the relation between the presence/absence of the 16 elements and the two newly created variables (Top2, Bot2, respectively). All 24 vignettes were used to create two models for each respondent, one model relating the elements to optimistic outcome (Top2), and the other model relating the elements to pessimistic outcome (Bot2). The two equations were expressed by the simple linear expression: Binary Transformed Rating = $k_1(A1)+k_2(A2) \dots k_{16}(D4)$. The equations were estimated without an additive constant. With two equations for each respondent, there are 204 equations, two for each of 51 respondents participating in 2019, and two for each of 51 different respondents participating in 2020. The 102 respondents were clustered by k-means clustering, with the distance between any two respondents defined by the expression (1-Pearson R, viz., 1- Pearson correlation coefficient computed on the 24 corresponding coefficients between two respondents.) The expression, 'distance between two respondents,' ranges from a low of 0 when the coefficients from the two respondents are perfectly aligned (R=+1, 1-1 =0), to a high of +2 when the coefficients from the two respondents are perfectly inversely aligned (R=-1, 1-1=2) [10].

Step 7: Computing the means and performing the "Grand' regression analysis on vignettes 2-24 for each group: Previous studies suggest that the respondent does not know what to do on the first rating. Since each respondent evaluated a unique set of combinations, the average data and the group regressions (total, all males, mind-sets, etc.) were computed using the data from vignettes 2-24, and ignoring the first vignette evaluated by the respondent. Note that the individual-level analysis (Step 6) was made using all 24 vignettes for each respondent, a necessary step because the experimental design at the level of the respondent requires all 24 vignettes, whereas the analysis of larger groups is based on much more data, so the individual-level experimental design is not necessary. The first vignette and its rating may be safely discarded with base sizes of 20+ respondents.

2. Results

Means for ratings, comparing pre Covid-19 ratings to ratings assigned during Covid-19: Table 2 shows averages for ratings of vignettes in position 2-24, 23 vignettes. The variables on which the vignettes were rated are Top2 (Positive outcome), Bot2 (Negative outcome), and RT (response time, or time to read the vignette). The data come from the Total Panel of 102 respondents, first considered as one group, and then divided into the first study (before the Covid-19 pandemic) and the second study (during the Covid-19 pandemic) **(Table 2)**.

We are not looking for statistical differences, but rather simply for patterns which can suggest hypothesis. The Mind Genomics world-view is akin to a cartographer, not so much looking to falsify a hypothesis in the manner of the hypothetico-deductive process but rather to identify interesting patterns. In this spirit of patterns, the data suggest the following for the total panel, first combined and then broken out into the data from the respondents who participated in 2019 (pre-Covid-19) and those participated in 2020 (during Covid-19) [11].

- When we look at the averages from those vignettes comprising only solutions and no problems, viz., elements B1-D4, we see that respondent participating in 2019, pre-Covid-19 were far more optimistic than respondents participating during-Covid-19 (average of 41 vs 28, respectively for Top2). The reverse is the case when look at pessimism. Respondents participating during-Covid-19 were slightly more pessimistic than respondents participating pre-Covid-19 (24 vs 32, respectively for Bot2). The respondents participating pre-Covid-19 showed a dramatically longer response time than respondents participating during-Covid-19 (4.3 vs 3.6 seconds, respectively).
- When we move to incorporating all vignettes, those with problems (A1-A4) and with solutions (B1-D4), we see an unexpected pattern. Those responding pre-Covid-19 are slightly LESS optimistic than those responding during-Covid-19 (30 vs 34 for Top2). Those responding pre-Covid-19 are slightly more pessimistic than those responding during-Covid-19 (37 vs 30 for Bot2). Finally, those responding pre-Covid-19 showed a much longer response time (4.7 seconds vs 3.8 seconds).

Table 2.

Average ratings assigned to vignettes 2-24 across respondents, test year, for binary recoded rating (Top2, Bot2) and response time.

Total Panel	TOP2	BOT2	Response time
	Optimistic	Pessimistic	Engagement
Vignettes with solutions only (B1-D4)			
Pre and post combined	34	28	4
Group 1-2019 (Pre-Covid-19)	41	24	4.3
Group 2-2020 (During Covid-19)	28	32	3.6
Vignettes with problems (A1-A4) and Solutions (B1-D4)			
Pre and post combined	32	34	4.3
Group 1-2019 (Pre-Covid-19)	30	37	4.7
Group 2-2020 (During Covid-19)	34	30	3.8

2.1. Uncovering the Granularity of the Mind Through Regression

A deeper understanding of the mind of the respondents emerges by relating the presence/absence of the different elements (problems, solutions) to the ratings (Top2 for optimistic, Bot2 for pessimistic, and Response Time for engagement). The benefit of experimental design is that the combinations are specified; afterwards the researcher can deconstruct the ratings into the part-worth contribution of each of the 16 elements. The Mind Genomics approach becomes even more valuable when the elements themselves are 'cognitively rich,' having meaning that they have denotative and connotative meaning. Becomes far easier to understanding the patterns which emerge from these straightforward experiments which mix ideas, i.e., elements, in contrast to having to uncover, or really impute a meaningful pattern from a set of simple points, these points themselves having no intrinsic meaning.

The equation is the same one as used for the individual respondents, but the 'cases' or 'observations' are all vignettes tested in position 2-24, half of those vignettes from 2019, and the other half from 2020. The equation is: Transformed Rating or Response Time=$k_1(A1)+k_2(A2)\dots K_{16}(D4)$. The coefficients appear in **(Table 3)**. All coefficients greater than 1.0 are shown for Response Time. Only the positive coefficients are shown for Top2 (optimistic) and Bot2 (Pessimistic). Showing only the positive coefficients for the binary-transformed rating or the higher response time coefficients makes it easy to detect patterns, without forcing the reader to face a 'wall of numbers'.

2.2. Emotional Responses to Situations (Problems Facing the Country)

When we step back from the individual elements, and look at the general pattern, we see that there are about equal numbers of pessimistic and optimistic responses. There are two types of situations, one type driving clear pessimism (A2–The country is very corrupted; A4–Political situation is unstable), and the other type driving an ambivalent response (A1–The economy is growing slowly; A3-Young people are leaving the country).

2.3. Emotional Responses to Solutions

The solutions are much clearer. A number of solutions drive strong optimism, especially for pre-Covid-19 days, not so much for feelings during the pandemic (C3–Increase the minimum wage; B1–invitation to foreign investors; B3–Reduce taxes for innovations; C1–Offer free healthcare). The strong performing solutions divide into those dealing with economic incentives, and those dealing with social benefits. As we will see below, these two types of solutions appeal to two mind-sets, respectively. There is another set of solutions which drive optimistic responses, but less strongly, but driving optimism both before the pandemic and during the pandemic. These are: B2–Create new startups; D2–Free online courses for students' development; D3–Invest in student creativity. There only a few scattered solutions which drive pessimistic responses, none strongly. The strongest is C3–Increase the minimum wage, driving pessimism only during the pandemic.

2.4. Which Elements Engage Attention (Response Time).

In the history of experimental psychology, response time (also called reaction time) is assumed to represent underlying psychological processes [12]. When it comes to reading vignettes, the response time, measured from the time the stimulus appears to the time the response assigns the rating, may reflect the time it takes to read the vignette, the time it takes to comprehend what is read, and the time it takes to assign the response. The model for response time is expressed in the same way as the model for Top2 and Bot2, optimistic and pessimistic responses, respectively. The equation is: $RT = k_1(A1)+k_2(A2)\ldots k_{16}(D4)$. The coefficients of 1.0 or less (response time less than 1 second) are not shown, and may be considered to be not engaging. Whether these non-engaging elements drive optimistic or pessimistic responses is irrelevant. Coefficients of 1.1-1.4 are shown, but not highlighted. These elements drive engagement, but not long engagement. Coefficients of 1.5 or higher are shown in bold type and in shaded cells. These elements drive long engagement. With respect to problems A1-A4, all four problems drive engagement. The longest engagement is A1, political situation is unstable. With respect to solutions, we see a range of engagement, from elements driving strong engagement (e.g., 1.8 seconds for B3, reduce taxes for innovation pre-Covid-19), to elements which drive little engagement (e.g. D1-D4, elements about students, during-Covid-19).

2.5. Dividing the Respondents by the Pattern of Coefficients

The creation of the mind-sets through clustering is a mathematical process, not a process of interpretation. The computational formulas define the clusters based upon variability within a cluster versus variability across clusters. Yet, the mathematical clusters are not the objective of clustering. Rather, it is the creation of different and interpretable groups of respondents. The clusters or groupings must be parsimonious (fewer clusters are better), but must also be interpretable (tell a story). A two-cluster solution is parsimonious, but not easy to interpret. A three-cluster solution is easier to interpret.

Three mind-sets are the following, based upon what makes them feel optimistic. Rather than looking at each element, one at a time to determine what these mind-sets are 'all about,' it's easy simply to look holistically at the pattern of the elements for optimistic responses, for pessimistic responses, and for response time. The three mind-sets have been already decided upon by the combination of statistics (clustering) and interpretation (a general, almost intuitive sense of the meaning of the clusters).

2.6. What Drives Optimism (Top2) among the Three Mind-Sets, Pre-Covid-19 and During-Covid-19?

Table 4 shows the non-zero coefficients for Top3, the sense of optimism. **(Table 4)** shows the positive coefficients for each of the three mind-sets, for those respondents in the mind-set participating Pre-Covid-19 (May 2019) and During-Covid-19 (May 2020).

Mind-Set 1: (Focus on startups and students)

Pre-Covid-19-Optimistic when helping everyone, being generous, the effort has to build something. During-Covid-19-Optimism increases when focusing on what students can do to help the country

Mind-Set 2: (Focus on investment and deep structural change)

Pre-Covid-19-Optimistic when helping business to compete. During-Covid-19-Optimism goes away.

Mind-Set 3: (Focus on the family and the social safety net)

Pre-Covid-19 Optimistic when helping the social fabric. During-Covid-19–Optimism drops, but still interested in helping the family.

What drives pessimism (Top2) among the three mind-sets, Pre-Covid-19 and During Covid-19

Table 5 shows the non-zero coefficients for Bot2, the sense of pessimism. **(Table 5)** shows the positive coefficients for each of the three mind-sets, for those respondents in the mind-set participating before Covid-19 (May 2019) and during Covid-19 (May 2020)

Mind-Set 1: (Focus on startups and students) Pre-Covid-19. Focuses on problems and effort involved in retraining workers. During-Covid-19. Less pessimistic about problems

Mind-Set 2: (Focus on investment and deep structural change) Not pessimistic about the problems Pre-Covid-19. Pessimistic when the solution involves social aspects. Such as worker retraining, higher minimum wage, free healthcare. During-Covid-19. Dramatically more pessimistic about solutions.

Mind-Set 3: (Focus on the family and the social safety net) Pre-Covid-19 and During-Covid-19-Almost equally pessimistic about the problems and solutions. Little effect of the pandemic on their point of view.

Table 3.

Coefficients for the total panel, showing the models (equations) relating the presence/absence of the 16 elements (4 problems, 12 solutions) to optimistic responses (Top2), pessimistic responses (Bot2), and response time. Strong performing elements are shown in bold type and shaded. Only positive coefficients are shown in the table for optimistic and pessimistic responses. Only response times greater than 1.0 seconds are shown).

Total Panel		Optimistic			Pessimistic			Response Time		
		Pre and Post	Pre (2019)	During (2020)	Pre and Post	Pre (2019)	During (2020)	Pre and Post	Pre (2019)	During (2020)
Situations										
A1	Economy is growing slowly	16	17	13				1.3	1.3	1.2
A3	Young people are leaving the country			18	14	22		1.4	1.4	1.4
A2	The country is very corrupted			14	23	35	10	1.3	1.4	1.2
A4	Political situation is unstable			10	15	21	10	1.5	1.6	1.5
Solutions										
C3	Increase the minimum wage	14	20				12	1.2	1.4	
B1	Invitation to foreign investors	14	17	11				1.3	1.3	1.3

B3	Reduce taxes for innovations	12	17				11	1.5	1.8	1.4
C1	Offer free healthcare	12	16		10		11	1.2	1.3	1.2
B2	Create new startups	12	14	10				1.2	1.1	1.3
B4	Help small businesses to compete	10	14				10	1.4	1.4	1.5
D2	Free online courses for students' development	11	11	12			10		1.1	
D3	Invest in increasing student creativity	11	11	11					1.1	
D4	Create better understanding for student talent			11				1.1	1.4	
C2	Support family oriented social services							1.1	1.4	
C4	Workers should be retrained				10	10	10	1.2	1.5	
D1	Sponsor education labs students' development						11		1.3	

Table 4.
Non-zero, positive coefficients for elements, showing those elements which drive optimism (Top2), by mind-set, both Pre-Covid-19 and during-Covid-19.

Optimistic response (Top2) (Positive, non-zero coefficients only)		MS1 - Focus on startups and students		MS2-Focus on investment and deep structural change		MS3-Focus on the family and the social safety net	
		Pre	During	Pre	During	Pre	During
	Problems						
A1	Economy is growing slowly	11			34	18	14
A2	The country is very corrupted			10	33		13
A3	Young people are leaving the country			14	31		26
A4	Political situation is unstable			18	37		
	Solutions						
C3	Increase the minimum wage	25	16			19	13
B4	Help small businesses to compete	22		16			12
B2	Create new startups	21	18	15			
C1	Offer free healthcare	21	12			28	21
D1	Sponsor education labs students' development	18	25		12		
B3	Reduce taxes for innovations	17		22		10	
B1	Invitation to foreign investors	16	17	29			11
D3	Invest in increasing student creativity	16	22		14		
D2	Free online courses students' development	15	27		18		
C2	Support family oriented social services					14	23
C4	Workers should be retrained						13
D4	Create better understanding for student talent		30		13		

Table 5.
Non zero coefficients for elements, showing those elements which drive pessimism (Bot 2) by mind-set, both before and during Covid-19.

Pessimistic response (Bot2) (Positive coefficients only)		MS1-Focus on startups and students		MS2-Focus on investment and deep structural change		MS3-Focus on the family and the social safety net	
		Pre	During	Pre	During	Pre	During
	Problems						
A1	Economy is growing slowly	14	11				16
A2	The country is very corrupted	48	22			38	15
A3	Young people are leaving the country	30	16			23	13
A4	Political situation is unstable	34	20			18	25
	Solutions						
C4	Workers should be retrained	14	23				
C1	Offer free healthcare			25	25		
C3	Increase the minimum wage			15	22		11
D1	Sponsor education labs students' development			12		32	27

D2	Free online courses students' development			15		22	22
D4	Create better understanding for student talent					21	22
D3	Invest in increasing student creativity			11		18	16
B4	Help small businesses to compete				19	17	
B2	Create new startups				19	12	
C2	Support family oriented social services			13	20		
B1	Invitation to foreign investors	12					
B3	Reduce taxes for innovations		14		11		12

Table 6.
Strongly engaging elements (RT>1.45), by mid-set, both Pre-Covid-19 and During-Covid-19.

Engaging elements (Response time > 1.45 seconds)		MS1 - Focus on startups and students		MS2-Focus on investment and deep structural change		MS3-Focus on the family and the social safety net	
		Pre	During	Pre	During	Pre	During
Problems							
A4	Political situation is unstable	1.7		1.7			1.9
A1	Economy is growing slowly	1.6					1.5
A2	The country is very corrupted					1.7	2
A3	Young people are leaving the country					1.5	1.8
Solutions							
B3	Reduce taxes for innovations	2				1.6	
B4	Help small businesses to compete	1.8	1.5		1.8		1.5
C4	Workers should be retrained	1.8			1.5	1.8	
C2	Support family oriented social services	1.7				1.9	
C3	Increase the minimum wage	1.7				1.6	
B1	Invitation to foreign investors	1.6				1.6	
D4	Create better understanding for student talent	1.6			1.7		
C1	Offer free healthcare	1.5				1.6	
B2	Create new startups					1.7	
D1	Sponsor education labs students' development				1.7	1.5	
D3	Invest in increasing student creativity						
D2	Free online courses students' development						

2.7. What Drives Strong Engagement (RT>1.451 Sec) among The Three Mind-Sets, Pre-Covid-19 and During-Covid-19

Table 6 shows only those elements which demonstrate 'strong engagement,' operationally defined here as a response time coefficient of 1.451 seconds or longer, a coefficient which rounds up to 1.5 seconds. There could have been other cut-points. This point was selected to allow a pattern to emerge, if one exists **(Table 6)**.

Mind-Set: (Focus on startups and students) Barely focuses on problems. Pre-Covid-19. Focuses on solutions. During-Covid-19. Does not focus on solutions

Mind-Set 2: (Focus on investment and deep structural change)
Barely focuses on problem.
Pre-Covid-19. Does not focus on solutions
During-Covid-19. Focus on solutions

Mind-Set 3: (Focus on the family and the social safety net)
Focuses on problems, both before and during Covid-19.
Pre-Covid-19. Focuses on solutions.
During-Covid-19. Does not focus on solutions.

2.8. Finding These Mind-Sets in the Population

A key tenet of Mind Genomics is that within any population of people the differences in opinion about a topic will manifest themselves in ways that we might consider random or at least in patterns across standard demo- and psycho-graphics that we will find hard to predict. People are accustomed to believing that people similar in their geo-demographics or in the psychographic profile will think similarly about a topic. The reality is absolutely different. Even within a typical group at a fixed time there are a variety of patterns of responses to the same test stimuli, by people who might be otherwise labelled homogeneous with respect to standard criteria, such as age, gender, income, education, political belief, and so forth. Presents the distribution of respondents by year, gender, age group and response to the government all provided before participation in the experiment.

The numbers in the table are the numbers of respondents in the group. No clear pattern emerges suggesting that the mind-sets align with standard measures, e.g., period (before versus during the pandemic), geo-demographics (age, gender), or attitude towards the government. There may be other metrics which do show clearer alignment of mind-sets, but finding these metrics may be very hard for any specific set of mind-sets which emerge when the Mind Genomics study is run on a challenge-topic, one with little previous data. During the past three years, beginning in 2017, authors Gere and Moskowitz have addressed the issue of discovering mind-sets in the general population. The metaphor for the approach is the development of a 'colorimeter, a device which, when applied to any object, deconstructs the color of the object, showing the percent of 'primary' colors which combine to create the object's color.

The issue for Mind Genomics is that each topic area, and indeed each study, will reveal so-called primaries, or in the language of Mind Genomics, so-called mind-sets. These mind-sets emerge from the common pattern of responses to a set of messages. Thus, the issue for discovering the mind-set of an individual in the general population is complicated by the fact that the mind-set may be hitherto unsuspected, i.e., newly discovered, and the requirement for identifying the mind-set among new people is time-limited.

Political or economic instability may emerge, the Mind Genomics effort may provide a set of viable solutions, but only for certain mind-sets.

The real problem is to discover these mind-sets first, then identify the proper solutions, and finally poll the general population with a tool that assigns each new individual to one of the mind-sets, and thus suggests the most appropriate 'messaging' for that newly assigned person. The approach presented here is called the PVI, the personal viewpoint identifier. It uses the basic data from the study, independent of year **(see Table 8)**, focusing only on the optimistic responses (Top2). The approach uses a Monte Carlo simulation to create 20,000 sets of data, with random perturbations in the coefficients of the elements, and then searches for a linear function comprising exactly six elements, so that the three mind-sets are best separated. The algorithm can be employed for any data emerging of the form shown in **(Table 7)** (with the blanks either the original coefficients, or the blank cells replaced by 0, which they were for the PVI reported here).

Table 7.
Original data from the mind-set segmentation, after combining data from both Pre-Covid-19 and during Covid-19. The PVI will be developed on the basic of Top2 coefficients only, with the blanks replaced by 0.

MS1 - Focus on startups and students MS2-Focus on investment and deep structural change MS3-Focus on the family and the social safety net	Optimistic-top2			Pessimistic-Bot2			Engagement (Response time)		
	MS1	MS2	MS3	MS1	MS2	MS3	MS1	MS2	MS3
Problems									
A1 Economy is growing slowly		31	16	12		12	1.3	1.2	1.4
A2 The country is very corrupted		23		37		26		1.3	1.9
A3 Young people are leaving the country		24	16	24		17	1.3	1.4	1.7
A4 Political situation is unstable		28		28		23	1.5	1.5	1.7
Solutions									
C3 Increase the minimum wage	22		16		18		1.4		1.3
D1 Sponsor education labs students' development	21					28	1	1	
D2 Free online courses students' development	20	13				22		1.2	
D3 Invest in increasing student creativity	19					17		1	
B2 Create new startups	18	10			10		1.1	1.2	1.2
C1 Offer free healthcare	18		25		24		1.4		1.4
D4 Create better understanding for student talent	17					22	1.2	1.2	1
B4 Help small businesses to compete	16					12	1.7	1.2	1.4
B1 Invitation to foreign investors	15	16	10				1.5	1.2	1.2
B3 Reduce taxes for innovations	11	13					1.7	1.6	1.3
C2 Support family oriented social services			19		16		1.3		1.4
C4 Workers should be retrained			10	18	14		1.5		1.2

Figure 1.
Part 1 pf the PVI-self-profiling classification.

Figure 2.
Part 2 of the PVI, showing the four attitudinal questions and the six binary questions.

Table 8.
The feedback table for the mind assignment. The mind-set to which the respondent belongs is show by the shaded cell.

Restart A Country
MS1-Focus on startups and students
Increase the minimum wage; sponsor education laboratories for students; Provide free online courses for students
MS2-Focus on investment and deep structural change
Invite foreign investors; Reduce taxes to encourage innovation
MS3-Focus on the family and the social safety net
Offer free healthcare; support family-oriented social services; offer free online courses for students

3. Discussion and Conclusions

For many years now researchers dealing with public policy have worked either with published or about-to-be published secondary data, or with what may well be considered to be simplistic attitudes. The data about behavior and geo-demographics are often quite detailed, presumably because such data are readily available. The many measures of a personal available in so-called purchasable data allows the creative researcher to divide the respondent population into many groups, depending upon the predilection of the researcher to delve into the deep of granularity underlying who a person is, what the person does, and in some cases what the person thinks or at least expresses, the latter through analytics of social media posts, and so forth. The aforementioned data is part of the mass of information known as big data. Econometricians know this type of information as cross-sectional data, namely data which has some basic structure, that structure awaiting the adept researcher or data scientist to reveal some hitherto unknown pattern. The analysis becomes even more interesting when one has a modest amount of attitudinal information about the person, obtained from simple questionnaires, or self-reported behavior of interest, such as voting.

What appears to be missing in the conventional data analysis but provided by Mind Genomics is an understanding of a topic at a deep, granular level, through experimentation. Rather than working with the standard categories of information available to everyone, whether these be geo-demographics, behaviors, or even so-called segmentation schemes based on attitudes, Mind Genomics goes right to the heart of the matter, structuring a topic by a series of questions and alternative answers, presenting these answers, obtaining ratings, and by so doing understand the mind of the person at deep level, as shown in this paper. The analysis has been able to delve into what problems and solutions are associated with an optimistic feeling, a pessimistic feeling, as well as which problems and solutions engage attention.

The small-scale exercise with Mind Genomics demonstrates for social scientists a new opportunity to move beyond simply collecting and analyzing cross-sectional data, or using simplistic surveys, both to attack defined problems. The world-view of Mind Genomics is focused experimentation, with the objective to descend into the granularity of experience, at virtually any level of granularity desired. The study reported here focused on general problems that a country may have, and general solutions to these problems. Yet, the problems are not so general that they are without real meaning. The problems as stated and the solutions as stated provide sufficient concreteness and granularity so that they paint different world pictures.

If this paper can be said to make one major contribution, it is to introduce the aforementioned notion of experimentation to political science. It is impossible to do 'real experiments' with nations and their inhabitants, but it is straightforward to set up an experiment, mixing descriptions of situations, problems and solutions, present these descriptions (vignettes) to respondents, secure ratings of the vignettes, and deconstruct the responses into meaningful, interpretable patterns, as well as even find different mind-sets. Furthermore, the mix of psychology as informed by market research (dealing with the cognitive rich and real, rather than doing abstract experiments) with political science, and other social sciences, opens up new vistas, whereby once can observe the world order or the national order at a macro-level, and at the same time probe deeply by experiment into the psyche of the citizen.

The experiments are short (3-5 minutes), meaning that during the course of a day or two a dozen or two dozen studies can be run quickly, to obtain a real-time snapshot of the mind of the citizen as the world about the citizen is in flux. Some of proposal solutions that comes as a framework of this study are that a country should create programs and projects for education to increase the minimum wage; sponsor education laboratories for students, provide free online courses for students. Also, it would be advantageous to increase the economy; a country should invite foreign investors and should reduce taxes to encourage innovation in order to have incomes and to increase labor force. For families, free healthcare should be supported to support family-oriented social services by creating programs and support from government.

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