

What Differentiates Believers and Non-Believers of Conspiracy Theories? A Structural Analysis of Semantic Networks Regarding the Social Representations of Covid-19 Pandemic

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ABSTRACT

Belief in conspiracy theories is close related with the adoption of behavioral patterns often associated with a direct dispute of scientific research, institutional and governmental practices. The recent Covid-19 pandemic revealed an ecosystem of stories and narratives promoting alternative explanations about a real public threat. The exposure to these narratives and their persuasion towards people's cognitive structures is a crucial issue to be examined to identify the different strategies implemented, by individuals and groups, in order to address a direct threat to society. In the current exploratory research, we examined whether believing in conspiracy theories about Covid-19 pandemic, is possible to predict semantic networks as cognitive structures. The analysis of the research findings provided different patterns of thought about individual exposure to Covid-19 conspiracy theories, their persuasiveness, and the different levels of compliance to (state-promoted) health measures. We discuss the importance of future research focusing on the level of acceptance of the role of different social institutions. A systematic analysis of conspiracy theories rationale is possible to address the cognitive bias organized on belief systems that offer a logical problem solving in social uncertainties. A more thorough study on the individual and group perception of the role of institutions, the level of their acceptance or dispute, as well as their direct and indirect impact on the development of socially responsible behaviors, within a shared social reality, could enhance our knowledge towards the development of effective social policies to confront the next public health crisis.

Keywords: conspiracy beliefs, semantic networks, cognitive structures, social representations.

A KNOWLEDGE SEMANTIC MAP OF CONSPIRACY NARRATIVES AND BELIEFS

Social representations theory has been lately deployed to understand conspiracy theories and beliefs as it brings into focus the socio-cognitive parameters that could explain in depth individual and group perceptions, attitudes, and behavioral intentions. Moscovici's theory on social representations (1961, 1972) is better understood as a contribution to a "social psychology of knowledge" (2001, p. 2). The theory of social representations provides a

reflection of the topological imprints of human thought and knowledge based on organized and shared cognitive patterns that are meaningful enough to shape individual or collective action across time. Their contribution to belief systems, affected by conspiracy theories, is important taken into consideration that they consist dynamic hermeneutical products of social and interpretative interactivity, empowered by communicative processes. As Moscovici coined (1998, 2001) social representations are historically grounded and determine a dialectic relation between sociological and psychological explanations of conceptualizations about shared social reality. In other words, social representations theory integrates the description of individual and collective thought, narratives, and argumentations about the social worlds, as well as behavioral intentions, by taking advantage of their cognitive structures and tropes. In a world unpredictable and uncertain social representations serve as a frame for the understanding of social reality (Moscovici, 2001, p. 37).

Current research (Nera et al., 2020, see also Levaux et al., 2022) on social representations, related to conspiracy theories' acceptance or rejection, identifies a diverse content with reference to the conceptualization of conspiracy theories and previous conspiracy associated beliefs. Franks et al. (2013) combined social representations theory with frame theory emphasizing the evolutionary dimensions of social thought and action. Conspiracy narratives work as intermediaries between a threatful reality and contradictory mindsets about that reality, providing temporary or long-lasting socio-cognitive stability (Franks et al., 2013, p. 9).

Further research (Nera et al., 2022), applied the Generic Conspiracist Beliefs scale regarding the factors that play an important role on the acceptance of conspiracy theories. The model showcases the significance of the message content for believers and the source of the message for non-believers. These results highlight the importance of the narrative elements, organized into the content, of conspiracy beliefs and their association with the individual and group perspectives on certain issues of social, political, economic, and cultural world.

The most typical paradigm regarding the development and communication of conspiracy theories, as well as their impact on individual and groups beliefs, is the recent experience of coronavirus pandemic. Melotti et al. (2022) conducted research, in Italy, on social representations of coronavirus, during the early phase of the pandemic and lockdown policies. They concluded that a set of organizational and knowledge parameters shaped social representations about the recent pandemic (Melotti et al., 2022). The transformation of everyday life due to a natural phenomenon, like pandemics, revealed a primitivistic content of explanations towards threatful and fearful situations. Additionally, it revealed a behavioral response based on individual, group (or even institutional) skepticism, anchored in social thought, towards the acceptance or denial of the existent threat (Jaspal & Nerlich, 2022, see also Gkinopoulos et al., 2022a, 2022b). In the context of post truth era, acceptance, or denial of the coronavirus pandemic as well as of the adoption of certain health measures (lockdown, vaccination, health precautions, physical distancing) became a topic of high concern for modern societies, raising questions whether is possible to reach a shared consensus to confront common threats.

In the current study we examine the exposure of individuals to conspiracy narratives on an early stage of Covid-19 pandemic in Greece, aiming to explore their effect upon cognitive structures and declared behavior. The research design is developed upon the theoretical

framework of social representations. The dialectical, and explanatory framework of social representations theory facilitates the study of conspiracy theories' social impact in two ways. Firstly, the theory permits the structural comprehension of social cognition, the semantic networking and mapping of belief systems, when individuals, groups and communities are exposed to conspiracy narratives (see also Graumann & Moscovici, 1987, on conspiracy theories). Secondly, the theory facilitates the examination of problem solving and decision making by emphasizing their behavioral declarations to any possible adoption of actions, in a specific historical narrative. Implementing social representations theory with a rhetorical psychological perspective (Gibson, 2015; Laszlo, 1997), we aim to focus on the discursive processes of individuals' and groups' "concerns" about a specific topic of interest (Gibson, 2015, p.17), in our case the narratives about Covid-19 pandemic.

More specifically, we decided to examine the structure of social representations by identifying and extracting the "semantic dependencies of words" (Simmons, 1982, p. 100) that construct a meaningful outcome for the understanding of Covid-19 pandemic. The identified and extracted conceptual relations, representing reality, are mainly "binary relations" (Denecke, 2012, p. 36). It could be better described as a semantic space produced by the semantic nodes-concepts and their linkages-relations (Zhuge, 2004). Therefore, a semantic network is produced to provide reasoning between the networking concepts. The production of semantic network leads to a map of knowledge representing sets of beliefs and a possible declaration of behavior. The process of identification and extraction of conceptual relations is based on their similarity and dissimilarity meaning. Concepts are organized into hierarchical clusters that describe similar or dissimilar meaning. The hierarchical clustering offers information not only about the concepts, that share the same or different meaning, but also about their topological structure (Heller, 1994; see also Miller, 1969).

METHODOLOGY

Research Questions

In this study, we brought forward two research questions regarding the adoption of conspiracy theories' argumentation and the adoption (declaration of behavior) of specific precautions to address the pandemic of Covid-19:

- a. Adopting conspiracy theories' arguments (finding them convincing) should reflect both to the evaluation of items (in terms of attributed importance) and, structurally, to the relations between items (in terms of distance/proximity) of the given social representation, and
- b. Adopting conspiracy theories' arguments (finding them convincing) should reflect to the declared predisposition to action regarding compliance to measures and vaccination readiness (social practices).

Participants

Participants were solicited electronically following a procedure of network – convenience sampling. More specifically, we used the official e-class software of Panteion University (as an "Exercise") since other survey forms services (such as Google Forms, Survey Monkey etc.) did not support specialized form of questions such as pairing or blanks' completion, at least in presentable way. Thus, we created a new course named "Researches_A" and we designed the whole questionnaire under the menu "Exercises". The questionnaire was then an exercise under open access to everybody without any credentials. However, most students and faculty

members had their university credentials already stored in their preferred internet browser (for quick access) and, their name (and registration number) was stored automatically. To deal with this problem, which endangered the proclaimed participants' anonymity, we strongly suggested in the introductory note to use another browser instead, so their participation was registered as "anonymous user". Of course, this information concerned only participants with university credentials (access codes) from Panteion University, all other users were registered automatically as "anonymous user"ⁱ. Then, an internet link was sent to all students registered to author's courses via e-class announcementsⁱⁱ (about 300 students) and via personal Facebook announcement (about 100 persons). Since, the main part of the participants were students, three reminders were sent within 10 days of each other via e-class announcements. The questionnaire was anonymous and, it was clearly mentioned (in the introductory note) that participation was absolutely free and voluntary.

The link was active from the 17th of March 2021 to the 23rd of April 2021. In total, 112 individuals responded, 85% were women and about half of them were 18-19 years of age (range between 16 and 62 years). The general return rate was about 25% and most of the responders were from the 1st year's mandatory methodology course.

Materials

A relatively voluminous questionnaire was administered electronically. There were 8 separate sections: 1. Perceived "importance" of Social representation's elements (items), 2. Pairing of Social representation's elements (items), 3. Perceived arguments' "Persuasiveness" of 4 "alternative" scenarios, 4. "Daily Paranoia", 5. Emotion of Anger, 6. Emotion of Fear, 7. Predicted Reversibility - Conditionality and, finally, 8. Two questions of individual actionⁱⁱⁱ regarding a) compliance to measures against Covid-19's spreading and b) vaccination readiness. In this paper, we shall deal with three sections: 1, 3 and 8.

Perceived "Importance" Of Social Representation's Elements (Items):

Between mid-February 2021 and mid-March 2021, we performed 8 (four with undergraduate students and four with postgraduates, a convenience sample) individual unstructured interviews (more like loosely structured discussions with a central theme in place) aiming to collect the symbolic "vocabulary" used concerning "their idea" for Covid-19. Finally, we concluded in a pool of 35 items (words or expressions) and, by summarizing similar items together, we ended up with 25 items, as follows (separated by commas): *Weak body / Poor Health, Poverty, Danger / Fear / Anxiety / Stress, Individual responsibility, Faith in God, Diagnostic tests / diagnosis, Fun, Confinement / Restriction / Isolation, Vaccine / Drugs, Partners / colleagues, Death, Information / Media / Internet, Social irresponsibility, Social control, State responsibility, Mask / Disinfectants, Hospital / Hospitalization / ICU, Family, Politics, Fate / Uncertainty, Relatives / Friends, Social contact, Profit / Money, Suffering / Problems, Mental illness.*

The twenty-five items were presented in random order, and participants were instructed to assign each item to a category. There were five categories denoting the "item's importance to my idea of Covid-19": [-4] The least important items, [-2] The less important items, [+2] The important items and, [+4] The most important items. At the same time, participants were instructed that each category must contain no more and no less than 5 items: 4 categories x 5 items each = 20 items in total. Finally, a [Null] category is presented for the 5 items which they

have not already been classified to any other category. Thus, participants could not just place all items to one or two categories (par example, into [+2] and [+4]). Starting from the fact that all items are highly relevant to the social representation of COVID-19, participants may tend to grade all items as “very important” to their “idea” and, thus, fail to differentiate them sufficiently. They had to rank twenty-five items in terms of importance in five categories containing 5 items each (c*k block, Katerelos, 1993). Although, this procedure aims to guide the participants so that they rank the items instead of simply grade them, in practice, it is a relatively “heavier” cognitive process and therefore, it is rarely strictly observed. Nevertheless, by applying this procedure, even if not perfectly, the general purpose of differentiating the items in terms of importance, is achieved. Although, the semantic network analysis is, traditionally, conducted using natural speech (see for example, Segev, 2022), we chose this approach aiming the comparison between structures.

Perceived Arguments’ “Persuasiveness” of 4 “Alternative” (Conspiracy) Scenarios:

Four texts (in Greek) were consecutively presented to participants, all inspired from conspiracy^{iv} theories circulating wildly through internet sites and social media, regarding coronavirus. Instead of “copying” directly these sites, we preferred to use official (not “alternative”/conspiracy or “mainstream” /” systemic” as they are characterized by certain conspiracists) news^v or popularizing science-scientific^{vi} channels which published counterarguments (“myths busted”) in an effort to prevent their spread and, thus, to facilitate the vaccination campaigns initiated in every nation during that time. The fourth scenario was inspired by Facebook videos^{vii} and tv interviews of G. Petrakos (Greek singer/performer) who, during October 2020 posted videos denying the severity of Covid-19 and proposing “resistance” or “uprising” against the measures of quarantine and/or mandatory vaccination. Soon after, he became the most recognizable face of the anti-vaccination movement in Greece^{viii}. By retaining the highlights of different conspiracy theories, we created four scenarios (numbered 1-4, SCE1-SCE4) and in certain positions inside each text, we asked all participants to “score” each argument in a scale from 1 (not at all convincing) to 5 (very much convincing) according to its perceived “persuasiveness”: “How convincing do you find this argument?”

Table 1: Four “alternative” scenarios presented to participants. Brackets with codes SCEX_X (in Bold) denote the position of participant’s response (How convincing-persuasive- is this argument?).

The 5G network is a network that will soon reach all of us and, due to its technical capabilities, allows the monitoring and, inevitably, the control of every citizen worldwide. Thus, for the first time, the coordination of frequencies at the molecular level of the recipient’s cells (that is, inside each one of us) with the frequencies emitted by the network inducers is achieved [SCE1_1]. Deviation from these approved thoughts (see frequencies) leads to severe headaches, high fever, mental illness and, in general, severe weakening of the immune system [SCE1_2]. COVID-19 (the coronavirus) and, as it is spread, is the result of this weakening of the immune system especially of disobedient citizens in order to weaken them and / or, to exterminate them eventually [SCE1_3].	SCE1
In 2015, at an event at his institute, Bill Gates (co-founder of Microsoft, one of the richest people in the world if not the richest) spoke at length about the "danger" of a pandemic similar to that of the Spanish flu in 1918. He invited governments to "throw" much more money into addressing this risk than into other issues such as tackling poverty or ending wars around the world [SCE2_1]. The "prophecy" came true after only 4 years, with the appearance of COVID-19. So now governments will have to "throw" all the money they have into "treatments" and "vaccines" and the big	SCE2

pharmaceutical companies will have huge profits [SCE2_2] while Bill Gates, with his institute, will achieve both absolute financial control in level of states/governments [SCE2_3] (since national economies have been dismantled by successive measures, "quarantines") and the individual control of each of us since within the mandatory "vaccines" there will be a quantum nanomechanism that will relay at any time what we think and what we do [SCE2_4].	
Coronavirus (COVID-19) is just another biological weapon produced in a secret military laboratory of the many around the world [SCE3_1]. After all, it is known that its genome contains elements from HIV (the virus that causes AIDS) and the probability of this happening naturally is zero [SCE3_2]. The only question is whether it is an American creation that was "planted" in China to cause damage to the Chinese economy that threatens them in the game of world domination [SCE3_3] or, on the contrary, it is a Chinese creation that aims to dismantle the American economy [SCE3_4].	SCE3
The coronavirus does exist, of course, but in no case, its effects are real. As we can easily see, at least anyone searching seriously and looking at the data, deaths have not increased [SCE4_1]. They are about the same as last year and the year before last year [SCE4_2]. Seasonal flu has always had some casualties but now, medical staff, on orders from above, are virtually recording every death resulting from cardio-respiratory problems like death from coronavirus [SCE4_3]. Thus, people will panic and forget their real problems while accepting changes that will dramatically affect their lives for the worse "without even their noses bleedix" [SCE4_4].	SCE4

In Table 1, one can see the four “alternative” scenarios and the positions of the points where we asked the participants for their opinion regarding argument’s persuasiveness.

The first scenario concerns the supposed correlation between 5G network (relevant conspiracy theories existed already) and coronavirus spreading in the community via the immune system’s weakening for social control. The second scenario concerns Bill Gates involvement and the financial control of national economies aiming absolute social control via financial ruining and thought-controlling nano mechanisms inserted to human body by mandatory vaccination. The third scenario refers to coronavirus as a bioweapon developed in a lab aiming the financial disaster of the opponent for world domination: USA Vs China. Finally, the fourth scenario concerns the government spreading (unjustified) fear to the community aiming absolute social control’s enforcement without any resistance.

Participant’s Statement of Action: Compliance to Measures and Vaccination Readiness:

Finally, participants were asked to respond by a dichotomous answer in two questions: 1. “Do you abide by the measures imposed by the state regarding the coronavirus?” with two possible answers:” Nah, I do not abide by that much ...” or “Yeah, of course, I abide by them”. 2. “When it’s your turn, will you get the vaccine?” with two possible answers: “Nah, better not, you never know what happens ...” or “Yeah, of course, as soon as possible...”.

RESULTS

Overview of Analyses

We performed cluster analysis (used Jamovi 2.2.2), network analysis (using Gephi 0.93 and SocNetV 3.0.4), correspondence analysis and correlational analysis (using SPSS 28.0 and STATISTICA 12.5).

Elements' Perceived Importance

Means and standard deviations of elements' importance can be seen in Table 2. Elements of higher perceived importance (mean above 4/5) are: *weak body/poor health* (4.27), *individual responsibility* (4.27), *vaccine/drugs* (4.46), *death* (4.15), *state responsibility* (4.02) and *hospital/hospitalization/ICU* (4.43). Elements of lowest perceived importance are (mean below 3/5): *faith in God* (1.95), *fun* (2.54), *Partners/Colleagues* (2.36), *Information/Media/Internet* (2.96), *politics* (2.88), *Fate/Uncertainty* (2.33) and *Profit/Money* (2.56).

Table 2: Means and Standard deviations of perceived importance ("to my idea of COVID-19").

Descriptive Statistics			
	N	Mean	Std. Deviation
Weak body / Poor Health [WBPH]	112	4,27	1,07
Poverty [POV]	112	3,36	1,27
Danger / Fear / Anxiety / Stress [DFAS]	112	3,81	1,16
Individual responsibility [PRESF]	112	4,27	,98
Faith in God [FGOD]	112	1,95	1,26
Diagnostic tests / diagnosis [DIAG]	112	3,96	1,07
Fun [FUN]	112	2,54	1,21
Confinement / Restriction / Isolation [ISOL]	112	3,89	1,10
Vaccine / Drugs [VACDR]	112	4,46	,82
Partners / colleagues [PARCOL]	112	2,36	1,00
Death [DEATH]	112	4,15	1,03
Information / Media / Internet [INFMED]	112	2,96	1,31
Social irresponsibility [SIRREP]	112	3,64	,98
Social control [SCONTROL]	112	3,14	1,36
State responsibility [SRESP]	112	4,02	1,13
Mask / Disinfectants [MASK]	112	3,99	1,08
Hospital / Hospitalization / ICU [HOSP]	112	4,43	,90
Family [FAMILY]	112	3,71	1,17
Politics [POLITICS]	112	2,88	1,26
Fate / Uncertainty [FAUNCERT]	112	2,33	1,03
Relatives / Friends [RELFRIEN]	112	3,41	1,17
Social contact [SOCONTA]	112	3,56	1,24
Profit / Money [PROFIT]	112	2,56	1,18
Suffering / Problems [TROUBL]	112	3,25	1,17
Mental illness [MENTAL]	112	3,79	1,24
Valid N (listwise)	112		

Participants seem to attribute more importance to a medical view of the disease (weak body/poor health, hospitalization/ICU, death, vaccine/drugs) with a clear accent on both individual responsibility and state responsibility. At the time of the study, the first vaccines were addressed only for the medical personnel and the senior citizens (above 70 years of age). All the others were in a state of stand-by for their turn. Undoubtedly, it was a challenging time, in a quarantine for the second extended period, so almost everybody was waiting for the vaccine (drugs was an eventuality with little hope in the immediate future) to be "deliberated" and "circulate freely" specially during the coming summer. Thus, it is easily understandable

why vaccines were highly validated as a “solution” and all the weight of “pulling through” the epidemic (death), was rendered to the medical personnel and their equipment (science and technology). Both being acknowledged as state responsibility. Nevertheless, individual responsibility was attributed to many victims because “...if you comply with the measures, then you will be ok”, therefore if you get sick then something went wrong, and you are responsible.

On the contrary, items (notions) usually used by conspiracy theories like social control (3.14), profit/money (2.56), faith in God (1.95, the lowest importance), Information/media/internet (2.96), Politics (2.88) and Fate/uncertainty (2.33), are less validated as important. Still, after the first epidemic wave (March-April 2020) with extremely strict quarantine, conspiratorial rumors had already begun to spread.

Persuasiveness of “Alternative” Scenarios-Conspiracy Theories:

Participants seem to be more convinced by SCE2-1 and SCE2-2 (mean 3.21/5 and 3.07/5 respectively). Both texts refer to Bill Gates’ involvement in world domination. Mixing truth (there was, indeed, an event in 2015) with rather extravagant intentions (worldwide financial control) reveals to be the most “convincing” strategy. On the other hand, the least “convincing” arguments are SCE2-4 (mean 1.59/5), SCE1-3 (mean 1.84/5) and SCE3-2 (mean 1.89/5). All these arguments refer to extravagant technologies (“suspect similarity to HIV”, “quantum nanomechanism” or “5G weakens the immune system”) with little credibility as to their existence.

Table 3: Means and Standard deviations of convincing scenarios

Descriptive Statistics			
	N	Mean	Std. Deviation
SCE1-1	112	2,16	1,03
SCE1-2	112	1,94	1,11
SCE1-3	112	1,84	1,24
SCE2-1	112	3,07	1,05
SCE2-2	112	3,21	1,20
SCE2-3	112	2,38	1,25
SCE2-4	112	1,59	1,04
SCE3-1	112	2,11	1,09
SCE3-2	112	1,89	,88
SCE3-3	112	2,01	1,07
SCE3-4	112	1,97	1,05
SCE4-1	112	1,92	1,10
SCE4-2	112	2,04	1,18
SCE4-3	112	2,63	1,17
SCE4-4	112	2,88	1,26
Valid N (listwise)	112		

Firstly, Cronbach’s Alpha was calculated for attesting the participants’ responses’ internal consistency: Alpha=0.909 which is a strong indication that participants tend to understand (=find them convincing or not) all four scenarios in an analogous manner (=they all tend to go together whether they are convincing or not). Secondly, we continued by applying K-means clustering method (MacQueen Algorithm, Jamovi 2.2.3, 2021) for separating the sample in three

groups. In Figure 1 one can see that the optimal number of clusters is three because by demanding greater numbers of groups, the gain in retained information would be minimal in contrast to the added difficulty of interpretation. In Figure 2 and Figure 3, after performing a PCA, the participants' cluster plot and the variable's plot is presented indicating that, regarding the choice of three groups, a well satisfying total of 56.8% of total variability observed is retained (1st dimension 45% and 2nd dimension 11.8%) while both the group profiles and the differentiating variables are well defined / not overlapping.

The count for the three clusters is: first cluster fifty-two participants, second cluster 36 participants and the third cluster 24 participants. After submitting all fifteen variables to one-way ANOVA (as factor the cluster membership is used), all mean's differences between groups (clusters) were statistically significant in a level lower than 0.001. Therefore, there are not any variables with less differentiating power between all three clusters' members.

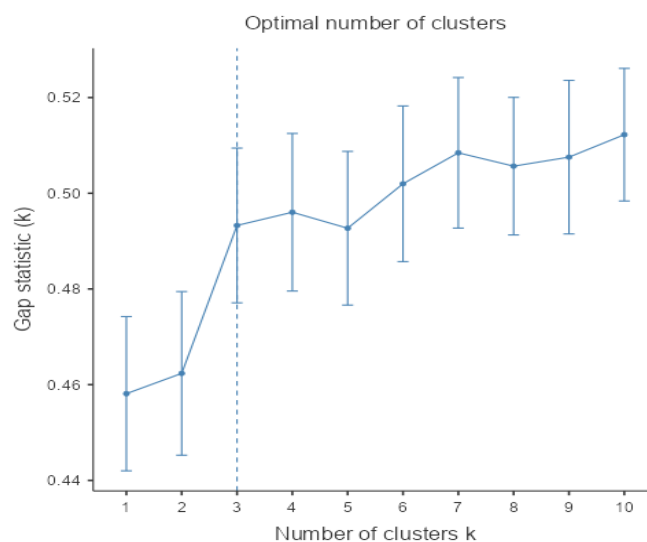


Figure 1: Optimal number of clusters

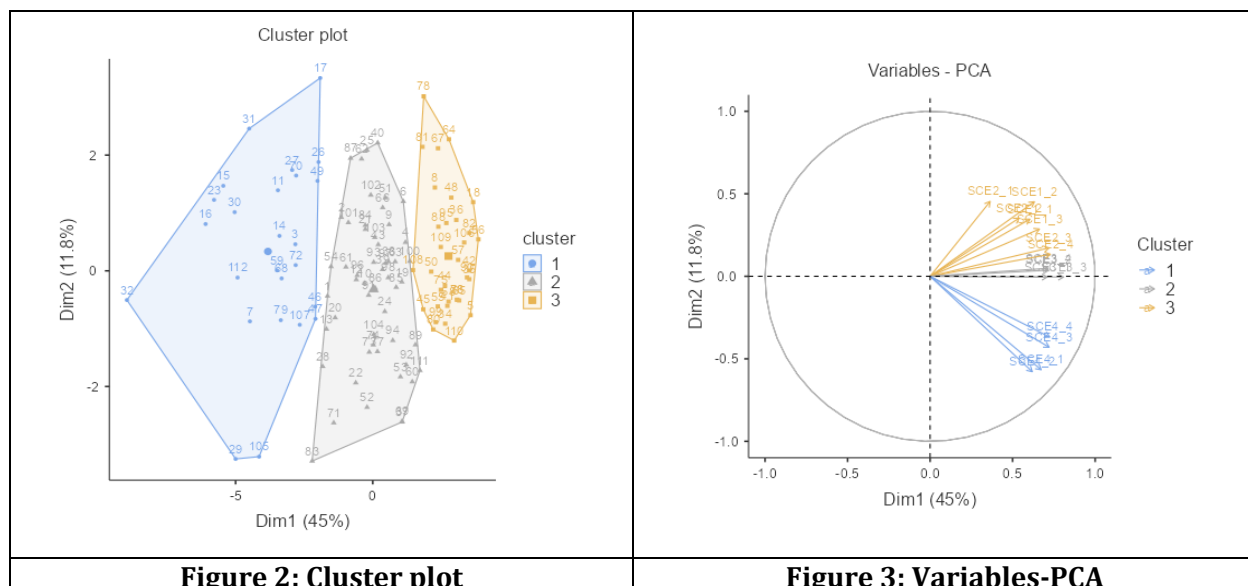


Figure 2: Cluster plot

Figure 3: Variables-PCA

In Figure 4, the plot of means across clusters can be observed. In first sight, the three lines reflecting the means of each group do not intersect. Thus, regarding all three clusters, each cluster can easily be characterized as low level of conviction (cluster 2), intermediate level of conviction (cluster 1) and high level of conviction (cluster 3). Nevertheless, certain “close calls” between clusters are noted: according to post-hoc analysis (Bonferroni test used), the observed mean difference between cluster 1 and cluster 3 regarding SCE1-1 is not statistically significant ($p=.156$), the same apply for arguments SCE2-1/SCE2-2 (respectively, $p=.859$ and $p=.206$). For arguments SCE2-4/SCE4-2, the observed mean differences between cluster 1 and cluster 2 are not statistically significant (respectively, $p=.121$ and $p=.31$).

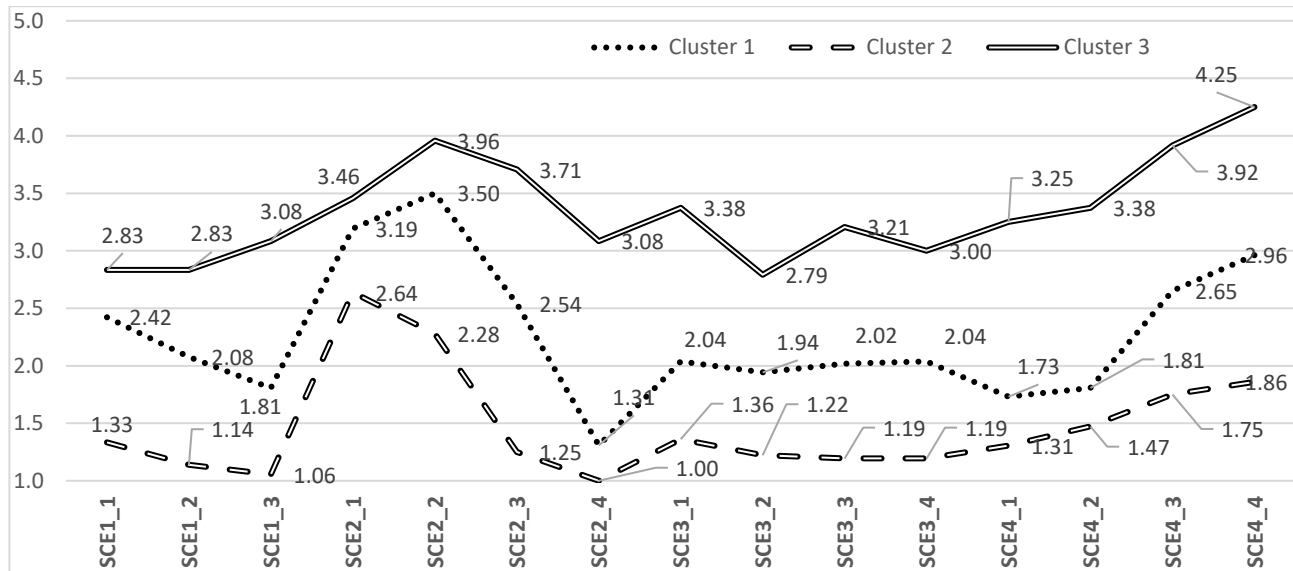


Figure 4: Plot of means across clusters

Compliance to Measures and Vaccination Readiness:

A percentage of 80.4% of the participants declared to abide by the measures imposed by the state regarding the coronavirus (at that time, wearing masks/using disinfectants/distanciation/gatherings of no more than six persons etc.) The rest (19.6%) responded “Nah, I do not abide by that much ...”. Concerning vaccination readiness, 71.4% of participants stated that “Yeah, of course, as soon as possible...” while the rest (28.6%) refused to get vaccinated because “Nah, better not, you never know what happens ...”.

Subsequently, a new variable deriving from the combination of the two variables above mentioned is created. This new variable concerned the level of precaution and protection adopted by the participants against Covid-19. Thus, four categories were created:

- those who do not comply to measures and refuse to get vaccinated (count=9/8%),
- those who do not comply to measures but they are ready to get vaccinated (count=13/11.6%),
- those who do comply to measures but they refuse to get vaccinated (count=23/20.5%) and, finally
- those who do comply to measures and they are ready to get vaccinated (count=67/59.8%). In this way, this new variable can reflect the *level of protection* adopted by each participant, respectively: a) *Min Protection/-Comply to Measures*, -

Vaccine, b) -Comply to Measures, +Vaccine, c) +Comply to Measures, -Vaccine and d) Max Protection/+Comply to Measures, +Vaccine. This new variable was defined as of ordinal level with four degrees of protection against COVID-19 from min (1) to max (4).

Correspondence Analysis is applied to the crosstabulation of the two variables: *Protection Level* and *Conspiracy Theories Conviction Clusters*. The crosstabulation between the two variables is statistically significant ($\chi^2=20.10$, $df=6$, $p=.003$) and in Figure 5 (Dimension 1 / 84.7% of total inertia, Dimension 2 / 15.3% of total inertia), one can see that finding conspiratorial arguments convincing (From “Low” to “High”) is directly related to the adopted level of protection against COVID-19 (From “Min” to “Max”). Maximal protection is in proximity of lowly convinced participants while Minimal protection is in proximity highly convinced participants. The Mid level of conviction seems to fluctuate between the two intermediate levels of protection: some do not comply to measures, but they declare themselves as vaccination ready while others do comply to measures, but they refuse to get vaccinated.

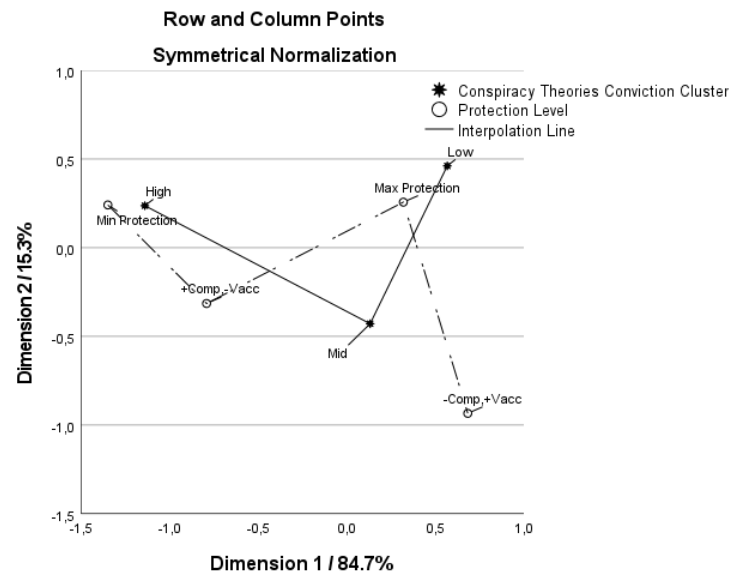


Figure 5: Correspondence analysis of Protection Level and Conspiracy Theories Conviction Clusters.

Means Differences of Item's Importance Across Conspiracy Theories Conviction Clusters:

In Figure 6 one can see how the conspiracy theories conviction's clusters differentiate the means of items' importance. For most of the items, there are not any notable differences. More specifically, for a total of 25 items, only 7 items present statistically significant mean differences (one-way ANOVA) in attributed importance: *Poverty* ($F_{2,109}=6.596$, $p=0.002$), *Faith in God* ($F_{2,109}=4.619$, $p=0.012$), *Vaccine/Drugs* ($F_{2,109}=4.636$, $p=0.012$), *Relatives/Friends* ($F_{2,109}=7.704$, $p=0.001$), *Social Contact* ($F_{2,109}=5.467$, $p=0.005$), *Profit/Money* ($F_{2,109}=6.043$, $p=0.003$) and *Mental illness* ($mLow=3.39$, $mMid=4.02$, $mHigh=3.92$, $F_{2,109}=3.008$, $p=0.052$).

Thus, the more is one convinced to conspiracy theories, the more importance is attributed to *Faith in God* ($mLow=1.53$, $mMid=1.98$, $mHigh=2.50$), *Relatives/Friends* ($mLow=2.83$, $mMid=3.60$, $mHigh=3.88$), and *Profit/Money* ($mLow=2.03$, $mMid=2.77$, $mHigh=2.92$). On the contrary, the less is one convinced by conspiracy theories, the more importance is attributed to

Poverty (mLow=4.56, mMid=4.13, mHigh=3.17) and to *Vaccine/Drugs* (mLow=4.75, mMid=4.42, mHigh=4.13). As exceptions, *Social Contact* (mLow=3.22, mMid=3.96, mHigh=3.21) and *Mental illness* (mLow=3.39, mMid=4.02, mHigh=3.92) have the bigger value among the mid-convinced participants (Cluster 1) although in the former mean values are very similar between low and highly convinced participants while in the latter, mean values are very similar between Mid and highly convinced participants.

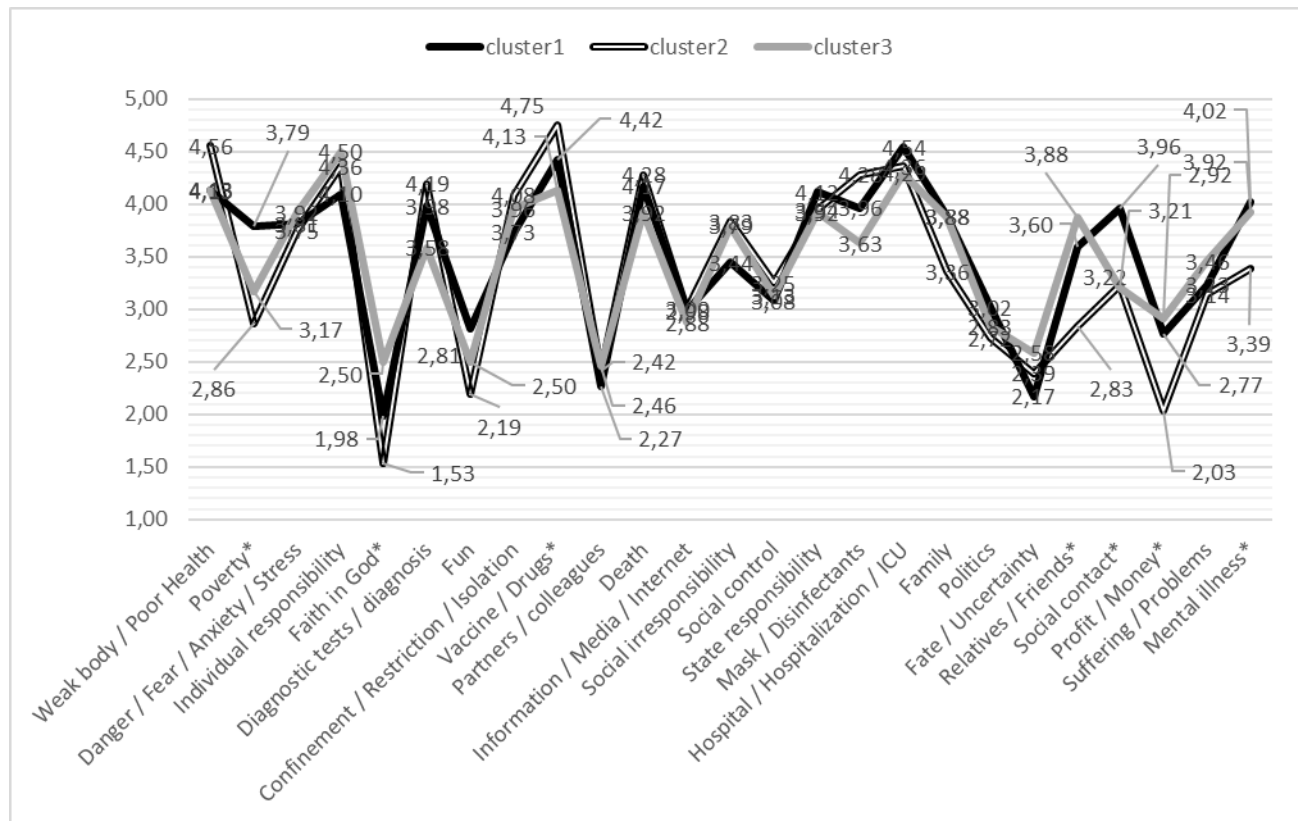


Figure 6: Means of item's importance across conspiracy theories conviction clusters (* denotes statistically significant differences $p < 0.05$).

Semantic Networks on Elements' Importance Across Conspiracy Theories Conviction's Clusters:

As mentioned above, the aim of this paper is to focus on structural effects. In structural terms, one must consider both each item's *salience* (its quality of being particularly noticeable or important, "how important it is") and its structural position or its *structural salience* (in terms of "centrality") in the whole (considering the relations between items, aka the "cognitive structure"). Therefore, we proceeded by creating the semantic networks for each of the conspiracy theories conviction's clusters.

First, a distance (or "metric") must be chosen so dissimilitude between any two nodes can be calculated. Manhattan Block Distance (MBD) was chosen for its simplicity, and we proceeded by constructing the distance's matrices for each cluster (we used SPSS 28.0). Then, we entered the data in Gephi 0.93 and, to clarify the graphs, we limited the distances' range, and therefore, the illustrated edges up to a point where all items were connected (critical threshold). This means that, while only a part of the distances is shown, we retain the smaller (most significant)

distances (=the most significant similarities). As a measure of structural salience, Betweenness centrality was selected since this type of centrality can give information about a specific node by examining if it is found frequently in the (minimum) path between any other two nodes. Therefore, a node with a relatively high score of Betweenness centrality is a node which is often an intermediary between (in the path) other nodes (Borgatti et al., 2013; Kadushin, 2011). Betweenness centrality is strongly connected with the notion of structural hole: if a node with a high score of Betweenness centrality is deleted then the whole network risk to fragment severely. Finally, we selected the layout Fruchterman-Reingold for illustrating each network (Gephi 0.93). At the same time, salience (the mean of the item) is shown by changing the color of each node from yellow to orange to red (highest salience corresponds to red color) in every network presented. Structural salience is denoted by node size (relatively highest Betweenness Centrality corresponds to bigger node size). In Figure 7 one can see the semantic network of the second cluster of participants (Lowly convinced by the conspiratorial arguments). This network has a maximum threshold of distance equal to $MBD \leq 41$. The weakest edge (higher distance) is between Partners/Colleagues and Information/Media/Internet ($MBD=41$, graph density=0.25): if one lower the threshold even more, the item Information/Media/Internet will be disconnected.

Two major sub-networks (cliques) appear: a) Social Irresponsibility, Danger/Fear/Anxiety/Stress, Social Control, Hospital/Hospitalization/ICU, Diagnostic tests/Diagnosis, Personal Responsibility, Death, State Responsibility, Confinement/Restriction/Isolation, Vaccine/Drugs, Mask/Disinfectants, Weak Body/ Poor health, Poverty, and b) Family, Suffering/Problems, Mental Illness, Relatives/Friends, Fun, Social Contact, Partners/Colleagues, Fate/Incertitude, Profit, Faith to God, Information/Media/Internet, Politics. The items Social Irresponsibility, Danger/Fear/Anxiety/Stress (from the first clique) and Family, Suffering/Troubles (from the second clique) have the highest scores in structural salience but only the items Social Irresponsibility, Danger/Fear/Anxiety/Stress are also salient (high means to importance attributed by the participants of given cluster).

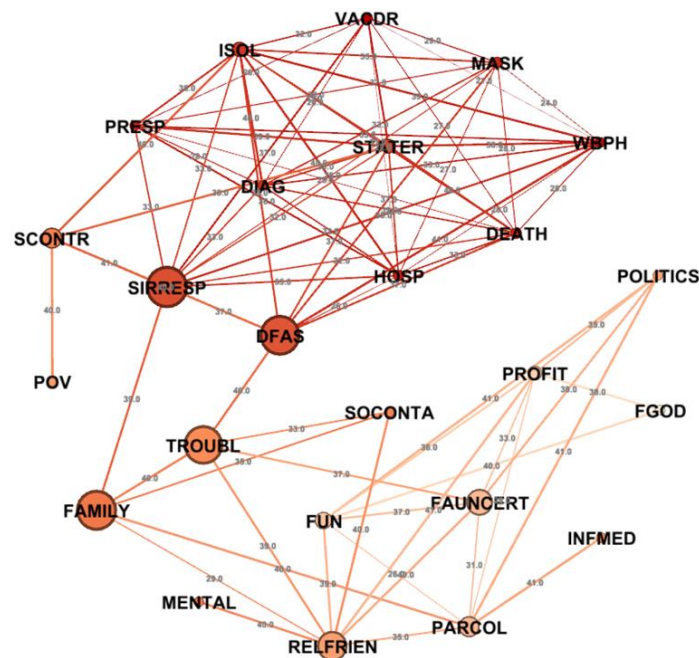


Figure 7: Cluster2 (Low) /Node Size: Betweenness centrality / Node color (red max): Salience / max MBD threshold=41

The semantic network for the midlevel convinced participants is presented in Figure 8. This network has a maximum threshold of distance equal to $MBD \leq 69$, much higher than the previous cluster of participants. The weakest edge (higher distance) is between Partners/Colleagues and Faith to God ($MBD=69$): if the threshold is lowered even more, the item Faith to God will be disconnected.

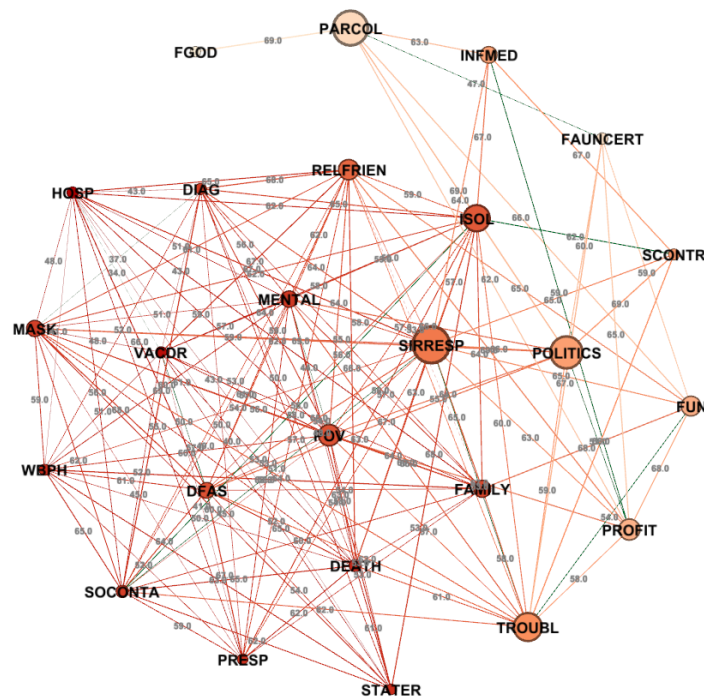


Figure 8: Cluster1 (Mid) /Node Size: Betweenness centrality / Node color (red max): Salience / max MBD threshold=69

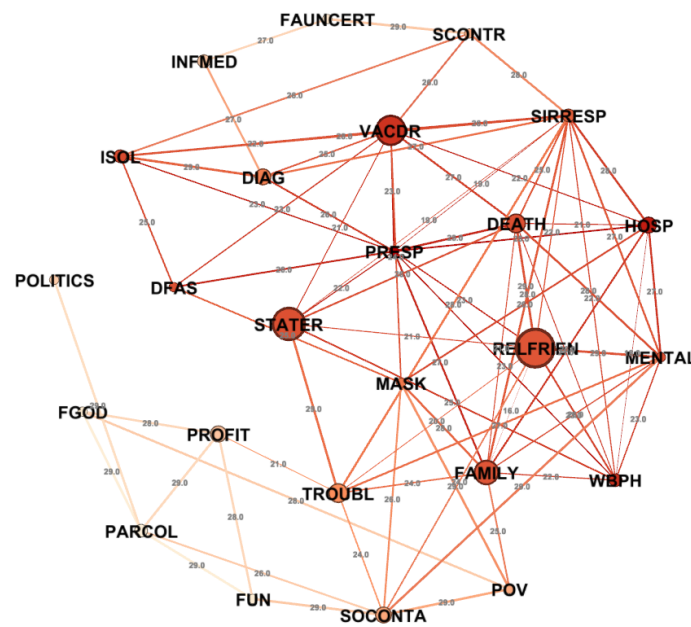


Figure 9: Cluster3(High) / Node Size: Betweenness centrality / Node color (red max): Saliency / max MBD threshold=29

One notes that this semantic network is much more dense: max distance threshold is the highest and most of the edges are included in the graph (graph density=0.50).

This semantic network does not present any distinguishable cliques among items. The whole network appears to be more *loosely* connected since it includes higher distances. At this point, the only comment about the whole structure is that it seems to be very “adaptive” since it contains higher distances (the relation between items is weaker) and can be “activated” depending on the context without much “damage” or “cognitive effort”: *more but weaker relations may mean less strong contradictions when activated selectively*. Social Irresponsibility, Politics and Partners/Colleagues have the highest scores in structural saliency but only Social Irresponsibility has also a higher mean to importance attributed by the participants of the given cluster (saliency).

Finally, in Figure 9 one can see the semantic network of the third cluster of participants (Highly convinced by the conspiratorial arguments). This network has a maximum threshold of distance equal to $MBD \leq 29$ (the lowest of the three clusters). The weakest edge (higher distance) is between Partners/Colleagues and Politics ($MBD=29$, graph density=0.25 comparable to the network of cluster 2/Low): if the threshold is lowered even more, the item Politics will be disconnected.

Two major sub-networks (cliques) appear (however, not so easily distinguishable as in the case of cluster2/Low/Figure 7): a) Social Irresponsibility, Death, Mental Illness, Danger/Fear/Anxiety/Stress, Social Control, Hospital/Hospitalization/ICU, Diagnostic tests/Diagnosis, Personal Responsibility, State Responsibility, Confinement/Restriction/Isolation, Vaccine/Drugs, Mask/Disinfectants, Weak Body/ Poor health, Family, Information/Media/Internet, Relatives/Friends, Fate/Incertitude, and b) Suffering/Troubles, Poverty, Fun, Social Contact, Partners/Colleagues, Profit, Faith to God,

Politics. The items Relatives/Friends and State Responsibility have the highest scores in structural salience both are also salient (high means to importance attributed by the participants of given cluster).

As a provisionary conclusion concerning all three semantic networks, differences to maximum distance threshold (under the condition that the graph must be connected) are detected which may be related to more stronger relations (but lower densities) or weaker relations (but higher densities). Inclusion of weaker relations (high threshold) between items may signify a rather *loose* (or “less conflictual”) structure while the inclusion of stronger relations may be an indicator of a *rigid* (or “more conflictual”) structure.

Semantic Maps (Minimal Spanning Trees) Across Conspiracy Theories Conviction's Clusters:

Although semantic networks can be informative, maybe we need a further “dimensional” reduction in data presented always trying to retain the most meaningful part. One way to achieve this is to draw the Minimal Spanning Trees (MSTs, by Kruskal algorithm, SocNetV 3.0.4). In Graph theory, a tree is a graph that is connected but without cycle (Harary, 1969). Therefore, between any two nodes, there is always one and only one path^x. In addition to this simplification, by construction algorithm, one always chooses the minimal distance between one node to any other node for the tree (without closing a cycle). In this way, one draws a tree in which the minimal distances are retained and since the minimal distances can be expressed as the maximal similitudes, one can say that we have the most significant part of the networks presented in the previous paragraph (the “map” or the “skeleton”, Flament, 1986) and, in an interpretative sense, a much clearer picture especially concerning the symbolic meaning for the items themselves.

In Figure 10, one can see the minimal spanning tree (MST) for cluster 2 (Lowly convinced by the conspiratorial arguments). Here, the most central items (criterion: Betweenness centrality) are *Social Irresponsibility*, *Family*, *Mask/Disinfectants*, *Relatives/Friends*, and *Partners/Colleagues*.

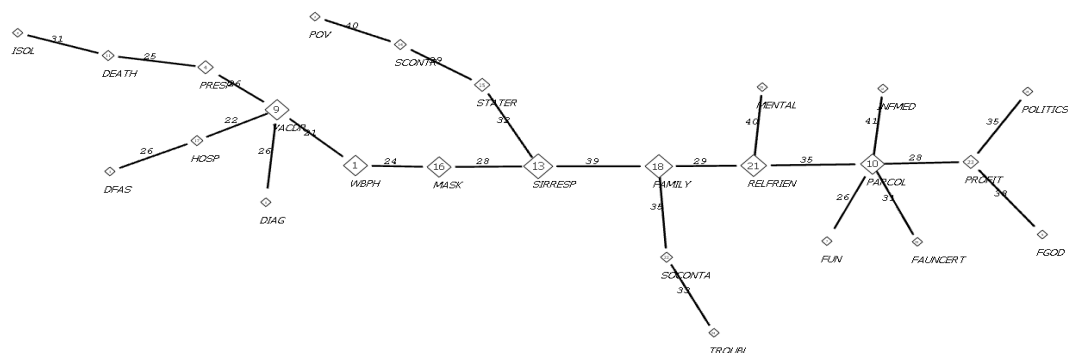


Figure 10: MST Cluster2(Low) Node size-Betweenness centrality / Diameter=11

The MST of cluster 1 (Mid convinced by the conspiratorial arguments) is presented in Figure 11. The most central items (criterion: Betweenness centrality) are *Social Irresponsibility*, *Social Contact*, *Troubles/Problems*, *Poverty*, *Mental Illness*, *Death*, and *Hospital/Hospitalization/ICU*.

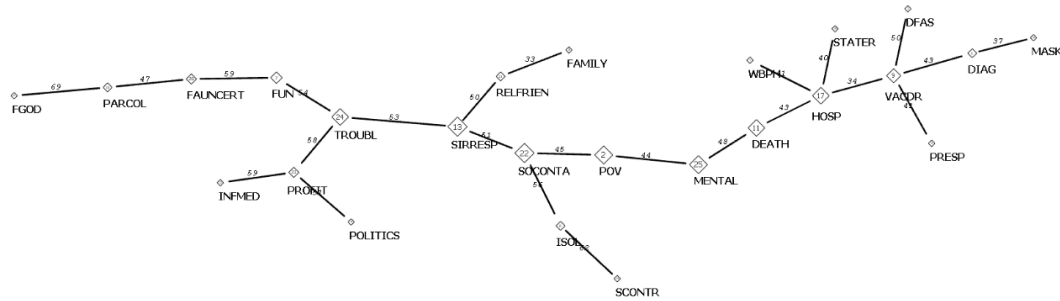


Figure 11: MST Cluster1(Mid) / Node size: Betweenness centrality / Diameter=13

In Figure 12, MST of Cluster 3 (Highly convinced by the conspiratorial arguments) is shown. In this case, the item *Relatives/Friends* seem to concentrate the highest score in Betweenness centrality followed by *State Responsibility*, *Vaccine/Drugs* and *Family*.

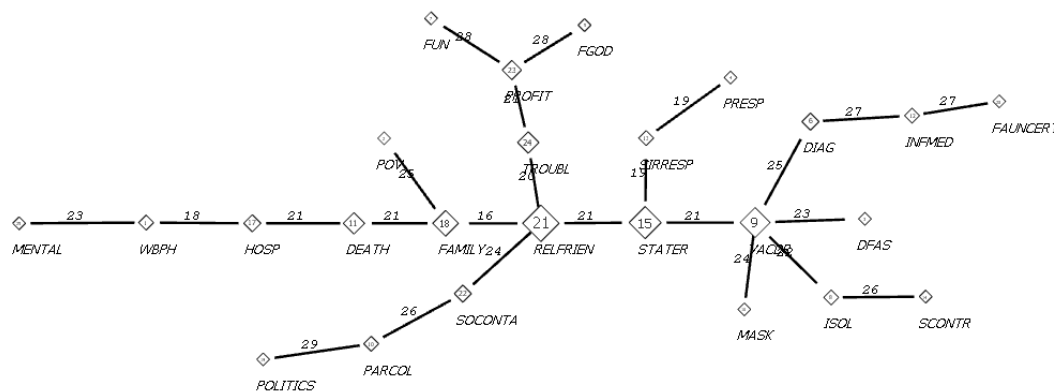


Figure 12: MST Cluster3(High): Node size-Betweenness centrality / Diameter=10

Concerning cluster 2 and 1 (Low/Mid) the item *Social Irresponsibility* has the highest betweenness centrality score. For the former (Low), *Social Irresponsibility* neighbors with *Family*, *State Responsibility* and *Mask/Disinfectants*. For the latter (Mid), *Social Contact*, *Relatives/Friends* and *Troubles/Problems* are connected at geodesic distance=1 to *Social Irresponsibility*. Therefore, for the participants who are lowly convinced (Cluster2), *social irresponsibility* is defined by using/not using *mask/Disinfectants* (for protecting or be protected from) *Family* (*relatives/friends*, *social contact* in general which may lead to *Trouble/Problems*) and it is *state's responsibility* to address this issue (of *Social Irresponsibility*) by exercising *Social Control* (relates to *Poverty*- financial problems/Bankruptcy). Regarding participants who are mid-convinced (cluster1), *Social Contact* is the most central item and neighbors with *Confinement/Restriction/Isolation* (related to *Social Control*), *Poverty* (which relates *Mental Illness*) and *Social Irresponsibility* (neighbors to *Troubles/Problems* and *Relatives/Friends*). In this case, *Social Contact* seem to be clouded by *Social Irresponsibility* (leading to *troubles/problems*) towards or from *Relatives/Friends* and *Family*, *Poverty* (financial problems/Bankruptcy) combined with *Mental Illness* (uncontrolled desperate actions) which leads to *Death* and *Hospital/Hospitalization/ICU*, a *State Responsibility* (especially for those who have *Weak Body/ Poor Health*). The third cluster (High) shows a different picture (Figure 12). *Relatives/Friends* is explicitly the most central item. It is related to *Family* (conveys to *Poverty* and *Death*), *Social Contact* (also relates to *Partners/Colleagues-Politics*), *State Responsibility*

(correlates with *Social Irresponsibility – Personal Responsibility* and *Vaccine/Drugs*) and, finally, *Trouble/Problems* (conveys to *Profit – Fun – Faith to God*).

Semantic Maps (MST)' Comparison Across Conspiracy Theories Conviction's Clusters:

Comparing Minimal Spanning Trees (MST) can be a very difficult task (Emmert-Streib et al., 2016; Shimada et al., 2016) A structural comparison should before everything else, consider the structural distances between items (aka the path's length) in each MST. Although, we introduced a method of Structural Comparison in our Ph.D. dissertation (Structural Analysis and Comparison K, Katerelos, 1993), in this paper, we decided to use Correlation Pearson's r^{xi} . Both indicators of relationship between variables use the same logic: between every two items there is a geodesic distance on any MST whether it considers the actual Manhattan Block Distances (DMB) on the path (weighted distance) or not (distances on the path are perceived as unitary and equal to 1). For example, in Figure 12, if we want to access item *Social Irresponsibility* starting by the item *Relatives/Friends*, we must pass through (use as intermediary) the item *State Responsibility*: this is the unique path between these two items on the MST. The weighted distance (D_w) between *Relatives/Friends* and *Social Irresponsibility* is $DMB(\text{Relatives/Friends, State Responsibility}) = 21 + DMB(\text{State Responsibility, Social Irresponsibility}) = 15$: $D_w(\text{Relatives/Friends, Social Irresponsibility}) = 21 + 15 = 36$. On the other hand, the unweighted distance (D) between these two items is simply $D = 2$ because it will take two steps for going from the first item to the second (without considering the DMB between items).

The distance (D_w or D) matrix is a square table 25x25 and since all networks presented (Trees or not) are undirected, the matrices is symmetrical to the diagonal (which is always zero because this is the distance between each item and itself). Therefore, in a total of $25 \times 25 = 625$ cells, 300 cells are duplicates^{xii} and 25 cells in the diagonal are equal to zero^{xiii}. These cells are disregarded and, in total, 300 values for each MST are compared (correlated). The results of Pearson's r between MSTs are shown in Table 4 (Correlations on D_w) and in Table 5 (Correlations on D).

Table 4: Weighted distance matrix Correlations on MSTs

		Cluster1	Cluster2	Cluster3
Cluster1	Pearson Correlation	1	,498**	,232**
	Sig. (2-tailed)		<,001	<,001
	N	300	300	300
Cluster2	Pearson Correlation	,498**	1	,236**
	Sig. (2-tailed)	<,001		<,001
	N	300	300	300
Cluster3	Pearson Correlation	,232**	,236**	1
	Sig. (2-tailed)	<,001	<,001	
	N	300	300	300
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 5: UnWeighted distance matrix Correlations on MSTs

		Cluster1	Cluster2	Cluster3
Cluster1	Pearson Correlation	1	,458**	,164**
	Sig. (2-tailed)		<,001	,004

	N	300	300	300
Cluster2	Pearson Correlation	,458**	1	,173**
	Sig. (2-tailed)	<,001		,003
	N	300	300	300
Cluster3	Pearson Correlation	,164**	,173**	1
	Sig. (2-tailed)	,004	,003	
	N	300	300	300
**. Correlation is significant at the 0.01 level (2-tailed).				

As one can see in both tables, all correlations are positive and statistically significant below the level of 0.01. However, it seems that the correlations between the MSTs' distances of Cluster1 (Mid) and Cluster2 (Low) is much stronger than the correlations between these MSTs and the MST of Cluster3(High). We tested^{xiv} these correlation coefficients differences and, we obtained level of significance $p < 0.01^{xv}$. Thus, the MSTs of cluster1(Mid) and cluster2(Low) they can be considered much closer structurally than with the MST of Cluster3(High).

From this point on, since there are no statistically significant differences regarding correlation coefficients between weighted and unweighted distances matrices, we decided to use solely the unweighted distance matrices. For interpreting these differences, first one must detect the items which present the biggest structural differences among the three MSTs. For obtaining this, and for every pair of MSTs, we calculated the difference (subtraction) of each pair of items (in absolute value^{xvi}). Then, we proceeded by calculating the mean of structural differences for each item (between this item and all other items, 25 values in total) for each pair of compared MSTs. Finally, we decided to consider, for each pair of MSTs, the items that presented a mean ≥ 3 .

Table 6: Items that present Structural differences mean ≥ 3 for each pair of compared MSTs.

Cluster2(Low)-Cluster1(Mid)	Cluster1(Mid)-Cluster3(High)	Cluster2(Low)-Cluster3(High)
Confinement/Restriction/Isolation (4.12)	Danger/Fear/Anxiety/Stress (3.36)	Confinement/Restriction/Isolation (3.76)
State responsibility (3.12)	Individual responsibility (3.28)	Death (3.20)
Mask/Disinfectants (3.68)	Diagnostic tests/diagnosis (3.52)	Information/Media/Internet (3.00)
	Faith in God (3.20)	Fate/Uncertainty (3.04)
	Vaccine/Drugs (3.36)	Mental illness (3.16)
	Partners/colleagues (3.28)	
	State responsibility (3.08)	
	Mask/Disinfectants (3.88)	
	Fate/Uncertainty (3.36)	

In Table 6 one can see the results of this comparison between MSTs. By MSTs observation (Figure, 10, Figure, 11, Figure 12), it is easily noted that micro-differences (items) is always referring to identified items that while having a relatively central position structurally in one MST (they are on the "tronc" or a major "branch" of the tree), they have a less significant position in the other (in most cases, they are the "leaves" of the tree). This fact can reveal the

correspondence that exists between this analysis and the centrality analysis (betweenness centrality) presented in earlier paragraphs.

As shown in Table 6, the comparison between MSTs of Cluster1(Mid) and Cluster2(Low), for a $\text{mean} \geq 3$, the items that present this kind of structural micro-differentiation are *Confinement/Restriction/Isolation*, *State responsibility* and *Mask/Disinfectants*. The item *Confinement/Restriction/Isolation* is connected to *Death* for those who are lowly convinced whereas for those who are mid-convinced neighbors *Social Control* and *Social Contact*. The item *State responsibility* also presents significant semantic differences when regarded by the two MSTs: for the lowly convinced, it is connected to *Social Irresponsibility* from one side and *Social Control* from the other. For the mid-convinced, the same item neighbors only *Hospital/Hospitalization/ICU*. Finally, the item *Mask/Disinfectants*, which is central in the MST of the lowly convinced and is connected to *Social Irresponsibility* and *Weak Body/ Poor Health*. On the contrary, for those who are mid-convinced, it is connected only to *Diagnostic tests/diagnosis*. Clearly, these items (notions) can have a differentiated meaning according to the MST studied.

The comparison between MSTs of Cluster2 (Low) and Cluster3 (high) shows 5 items with a $\text{mean} \geq 3$ (Table 6). The item *Confinement/Restriction/Isolation*, one more time, is one of those. For the lowly convinced, it relates to *Death* whereas for the highly convinced, it connects with *Social Control* and *Vaccine/Drugs*. *Death* for those who are lowly convinced is connected to *Personal Responsibility* and to *Confinement/Restriction/Isolation* but for those who are highly convinced, connects to *Family* and to *Hospital/Hospitalization/ICU*. *Information/Media/Internet* for the highly convinced is adjacent to *Fate/Uncertainty* and to *Diagnostic tests/diagnosis*. For the lowly convinced, *Information/Media/Internet* neighbors only with *Partners/colleagues*. But *Fate/Uncertainty* which, for the highly convinced, connects only to *Information/Media/Internet*, for the lowly convinced, connects also only to *Partners/colleagues*. Finally, *Mental illness* connects only to *Weak Body/ Poor health* for the highly convinced whereas for the lowly convinced, is connected only to *Relatives/Friends*.

The comparison between MSTs of Cluster1 (Mid) and Cluster3 (high) is the richer of all three comparisons: 9 items in total present a $\text{mean} \geq 3$ (Table 6). *Fate/Uncertainty*, for the mid convinced connects to *Partners/colleagues* and to *Fun* and, for those who are highly convinced, is adjacent only to *Information/Media/Internet*. The item *Diagnostic tests/diagnosis* neighbors with *Vaccine/Drugs* (in both MSTs) but, for the highly convinced, it neighbors also with *Information/Media/Internet* whereas, for the mid convinced, it is adjacent also to *Mask/Disinfectants*. *Mask/Disinfectants* relates to *Diagnostic tests/diagnosis* for the mid convinced but neighbors with *Vaccine/Drugs* for the highly convinced. *Vaccine/Drugs*, for the highly convinced, is adjacent to *State responsibility*, *Danger/Fear/Anxiety/Stress*, *Mask/Disinfectants*, *Diagnostic tests/diagnosis* and *Confinement/Restriction/Isolation*. For the mid convinced, *Vaccine/Drugs* connects to *Individual responsibility*, *Danger/Fear/Anxiety/Stress*, *Diagnostic tests/diagnosis*, and *Hospital/Hospitalization/ICU*.

Individual responsibility, for the mid convinced relates only to *Vaccine/Drugs* and for the highly convinced, is adjacent only to *Social Irresponsibility*. The item *Faith in God* connects only to *Partners/colleagues* for the mid convinced but only to *Profit* for the highly convinced. *State responsibility*, the most salient item structurally for the highly convinced, relates to *Social*

Irresponsibility, Vaccine/Drugs and Relatives/Friends. From the mid convinced's point of view, it connects only to *Hospital/ Hospitalization /ICU. Danger/Fear/Anxiety/Stress* is adjacent only to *Vaccine/Drugs* in both MSTs. Finally, the item *Partners/colleagues*, for the mid convinced, connects to *Fate/Uncertainty and Faith in God* whereas, for the highly convinced, to *Social Contact* and *Politics*.

CONCLUSIONS

Both our research questions are answered in a rather different but, in our opinion, complementary way. The first research question, divided into two sub-questions (items relative attributed importance -salience- and item's importance regarding its structural position -structural salience-), gives, accordingly, two types of answers. The first sub-question concerning differences of items' attributed importance between different conviction levels about conspiratorial arguments can be characterized as a "hard" result (meaning "straightforward"): a highly convinced individual seems to attribute more importance to "faith in God", "Relatives/Friends" and "Profit/Money". On the contrary, a lowly convinced individual, attribute more importance to "Poverty" and to "Vaccine/drugs".

These, well expected, results show that the level of conspiratorial arguments' adoption can lead an individual to, cognitively, promote certain items as "more important". These items are explicitly mentioned to the presented texts (the "alternative scenarios") and may well serve as a "definition" of what a "believer" is. Nevertheless, this kind of syllogism seems to be tautological^{xvii}: Adopting these arguments (=attributes more importance) makes one believer of conspiracy theories and/or a believer of conspiracy theories is an adopter of these arguments (=attributes more importance). Thus, these results can be considered as a mere precursor to the second sub-question: the items' structural salience¹.

In this case, the structural analysis' results can be characterized as "soft" (means they can be dependable/are open to interpretation/s) and, despite our efforts to quantify, a "structure" remains something rather volatile and difficult to grasp in a tangible (quantitative) way. Nevertheless, structural correlations as showed on MSTs and item's centrality, also shown on MSTs tend to demonstrate that structural differences seem to distinguish the levels of conviction in a much more significant way².

Structurally, the low-level and mid-level of conviction clusters can be "merged": very strong positive correlation indices on geodesic distances (on MSTs) and the same item as the most central (betweenness centrality on MSTs) indicate that, in terms of proximity, they can be

¹ In this study, we don't claim structural centrality as defined by Abric (1993, more recently, Moliner & Abric, 2015). Obviously, a higher network centrality on MSTs can be an indicator of affiliation to the central core but, for the time being, this can only be demonstrated experimentally.

² Nevertheless, this can be controversial since, from the beginning, qualitative methodological approaches were considered as more adequate (and more used) for the study of social representations: the quantitative approach - structural approach- is highly criticized for example, see Quenza, 2005, Arruda 2003. Moscovici himself, when asked (by us) whether all these (semantic networks, similitude analysis, trees etc) are really social representations, responded by saying that everything is social representations and "...you must study what people say to each other" (during the 2nd Congress On social representations, Aix en Provence, 1996). In such a perspective, the study of social representations can be successfully and fruitfully delimited in the rather qualitative study of communication, culture, and the public sphere (for example, Jovchelovitch, 1994).

characterized as very “similar”. On the other hand, also structurally, the high-level conviction cluster seem to differentiate significantly from the other two clusters in both these criteria: low (but, statistically significant) positive correlation indices on geodesic distances (on MSTs) and a different item as the most central (betweenness centrality on MST). Also, *the low-level and the high-level of conviction clusters* present, both, *relatively lower network densities compared to mid-level cluster’s network density* (on semantic networks/critical threshold values).

Consecutively, it can be assumed that, although there are statistically significant differences between clusters regarding attributed importance (salience), these are rather trivial compared to the observed structural differences (structural salience). Obviously, it all depends to the explanatory power’s level following the derivative data’s interpretation.

Structurally, the finding that stands out is, of course, the observed difference concerning the most central elements in each group. Both lowly and mid convinced share the same item as the most central: *Social irresponsibility*. On the contrary, those who were highly convinced highlight the item *Relatives/Friends* as the most central. In the case of low/mid convinced participants, the attention is focused on the *social* downside and the risk of a consequent “stigma” resulting of not following the official/institutional narration. Certainly, *they refer to a mainstream sociality addressed to a broader audience* in an, obviously, conflictual *social environment*. On the other hand, those who were highly convinced, they seem to settle for a *limited local sociality* addressed to *significant others* such as the family, relatives, and friends. Thus, the crucial question may be: *to whom is your allegiance? Who do you want to support or who do you want to please? Who will you defy or ignore?*

It seems that, in a rather conflictual social environment, *the arguments of each side have a lesser role to play compared to the position taking required by different views expressed by different levels of social involvement*. Both these conflicting views (or narrations) inspire fear of unwanted side effects (from social rejection to possible deaths) if the participant follows one or the other. In such cases of intractable conflict (Kriesberg, 2005, Coleman et al., 2007), the individual, facing extreme complexity of contrastive information, demanding highly specialized knowledge, and, in the end, considering extremely high stakes (such as Death for loved ones or, even, for them), cannot process all this by themselves: in order to optimize their cognitive function, they *delegate* at least a part of the information processing *to trusted others*: “the social group” (Nowak et al., 2018). In this way, by collective efforts, one can participate to the construction of a shared reality and, eventually, benefit and/or lose from it: this also creates a “bond” between the members of the group. Needless to say that the dynamics included in this process are complex and, in most part, nonlinear (Vallacher & Nowak, 1997, 2005; Katerelos, 2013).

Thus, in our opinion, it would be an oversimplification to settle for some kind of obstinate contumacy, gullibility on behalf of the participants who are highly convinced about conspiratorial arguments or, even, characterize them as credulous believers. The Regulatory Theory of Social Influence (RTSI, Nowak et al., 2018) suggests that depending on four primary factors (trust, importance of the issue, source’s coherence, and source’s expertise), the individual can “join” a group which now claims her attention. On the other hand, in such a conflicting environment, abandoning a group and joining another, will be perceived as “betrayal”. So, the low/mid convinced participants seem to fear the stigma and the highly

convinced participants seem to be content with relatives and friends and, a distancing from them will, also, be perceived as betrayal. In some cases, the trusted others can function as an echo-chamber (Uzzi and Dunlap, 2005) which can wreak havoc to the group by diminishing its effectiveness.

However, if we consider two conflictual narrations (official and conspiratorial), both can propagate either by reference to a rather negative attribute (maybe, as a fear for disobedience's consequence) or, by simply valuing a closed circle of trustees. In most cases, traditionally, the conspiratorial narration prefers to propagate via invading close circles or creating new ones. The booming spread of fast internet (ADSL/cable/optical fiber) during the '00s, the subsequent rise of social networking media, boosted this kind of propagation (Enders et al., 2021; Kearney et al., 2020; Mari et al., 2022; Stano, 2020; Stempel et al., 2007; Theocharis et al., 2021; Uscinski et al., 2018). Before the internet and the social media, this kind of narrations was restricted to the word of mouth, the publication of some magazines/books or, simply, by putting up some posters. In any case, the source was easily identifiable and was easily discredited (for example, concerning the history of the anti-vax movement, see Gallegos et al., 2023).

Nowadays, since the rise of the social media, one must address a much more complicated state of affairs: the primary source is almost impossible to identify. If the source is unidentified then the source's aims and objectives also remain unknowns, fact which sparks a wide speculation but makes the whole thing extremely difficult to manage from the individual's point of view: it is almost impossible to trace back and to contradict. In addition, one can easily imagine multiple signals arriving concurrently from all sides, giving *the impression* that, out there, it exists hundreds, thousands or even millions of adopters. *So unverifiable/unknown sources cannot be trusted/distrusted by traditional means, but they can be "credible" if they fulfill one main criterium: they seem to be popular.* After all, in many conspiratorial narrations, the source is attributed to somebody who wants to remain "Anonymous" or a "whistleblower" or an "repentant insider" in general.

Thus, the results of the current research reveal an interesting pattern of thought about individual exposure to Covid-19 conspiracy theories, their persuasiveness, and the different levels of compliance to (state-promoted) health measures. A general comment is that individuals, less convinced by conspiracy theories, believe that such narratives are related to behaviors stigmatized as socially irresponsible. Individuals, participated in our study, perceive the pandemic as a health problem/threat that affects society in a wide perspective. Therefore, their behavior is guided by a "socially responsible" attitude located at a level of individual responsibility (acceptance of vaccination and health measures) (Erceg et al., 2022). Individual responsibility is close related to their need to protect, not only themselves, but their relatives, friends, and family (Allen et al., 2023). It is for this reason that their individual behavior reflects their social responsibility with the obedience to the state and the adoption of state's health measures.

On the opposite side, individuals that are highly convinced by conspiracy theories believe that the pandemic is a constructed problem and threat, closely associated with state institutions and big corporations. They perceive the state as the main agent responsible for the pandemic, and they do not believe that it is a society's problem. Therefore, their behavior is guided and influenced by the decisions of an *inner social circle*, located on relatives and friends, in an effort

to confront social control. From the moment they believe there is not a real social threat, such as a serious public health problem, they do not acknowledge the need to protect either themselves or their close social circle. At the same time, direct social ties with their relatives and friends, with people sharing common perspectives on Covid-19 problem, develop an ecosystem of influential dynamics (an echo chamber, Diaz Ruiz & Nilsson, 2023) that affect their final decision to accept or reject state's measures. It is for this reason that their individual behavior reflects an opposition to state's social control and the rejection of governmental decisions to cope with an emergency health situation.

The findings of the current study also reveal another interesting socio-psychological element. The low or high level of persuasion of the conspiracy argumentation and the following declared behavior, regarding the adoption of state measures to protect public health, could be better understood if we provide a special focus on the level of acceptance of the role of different social institutions (family, political parties, governmental bodies, educational, financial, or religious organizations).

The respondents to our study were exposed to different stories about the Covid-19 pandemic. Those that were less convinced by different conspiracy theories scenarios declared a more socially aware behavior. Those that were highly convinced by different conspiracy theories scenarios declared a less socially aware behavior, as if society is nested within their inner social circle of family, relatives, and friends. Individual responsibility in the first case (low-mid convinced participants) is possible to depend on positive attitudes towards institutional role. Therefore, they tend to accept state's decisions by showing an allegiance and compliance for the benefit of the society. On the contrary, participants that were highly convinced by conspiracy narratives, is possible to depend on more negative attitudes towards institutional role (Mari et al., 2022; Van Prooijen et al., 2014, 2018, 2022). They tend to show their aversion to institutions, reject state decisions (Pummerer et al., 2022) and show more trust on the role of family and friends, on individual opinions with a higher degree of influence upon their everyday lives.

Further research on the subject could provide more information regarding the relation of people's attitudes towards institutions and their role, focusing on the level of trust upon their decisions in times of social crises (for example, see Chalari & Koutantou, 2022). Most of the conspiracy theories are based on narratives that, not only raise criticism upon power elites but also, question the power structures and the decision-making process, towards different aspects of social life (Pantazi et al., 2020). A thorough investigation on belief systems about the role of institutions in the society's existence and evolution, in modern democracies, could provide a critical and in-depth perspective about the acceptance or rejection of certain social policies for the general public good. Moreover, a systematic analysis of conspiracy theories rationale is possible to address the cognitive bias organized on belief systems that offer a logical problem solving in social uncertainties. The relevant research on cognitive bias content should be focused on the perception of the role of institutions, the level of their acceptance or dispute from different social groups, as well as their direct and indirect impact on the development of socially responsible behaviors within a shared social reality.

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NOTES

ⁱ Nonetheless, about 10 names were found and they were immediately deleted.

ⁱⁱ During that time, all courses were carried out via the internet - distance learning due to imposed quarantine.

ⁱⁱⁱ Obviously, this is a “statement” of action. It does not mean in any way that participants’ actual behavior is verified or, otherwise, examined by the authors.

^{iv} The word “conspiracy” was avoided during the presentation because it could convey a negative charge (not socially accepted) since the whole questionnaire originated from academics (Panteion University) and, one could easily assume that conspiracy theories are not acceptable in this specific context. Instead, we used the word “alternative”.

^v For further information see also several online news releases about different conspiracy narratives on Covid-19 pandemic (Adams, 2020; Bell, 2021).

^{vi} For example, relevant analyses on Covid-19 mythologies have been presented on “Scientific American” (Lewis, 2020) and “Scientific Reports” of “Nature” magazine (Cinelli, et al., 2020).

^{vii} Facebook pages in Greek language, such as “Poniros typos Karditsas” (2020), present videos with similar content.

^{viii} Later (August 2021), the same person accepted a political position (secretary) in a small political party named «Free People» (Ελεύθεροι Άνθρωποι).

^{ix} A Greek expression which means “without any notable casualty” or “without any resistance”.

^x A geodetic graph is one for which every pair of vertices has a unique shortest path connecting them. For example, all trees are geodetic (Øystein, 1967).

^{xi} Mainly because Pearson’s r can have both negative and positive values. K is limited between 0 and 1 and considers that the maximal distance between two MSTs with N nodes each is equal to the distance between a tree of star form (one node in the center and all the others around it) and a tree of line form (all nodes in a line). This maximal distance is shown to apply when $N > 5$. Also, K can be applied only to unweighted distances between items.

^{xii} $D(a, b) = D(b, a)$

^{xiii} $D(a, a) = \emptyset$

^{xiv} We used STATISTICA 12.5

^{xv} Except the coefficients Cluster1/Cluster2 ($p=.528$), Cluster1/Cluster3 ($p=.389$) and Cluster2/Cluster3 ($p=.423$) between weighted and unweighted distance matrices.

^{xvi} Depending on which MST’s distance between items is the subtrahend during the subtraction, negative values can occur. Thus, we adopted absolute values. $d1(A, B) = \sum_{i=1 \text{ to } n} \sum_{j=1 \text{ to } n} |a_{ij} - b_{ij}|$

^{xvii} A definitional circular argument. For example, “Why people that are believed to have a conspiratorial mindset, adopt this kind of arguments?” (White, 2009, p.40).