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Why Don't We Get Vaccinated? Some Explanatory Hypotheses of Vaccine Hesitation

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Abstract: Because inappropriate built-in or managed vaccination campaigns, regardless of the causes of vaccine hesitation, can have side effects, the most important being the opposition to vaccination, the understanding of vaccination hesitation can have an influence on specific public policies. In this article we identify a set of possible explanations for vaccine hesitation, which can be used to assess situations, identify problems and adopt appropriate solutions. We highlight the fact that the vaccination hesitation is not just about vaccination, the approach of identifying explanatory hypotheses involves identifying all relevant frames of reference, all social areas that participate in establishing the appropriate interpretation context. The level of compliance with the rules could be an important explanatory hypothesis for the differences between different states in the share of vaccinated citizens. Other explanatory hypotheses: the structure of epistemic communities, community and individual cognitive resources on strategies facing the uncertainty and risk, distrust. We also assess the limits of using the deficit model. We keep in mind two cognitive asymmetries: inaction is perceived as less risky or responsible than action; the indecision is in a similar situation to the decision. Because the values that people adhere reflect their personal beliefs and convictions, and they guide the way they seek, receive, and interpret information, strategies to reduce vaccine hesitation should be based on verifying the compatibility of the intended outcome with individual values and to continue testing the various solutions to change the beliefs that contribute to the determination of vaccine hesitation or refusal.

Keywords: *vaccine hesitation, pandemic, COVID-19, cognitive asymmetry, uncertainty.*

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1. Introduction

Addressing the issue of vaccine hesitation must take into account the fact that vaccine anxieties are just as old as vaccines, taking on different forms in different societies. This introductory remark is intended to support a proper counting of vaccination ideals, regardless of the type of vaccine, thus generating a reasonable distance from reality. The ideal level for each vaccination campaign participates in the generation of the social space in which the vaccination hesitation takes place.

The concern for the issue of vaccine hesitancy/refusal betrays the intention to see in this social phenomenon more than the daily debates show, thus joining the group of people trained in the field of philosophy who approach this social problem with the tools specific to the specialization they hold. The evaluation of the explanatory hypotheses in this article is strongly influenced by the commitment of a philosopher to the deontological obligation of an objective perspective, thus being marked by a form of existential tolerance towards all behaviors that are included in vaccination hesitation. We try to overcome both the multitude of simplifications that cover the essence of this problem and the explanatory reductionism that forces the identification of solutions. Avant la lettre we agree with Goldenberg (2021) that the data tend to indicate the existence of an alternative narrative to the official ones regarding the profile of people in a situation of vaccination hesitation, in most cases they are not ignorant of science, selfish, and so on. For this reason, we are carefully exploring the possibility that such attitudes may have objective justifications. At the same time, however, we do not hesitate to evaluate and suggest hypotheses that take into account different forms of cognitive inadequacy from some of some people who are in a situation of vaccine hesitation or refusal to vaccinate.

We agree with Cassam (2021) that the goal of such an approach must be the understanding, avoiding the use of stereotypical interpretations of vaccine hesitation. The analysis of the variables that we considered the most relevant considers the attempt to identify all possible perspectives about the problem. Although we end the article with some recommendations aimed at reducing vaccine hesitation, respectively increasing the share of vaccinated people, they consider covering the playing space created by a prudent approach to the limits of the possible.

Since improperly built-on or managed vaccination campaigns can also have side effects, the most important being the increase in opposition to vaccination, the understanding of vaccination hesitation can have an influence on specific public policies.

1.1. Some methodological clarifications

Most studies on vaccine hesitation are partially relevant because they try to answer the problems identified in vaccinating children. The results of those studies have limited explanatory power when we try to use them to understand the behavior of the population that is the target group of SARS-CoV-2 vaccines. In this article we use the guidelines provided by their data, while trying to identify explanatory hypotheses appropriate to the new context. This is a theoretical approach; its proposals still require experimental verification. However, there is an additional possibility to verify the results of the analyzes from this article: through pilot studies, that can be organized in the form of micro-awareness campaigns. Even if this alternative offers a low level of confirmation of the explanatory hypotheses (the absence of the experimental framework carries with it the risk of intervention of variables that cannot be controlled), in the absence of experimentally confirmed data, its use offers an advantage compared to the unfounded explanatory. Given the rapid evolution of events, this "better than nothing" could constitute a reasonable level for substantiation of some public policies.

The overwhelming part of the article is focused on the descriptive approach, the sections with a clear normative character being relatively small. We hope that this imbalance will be partially offset by the implicit suggestions contained in the descriptive approaches.

Where our explanatory hypotheses are not based on studies that have indicated the possibility of a causal link to people who hesitate or refuse to be vaccinated (PERV), they are speculative, originating in the analysis of specialized readings combined with the anecdotal evidence occasioned by the meditation on the social phenomenon in question.

We try to look at the problem from a multitude of perspectives, taking into account those identified in the analysis of the literature and selected as relevant or developing new ones that take into account the possible causes. This type of approach is the opposite of the traditional scientific one, the isolation of the problem in laboratory conditions being replaced by the attempt to understand it in situ, observing its multitude of interferences and tempting the observation of systemic influences.

Goldenberg (2021) indicates the following models as popular in explaining vaccine hesitation: the public's misunderstanding of science, the influence of cognitive biases on the public's reasoning about the vaccine, opposition to experts and denial of science as public attitudes. He considers each of them inadequate in explaining the vaccination hesitation, proposing as

a main explanation the crisis of trust (in science, authorities). Unlike Goldenberg, we keep in mind each of these explanatory levels (to which we add others), considering that they have a potential explanatory weight. Even if we tend to consider that trust has an important explanatory role, because there are no relevant data to verify its share in all potential explanatory models, we resort at most to a form of privileging it. In addition, we believe that the different explanatory hypotheses are not isolated, but must be captured in the structure of explanatory models, there being both the possibility of their interdependencies and the phenomenon of multiple participation (an explanatory hypothesis can be part of several explanatory models).

The approach is focused on the problem of individual and social knowledge, taking into account the ethnographic dimension of the problem. The case study is the attitude of Romanian citizens towards the COVID-19 vaccine.

For clarity, we point out that some of the approaches of this study could outline some explanatory models: the deficit model, axiological conflict, mistrust, reactions to uncertainty, competing influences, ecological rationality, risky decisions. As we will see, vaccination hesitation has a multitude of causes, varying by groups of people or even by individuals, and explanatory attempts must take into account this level of complexity.

1.2. Conceptual clarifications: vaccine refusal, vaccination hesitation or vaccine acceptance?

A classification of vaccination positions could help clarify the concept of vaccine hesitation. Please keep the following classification as possible:

- People who get vaccinated:
- Out of conviction ("vaccinists");
- Out of opportunity;
- Because that's how it's done;
- For other reasons.
- People who hesitate to get vaccinated
- People who refuse to get vaccinated
- For personal reasons
- For circumstantial reasons
- Anti-vaccinists.

However, the classification must be made from the perspective of the social interest, taking into account the effects of the definition. For example, the use of the concept vaccine refusal carries with it the risk of a

form of self-fulfillment prophecy, in fact determining the positions it seems to describe.

The main problem is the vaccine refusal, in general this article trying, like other works in the literature, to identify the appropriate explanations for the refusal and possible solutions to remedy the situation. In this context, discussing vaccine refusal seems to be the natural solution. However, the established concept is the one of vaccine hesitation. The use of harsh terms, such as the vaccination refusal, misses some of the essence of the situation, risking crowding citizens into positions that do not actually belong to them. A brief reading of the reasons given by some citizens as an argument for not being vaccinated is enough to make us understand that the common denominator of most unvaccinated citizens is vaccine hesitation, not vaccination refusal.

In principle, we can consider that the use of the vaccine hesitation formula also risks highlighting negative aspects, contributing to the amplification of the phenomena it intends to analyze. To avoid the risk posed by the connotations of this concept, MacDonald and co. (MacDonald et al., 2021) proposed the use of the concept of vaccine acceptance. However, we opt for the vaccine hesitation formula, its use being already established by a series of works dedicated to this problem. In some places, however, we resort to a more accurate identification, talking about people who hesitate or refuse to be vaccinated (using the acronym PERV).

Vaccination hesitation allows fine distinctions between two categories of situations: people who are not (yet) convinced by official submissions (pro-vaccine) and people who are (still) convinced by anti-vaccination statements/campaigns. The difference between the two types of situations is relevant to the identification of public policies.

1.3. The class of vaccine hesitation

Identifying the class of vaccination hesitation is based primarily on a proper understanding of vaccination. Is vaccination a strictly medical issue? Or has it become a moral issue, affecting individual or community values? Has the pandemic made vaccination a political issue? Ambiguities regarding the understanding of vaccination also affect the issue of vaccine hesitation. If vaccination is not a strictly medical problem, then vaccination hesitation cannot be understood only in the narrow framework of attitudes towards a medical practice, being necessary an extension of the context of interpretation, but based on the identification of all relevant dimensions. The approach of identifying the explanatory hypotheses of the vaccination hesitation thus implies the identification of all the relevant frames of

reference, of all the social areas that participate in the constitution of the appropriate interpretation context.

The impact of the vaccination problem on some moral dimensions of the society is notorious during this period. In the context of the dispute between those who support vaccination and those who reject it, the debate is not limited to arguments for or against the effectiveness of vaccination, but also involves other dimensions, such as oblique goals (e.g., opportunities for self-affirmation in front of the community, avoiding the risk of being rejected), transfer of symbols (freedom of decision people tend to become a symbol of personal freedoms) and so on. Since we didn`t plan to address the ethical issues involved, in short suggestions and axiological conflicts, we move the analysis of the problem to another level. In some way, we can consider that vaccination is part of the type of strategies specific to progressivism, which forces to adapt and position traditionalist visions, thus changing the moral settlements of society. The magnitude of the impact of the pandemic and the stakes of vaccination makes the solutions used so far to maintain the necessary compromise on ethical tensions no longer seem sufficient.

Assuming a systemic analysis leads us to consider the possibility that vaccine hesitation may be consistent with other types of social attitudes. Considering this, we believe that vaccine hesitation (or at least some of its dimensions) could be part of a class of pre-existing behaviors in society, with "tax avoidance" ("tax hesitation") being one example. The two types of behavior are comparable in terms of social effects. Addressing the problem from this perspective could facilitate a better understanding of causation, while providing some solutions to the social problem of vaccine hesitation. Changes in social design must also be discussed. We note so far that vaccine hesitation is a problem that involves several dimensions of social life, it occurring on the background of pre-existing problems.

2. Relevant context

2.1. Pre-existing social problems influencing vaccine hesitation

2.1.1. Approaches based on the presumption of unlimited rationality

The situation in the perspective of unlimited rationality (following the enlightenment model of rationality) can amplify the problems. Economic theories based on the model of unlimited rationality have often contaminated the political world, giving rise to inappropriate strategies. For example, limiting concerns about vaccine procurement and the logistical organization of its administration, considering that in the context of the pandemic, all citizens will be vaccinated, is a standard example of economic

thinking based on the model of unlimited rationality, transferred to public policy: the presupposition of homo economicus rationale generated the error that we can call homo vaccinatus rationale. Ecological rationality suggests that standards of judgment should be related to the specifics of the environment and the information that exists in that environment. This means that we cannot rule out the possibility that some people in the situation of vaccination hesitation may in fact make the best decisions under the given conditions. We will resume the approach of the problems generated by the situation in the perspective of unlimited rationality in the section dedicated to irrationality.

2.1.2. Complementary and alternative medicine (CAM)

Existing data (some references below) suggest that some citizens who are hesitant about vaccination are among the contributors to the big business of dietary supplements or other forms of alternative medicine. Even if epidemiologically, there is a significant difference between the two situations (vaccination and alternative medicine), the epistemic differences are not so great, the common denominator being a certain form of "insensitivity" to evidence. The study published by Attwell et al (2018) suggest that there is a correlation between the use of alternative medicine and the refusal of vaccination should be interpreted from the perspective of a common cause: parental agency, understood as a form of empowerment and responsibility of parents regarding the health of their own children.

The criticism of Big Pharma often misses the huge turnover made by CAM. From the perspective of our topic, the lack of evidence and the reaction of the citizens to this lack are relevant, these being common features with anti-vaccinists. Fear of the risks associated with side effects works in favor of CAM: since alternative interventions have very few therapeutic effects, they will predictably have few side effects. Subtly in such cases the decision on the selection of the desired therapeutic effects turns into the decision to avoid side effects, the persons concerned missing the substitution they have made. Risk aversion seems to have it say here, assessing the risks associated with the intervention with a greater cognitive weight than the risks associated with non-intervention. Cognitive adherence to CAM generates misconceptions: believing that it avoids the risk of vaccine side effects actually assumes a much higher risk.

The problem is complicated by the specific distortions of ethical thinking such as the "tram dilemma", which favors inaction/non-intervention from the perspective of responsibility under equal effects. This mental pattern is in some cases formed by the relationship with CAM. The

effects of inaction (understanding the action as an intervention of Western medicine) have a higher cognitive value in the case of CAM, indicating what its fails can be understood as side effects if we look at them from the perspective of delays caused by confidence in them.

2.1.3. Traditionalism

The opposition to vaccination must also be seen in terms of the manifestation of traditionalism, (e.g.: the resistance to change). Part of the resistance to vaccination is the defense of traditional values. Although we cannot rule out a dose of risk for possible future side effects of vaccination (although this is very unlikely, it is not 0), we believe that this is largely a form of fear for the new, present in all periods marked by fundamental changes. In some cases, it may be relevant that religion is the most important factor in favor of tradition. For example, overlapping political debates on family or sex education in schools with the same politicians' vaccination campaign may lead to a current rejection of the vaccine as a form of resistance because the vaccine may be perceived as belonging to the same category of progressive interventions, meant to destroy traditional values.

Transhumanism is a relevant meditation perspective on the vaccine (especially RNA). The naturalism of passing through the disease (the immunity acquired as a result of the infection) is opposed by the formula of the much more effective immunity acquired by vaccination. Let's imagine that instead of the vaccine in question there would be an intervention to increase the IQ. Do you think it would be convenient to stay in the camp of the traditionalists while a part of humanity will adhere to these improvements? New technologies are already here, making it difficult for us to estimate their effects. As the speed of change increases, we will have less and less time to check the long-term impact.

2.1.4. Free rider strategy

Part of the strategy (implicit or explicit) of some people in the situation of vaccination hesitation is based on a free rider approach: try to take advantage of the herd immunity generated by vaccinating other members of the community, without taking the risks of vaccination. The free rider strategy is defined in the case of vaccine hesitation as a "hide in the herd" strategy (Goldenberg, 2021, p. 121). It aims to outsource the costs of vaccination risks to others. If we look at things from this perspective, we can ask ourselves: is this the only situation in which we tolerate such behaviors? Shouldn't the analysis of causation include cases of this type that have somehow prepared the ground for the current situation? We cannot rule out the possibility that pre-pandemic free rider strategies may influence attitudes

toward vaccination. The high share of such situations, especially in relation to the health system / social health insurance could show its influences in the new context (Demichelis, 2018, p. 106).

In such cases, personal involvement for the common good is lacking. To the extent that this form of individualism can be found in other areas (reporting on tax obligations is one example) in question is not only a medical problem, but also a social one, derived from the reference to a set of community values. The free rider strategy does not belong to the causal class of cognitive errors, it belongs to the area of ethics. As an ethical issue, it must be analyzed in the context of the possibility of a continuum of similar behaviors, which leads to a continuous dilution of share capital.

The prisoner's dilemma provides a conceptual framework for analyzing some of these attitudes, indicating the situations in which a person may choose to act in opposition to the social good if it has an individual benefit (Kuhn, 2009; Saint-Victor & Omer, 2013).

2.1.5. Compliance with rules

The degree of social anomie influences the share of vaccination as a release of constraints, being directly related to a category of answers to the question: "Why do we get vaccinated?". The level of compliance with the rules could be an important explanatory hypothesis of the differences between states and/or communities in the share of citizens vaccinated against SARS-CoV-2. The hypothesis is not about the direct relationship between the level of compliance with social rules and vaccination (its involvement is mediated by trust, which we address separately), but the specific reactions generated by the level of social anomie in the context of the pandemic. In this case, a large part of the vaccination hesitation could be explained by the low level of constraints specific to social isolation, arising from a reduced compliance with these measures. Noting that the low level of compliance with the rules may have its effects even if compulsory vaccination were introduced. A first form of prior verification of this hypothesis is the share of people who have been vaccinated to escape social isolation in states with a high percentage of vaccination. A second step should be to investigate the hypothetical adherence to this variant of citizens in a situation of vaccination hesitation, carried out through social research. However, the final verification can be provided by a pilot study based on a plan of measures designed to significantly increase compliance with the rules.

The explanatory hypothesis of vaccination hesitation based on reduced compliance with the rules is based on the attempt to explain the low share of vaccination in the former communist states (Bulgaria and Romania

are in the first places). We note that this hypothesis is not based on a comparison between specific indicators of social anomie, the information underlying it being rather anecdotal (including the reasons given for the rejection of Schengen accession of some of these states). In support of this hypothesis, however, comes another hypothesis, which concerns the social model that could determine such a situation, the social context created by communism playing the role of causal explanation. In question is the extensive development of survival strategies based on informal or traditional social institutions (e.g.: the importance of the extended family). This support hypothesis can be verified by identifying the types of social networks specific to the companies concerned. It can be seen that this supporting hypothesis suggests the possibility of a "reverse evolution" of these companies, compared to Western ones. In this explanatory paradigm, post-communist societies would be affected by a delay in modernization (post-modernization) caused by both the slowdowns specific to the communist period and the side effects of this period. We can see that the supporting hypothesis is consistent with the low level of trust in state institutions.

2.2. Mentalities relevant to vaccine hesitation

In this section we examine the possibility that certain mentalities or some changes in mentality that have taken place in the last decades may contribute significantly to the share of vaccine hesitation in different communities. By mindset we mean specific forms of thinking, using the concept in a form liberated from its ethical interpretations.

2.2.1. The natural and adjacent ideologies

It is possible that the term vaccine has in the meantime suffered a slight shift in meaning, being moved for many people to an area of undesirable interventions on nature (for some mentalities it has always had this meaning). We had in mind that the topic of the side effects of artificial interventions may outweigh the joy of potential benefits. Given that, on the background of well-being, a part of humanity has come to fear the negative effects of food rather than its lack, it is almost understandable that the paradigm shift revealed by the extent of vaccine hesitation, caused by increased feelings of protection specific to Western societies. It should be noted that the expectations generated by the high confidence in science and technology can have as an effect not only confidence in the vaccine, but also a general sense of security that in some cases contributes to the generation of vaccine hesitation.

The ideology of natural living (Goldenberg, 2021, p. 72) indicates the new social current that assumes multiple values considered consistent with

natural living. Demichelis (2018, p. 66) indicates the influence of natural concerns on the vaccination decision, but treating it from the perspective of availability bias. Regarding the vaccination hesitation, the ideology of natural living is relevant especially by what it rejects, in this area entering a whole series of artifacts and procedures considered toxic / unnatural, the vaccine tending to be included in their ranks. The "new ontology" influences gnoseology. Ontological approaches suggest that there are ways of seeing the world in question, of conceptualizing it through fundamental categories, which determine a conceptual framework in which the understanding of vaccination and the decision-making process take place. The division into Natural vs. industrial/artificial seems to be one of the most important ways of understanding the world that influences the decision about the vaccine. The division of pharmaceutical substances into two biologically different classes, namely natural (compatible with life) and artificial (toxic), accounts for part of the causality of vaccine hesitation, the vaccine being perceived as an artificial construct and therefore toxic. This is a cognitive separation rooted in an ontological perspective. Missing the contribution of evidence-based medicine to increasing life expectancy, the ontological perspectives that favor nature and the products that seem to have an essential connection with it generate the favorable ground for epistemological vices. We notice here that an ontological resettlement consistent with the data provided by some sciences, respectively the concern for the environment, can lead to wrong cognitive positioning due to exaggerations. The ontological visions specific to religious beliefs also play an important role, being often taken in the new perspective. From an ontological perspective, all new solutions must fit into the picture provided by the metaphysical perspective to which people adhere. Cognitive dissonance requires solutions.

The way of understanding one's own body (the new type of sacralization of the body), the relations it maintains with the world, the ideal values assigned, etc. they are also variables that interfere with the vaccination process. Given that the western space is dominated by body building culture and associated phenomena, the vaccine is more likely to fall into the area of unwanted interventions, intended to disturb body purity.

2.2.2. Individualism

There are social strata in which individualism tends to be the dominant strategy. Rising houses in parks, modern ghettos without social facilities, etc. are all signs of this form of social reporting. The culture of individualism is consistent with the culture of making people responsible for all the effects of their existence (visible, for example, in cultural pressures

towards the standards of health and appearance of one's body), the latter tending to induce a sense of expertise in the field. Inoculating people with the idea that they have more control and responsibility for what is happening to them than they actually show their side effects here. If we refer to the situation of vaccine hesitation in the U.S. individualism could provide one of the possible alternative explanations. The promises of personalized medicine generate similar expectations from vaccines.

Nonconformism (Maverick) (Goldenberg, 2021), one of the faces of individualism, is a social model (forged rather on an area of the aesthetics of existence) that also exerts its influences in the current context. People enrolled in this existential niche will tend to justify their choice by emphasizing its model value. The maverick phenomenon (noticeable in the case of "doctors differently") is doubled by the emergence of a new pole of influence in epistemic communities called influencers. Their main feature is visibility, which tends to turn into influence, especially based on the confusion between notoriety and competence. The inability of traditional systems to generate social models contributes to increasing adherence to the recommendations of influencers, who meet an unmet need. Completing the wording proposed by McLuhan (1964), the new media are both the message and their promoters.

The model of personal identity can also exert its influences on vaccine hesitation. The social interest is focused on the high level of predictability of the individual, his adherence to community values being the most important indicator of predictability. Traditional communities, in the shadow of which we go, to varying degrees, the existence tends to ossify the person in the area of stable values and characteristics, thus forcing a form of their rigidity. However, some traditional inflexibilities conflict with scientific information and their forced positioning. The pandemic tends to accelerate the need to adapt to solutions to combat uncertainty proposed by science. To the extent that the change in our position following new information affects our social status, we may consider that we have an inadequate model (specific to contemporary society) of personal identity.

2.2.3. Informed consent

Increasing life expectancy, technological development and the relocation of a growing share of health systems to the commercial area are leading to a continuing increase in health spending. A cost-cutting solution that has a public policy character in many states is a form of "subsidiarity of the individual": his responsibility for his own health. Inevitably, this policy involves empowering the person with the ability to make relevant decisions,

which is the source of individual responsibility. However, the decision-making power in the field of one's own health cannot be granted and taken by the authorities in the light of current interests.

In the context of a continuous increase in social attention paid to the person (but also other interests, as you can see), the last decades have seen a shift from bioethical paternalism to informed consent, which also affects the vaccination situation (Demichelis, 2018). Like the malpractice system, informed consent is the result of a transfer of liberal values from the western space (especially the USA), but is taken over in a local way in different communities. The whole discussion about the violation of certain rights and freedoms, generated in the horizon of informed consent to vaccination, is generated by a liberal perspective on them.

The shift from the paternalistic approach to the empowerment of citizens, through informed consent, is not only about establishing a more liberal view of the individual, but is also driven by the entry of health into the area of commercial interests. The "healthcare industry" needs free people to access its services. The discussion is about a category of highly specialized services, traditionally accessing them being made on the recommendation of specialists. Because specialists can interfere with consumer interests, the solution is to shift some of the decision-making power to the individual (based, among other things, on cultivating distrust of experts). The model works all the better as the individual can develop less the filters necessary for the critical reception of (pseudo) information conveyed by the marketing industry.

In the absence of social structures designed to support the understanding required by informed consent, citizens may feel a significant decision-making burden, to which they tend to respond cautiously, minimizing risk-taking. From their point of view, the risk assumed by personal decision is asymmetric to that assumed by indecision: the first attracts individual responsibility while for the second there are already social mechanisms forged socially by taking responsibility (fate, divinity, others, etc.). Basically, it is not clear if this is a wrong attitude, because deciding in an area in which we are not competent falls on the side of inappropriate cognitive behavior. However, vaccination in the context of the COVID-19 pandemic has pushed us into the area of the need for a decision, with distrust of experts (implicitly involved in informed consent) forcing us to take both the decision and the inability to make it.

2.2.4. The side effects of some forms of social protection

The fight for equal opportunities has as a side effect a series of inadequacies to reality, increasing the distance between ideality and reality being the most important causal mechanism. Protection against the consequences of one's own errors cancels out the feedback effect necessary to verify knowledge. The absence of effects generates the illusion that all positions are equally cognitively justified. An infantilization of society, which must be compensated by something or whose negative effects we must suffer. We can hope that the evolution of (artificial) intelligence will compensate for the deviation from evolutionary rules.

2.3. How do we solve ethical problems?

2.3.1. Values

Vaccination hesitation is not only related to the characteristics of vaccines, but also to a number of other elements, the most important being the values. The vaccination against SARS-CoV-2 conflicts with a number of individual and social values, and its success lies in its ability to build the necessary compromises. In order to allow a proper understanding of vaccination hesitation, it would be appropriate to identify the whole range of values with which the vaccination process conflicts. Some examples: personal and community values, the person's position in society, the contours of identity, and so on.

Freedom is the most often claimed value. We must also take into account the context in which vaccination occurs, as the series of restrictions on some of the freedoms brought by quarantine is important. The conditioning of vaccination freedoms has led to a strong resignification of the vaccine as an obstacle to freedom.

In the event of a conflict between the person's belief system (determined by the set of values to which the individual adheres) and the information received on the topic of vaccination, the specific mechanisms for reducing cognitive dissonance intervene. The series of positions adopted by some people, which we usually label as illogical, can be understood in some cases from this perspective. The supply generated by all conspiracy theories is a significant reservoir of potential resources for reducing various cognitive dissonances, while having the advantage of a minimal form of social consensus. The absence of solutions to resolve the conflict specific to cognitive dissonance pushes people to conspiracy theories.

2.3.2. Conflicts between values

The types of interventions required by pandemic actions conflict with a number of traditional social values. A few examples are enough to illustrate this dimension of the problem:

- Informed consent vs. it is in the interest of society for the individual to take certain risks and costs. Vaccination, the use of masks and social distancing are the most visible examples of the costs borne by citizens.

- Personalized medicine vs. mass interventions such as vaccination.

- Rational allocation of resources vs. privileging COVID-19 patients. The traditional criteria for selecting and prioritizing access tend to be bracketed in the new context.

- The suspension of some of the traditional freedoms. The use of masks and social distancing are the most visible examples. We will not deal with the issue of affecting freedoms, which is in the process of being redefined, but with other conflicts between the new social interests and the less discussed traditional values.

These are real social conflicts, waiting for compromise solutions.

Traditionally, time has the biggest contribution to compromise. Unfortunately, in the new context, time-based approaches are very costly in terms of human lives.

Because the values that people adhere to reflect their beliefs and beliefs and guide the way they seek, receive, and interpret information, strategies to reduce vaccine reluctance should start with verifying the compatibility of the intended outcome with individual values and continue. with testing the various solutions to change the beliefs that contribute to the determination of vaccine hesitation or refusal.

2.4. The difficulties of understanding

In the new existential context, the understanding of our own life meaning tends to be based on disparate symbols, with a thin connection between them, rather than on unifying approaches. The metaphysics rejection, specific to postmodernity, contributes to this type of meaning`s fragmentation, generating a high level of permeability to marketing exaggeration on different consumer goods significance. In some cases, consumption has replaced the need to understand: we no longer have to understand the world we live in, the achieving of its essence seeming to be mediated by the various objects of consumption that are all presented as keys to an entire world along with its significance. Thinking was replaced with consuming; what you allow yourself to consume (purchasing power;

meaning your wealth) becoming the gold standard of success evaluation. Inevitably, this way of understanding affects the cognitive positions relevant to vaccination. For example, the free vaccine could explain part of its failure, at least for certain categories of citizens. Equally, conditioning the access to certain vaccination practices could be one of the conditions for success.

2.4.1. Is there a weltanshauung specific to vaccination?

The vaccine is part of a way of reporting to the world specific to Western modernity, these societies being much more permeable to trust in the category of therapeutic approaches of which the vaccine belongs. Vaccination hardly finds its place in traditionalist societies, this type of medical practice often conflicting with the axiological systems specific to these societies. The adoption of precautions based on the practice of vaccination is not always consistent with the confidence in the destiny predetermined by the Divinity and with the place that human interventions should occupy in the organization of the world presented by religion.

We specify that, from the axiological differences between different religions and the specific system of vaccination practice, we must not deduce the need for a sign of equality between religiosity and resistance against vaccination, being enough situations where high vaccination rate and religious affiliation coexist. The possibility of religion contributing to resistance to vaccination is being discussed, as it becomes a reality and needs to be analyzed in each case.

2.4.2. The influence of uncertainty

Variations in attitudes towards uncertainty could help explain the visible differences in vaccine hesitation. In question there are different types of betting derived from distinct social practices. As we have previously addressed the issue of uncertainty during the COVID-19 pandemic (Rotilă, 2021), we will summarize here a few new aspects relevant to vaccination.

We are characterized by a form of uncertainty avoidance. Low tolerance for uncertainty can lead to strategies such as "any certainty is better than uncertainty", providing the space for various wrong theories or misinformation. As religion is the strongest bet against a category of fundamental uncertainties, we can expect its mediators to be accessed/ credited as having the right solution in this case as well. In the case of people whose cognitive practices are not coupled with religious belief systems, we can see other sources of ready-made certainties, with conspiracy theories having a significant weight.

Reality suggests that uncertainty does not go well with politics. Using the pandemic as a source of political legitimacy has led many politicians to

"avoid" uncertainty by displaying unfounded security. Because the "job profile" requires the belief in one's own statements, in many cases politicians have even come to believe what they say, against the evidence.

Denying or camouflaging uncertainty is a wrong strategy. The study by Wegwarth et al. (2020) suggests that the public prefers honesty in such situations, confirming the results of the study on the same topic published by Markon et al. (2013). The traditional practice of relying on trust in the authorities and camouflaging uncertainty is not usable in the context of current information globalization. An area of uncertainty camouflaged by miming belief is quickly detected and then amplified. The failure to recognize the uncertainty often becomes a reason for amplifying the perceived uncertainty. Acceptance of uncertainty must start at the level of policy makers and scientists who make or influence these decisions. As the evolution of the COVID-19 pandemic is characterized by a high dose of uncertainty, it is preferable that public policies are coordinated by honest professionals who are willing to assume the dose of uncertainty and the risks to the trust, that this attitude generates.

2.4.3. Risk strategies

Risk perception raises many issues, as they are determined by a number of variables that we specify below:

a. Expressing risk in percentages, this being an approach that does not allow intuitive access. The personal story of a citizen who suffered the side effects of a vaccine decreases the perceived significance of the 99,999 who received the same vaccine without side effects. It is added that the new media favor the increase of the incident's visibility, distorting the perception of the place they occupy as a whole, i.e., of the relevant information provided by the percentages. We also believe that denying the existence of risks related to vaccination is wrong, being part of the mechanisms for generating and maintaining distrust. This means that the solution is to find the right balance between providing the right information and presenting it in ways that promote cognitive acquisition. The focus on low-risk vaccines has a limited impact. An analysis of the relationships between different risk classes associated with different behaviors and the ability to change those categories of behaviors only by informing the population about the risk class, highlights a part of the problem. One method of facilitating intuitive access to the magnitude of the assumed risk of vaccination is given by the comparisons with the risks assumed by everyday practices.

b. Specific difficulties in observing the impact of prevention. Prevention does not provide strong feedback specific to experiential

learning. If we rely on everyday cognitive practices then it`s difficult for us to know whether the avoidance of the severe form of COVID-19 disease was caused by the fact that we were vaccinated or by other personal characteristics. The number of those who have not been vaccinated and who got rid of the disease depends quite heavily on the individual's judgment of the vaccines` relevance. Relevant information is provided by that area for which we are not prepared for a correct information evaluation: statistics. The lack of specialization in taking into account the effects of one's own decisions is accentuated by the asymmetrical distribution of relevant information. Ecological rationality tends to justify the phenomenon of "vaccine is the victim of its own success" (Janko, 2012), at this level the essential variable being the existence or absence of risk of infection (more precisely its perception), compared to the perception of vaccination risks.

c. The asymmetry between passivity and action, respectively between indecision and decision.

d. The precautionary principle. The precautionary principle empowers decision makers to take a set of measures when there is no clear scientific evidence/there is a high level of uncertainty and the stakes are very high. We can`t exclude that, for many citizens, the way how they access information/the information is presented to them, places them in such a decision-making context.

e. Citizens` justified precautions. We can`t eliminate the possibility that a caution, determined by a certain way of perceiving risk, may be mistaken for an epistemic vice.

f. Understanding safety. For sure the term has different meanings in everyday space than in science: while in everyday life we certainly tend to understand the absence of any risk, in the space of science certainty can take the form of probability. Although the mathematical difference between the value 1 of confidence level and the value 0.999 is very small, in the space of daily existence, it tends to be perceived as the difference between safe and insecure.

g. The asymmetry between responsibility and reward: the acute form of risk aversion in the case of decision-makers is generated by the asymmetry between responsibility and reward: they risk paying if things go wrong, but won`t benefit if the preventive measures are paying off (Pinker, 2021).

3. The deficit model

The deficit model as an explanatory solution to vaccine hesitation includes a multitude of explanations based on the assumption of existing deficits in thinking of people who hesitate or refuse to be vaccinated (PERV). In order to understand the extent of this explanatory model, it`s

good to remember that, from the perspective of those who support vaccination, the concepts associated daily with vaccine hesitation seem to be in from the following range: scientific illiteracy, credulity, naivety, stupidity. These concepts are part of the deficit model/deficit in explaining vaccination hesitation, involving the explanation`s focus on what is missing in the case of people who aren`t vaccinated. As we will see, this type of approach often risks missing the specific situation, in some cases having a boomerang effect on those who believe that using it could increase the percentage of those vaccinated.

The deficit model has an uncertain history. Although Goldenberg (2021) considers that it is first mentioned by Brian Wynne (1993), the analysis published by Nerlich (2017) indicates its possible "multiple paternity". The deficit model can register different variants, such as: information deficit, cognitive deficit (inability to understand), education deficit (this may include the absence of internalization of moral values, in the sphere of social interest). It includes the idea of public ignorance of science, which creates a suitable framework for the image of a war against science and experts.

The deficit model assumes the inability of the public to understand the reasons of science (those who disagree have this position because they don`t understand science), it determining interventions to increase the capacity to understand or to impel/determinate in other ways the citizens to get vaccinated (a form of paternalism). The traditional way of intervention associated with the deficit model is the didactic educational model: people must be made to understand, using the traditional forms of explanation/learning.

3.1. The level of education

From the perspective of differences in cognitive skills generated through education as an explanatory hypothesis of vaccine hesitation, we can note the data provided by several analyzes that show the level of education doesn`t correlate uniformly with vaccine hesitation, registering differences from one state to another. The variations start from the USA situation, where pre-pandemic studies reported a high level of hesitation to vaccinate those with higher education, go through the absence/of some correlation in the case of Australia and reach the classic place of explanation based on lack of education in the case of Great Britain (Demichelis, 2018, p. 17).

Can we consider that the level of education isn`t a significant variable in the vaccination hesitation? From a general perspective, existing data tend to suggest that they are not. However, there is an approach model where the level of studies can generate predictive capacity of the

probabilistic type. The big problem seems to be the existence of people with a high level of education among people hesitate to get vaccinated or refuse the vaccine. We believe that this type of behavior must be the subject of another class of explanatory hypotheses. The level of education is a significant variable, but it doesn`t intervene on its own. Multi-causal explanatory models may explain what would appear to be an anomaly in explanatory tests using the level of education: while people with a lower level of education may be more likely to be vaccinated, there are other categories of variables that can increase the impact of vaccine hesitation on people with a higher level of education. An approach that takes into consideration the science educational level could change the perspective. Using the quality of education as an additional variable, could provide additional information.

We further provide a justification for the cautious attitude towards both the deficit model and those that deny its relevance, through a brief analysis of the data obtained by us in a study on this topic (Rotilă et al., 2021a). The analysis corresponds to two levels of justified precautions: the one derived from the limits of the deficit model and the one specific to the use, as a causal explanation, of the inversely proportional relationship between the level of studies and the vaccination hesitation. The correlation exists, even if its share is not very high: the prospective study we made about the effect on healthcare employees indicated an additional difference of approx. 14 percentage points in accepting the vaccine between the staff with the highest level of education and the one with the lowest level. Given that the difference lies on either side of 50%, its explanatory power is reduced (for example, it remains to be explained how about 40% of employees with the highest level of education are in the area of vaccine hesitation). If we notice that in question is the difference between the categories of staff who have medical training and those who don`t have such training, then we find that the explanatory power of the education level could be even lower (especially if we add that exactly the category with the highest level of studies in the medical sector registers a level of vaccine hesitation of 40%). However, there is an additional element that needs attention: the explanatory power of this short presentation about the healthcare situation must be weighed by the very high impact of the immunity acquired as a result of the infection (which is unknown).

3.2. Epistemic failure

Navin (2016) uses the concept of epistemic failure for people who deny vaccination, without implying that all those who are vaccinated are in a situation of epistemic success (their decision may be determined by other

causes). Epistemic failure is represented by sub-optimal choices. Although the concept of epistemic failure makes sense in relation to a model of epistemic success, it doesn`t imply obvious responsibility, as is the case with epistemic defect or (to a lesser extent) cognitive biases.

Beliefs determined by epistemic virtue don`t mean the same thing as being right (Cassam, 2017): cognitively correct behavior can lead to false beliefs due to the way information is distributed in the environment. In such a situation, the problem is the structuring of environmental information, including official information. The structure of epistemic communities is one of the investigation directions.

The stubborn mind also seems to be part of the explanatory diagrams specific to epistemic failure. Goldenberg (2021, p. 54) indicates a series of studies suggesting that vaccine opponents are unable to understand the rational arguments behind the need for this procedure, as they are stubborn in maintaining their position. Motivated reasoning seems to be one of the possible explanations for maintaining the initial position or even increasing the resistance to its change.

3.3. Irrationality and ignorance

How should we treat a person who is afraid of getting vaccinated? To whom all the information in his environment or the way how he was taught to trust it and organize it to make a decision, outline an area of uncertainty about the vaccine, wide enough to generate fear against the vaccine? Judging others behavior from the perspective of the situation in which we find ourselves, regardless of their cognitive trajectory and the context in which they find themselves, could be wrong. This type of error is called the curse of knowledge (Kennedy, 1995) or the curse of expertise (Hinds, 1999), being known or at least intuited by any good teacher. Its awareness leads us to carefully analyze the situation, taking into consideration the multitude of positions and cognitive perspectives in which different people are.

Citizens are caught between official communications and (anecdotal) information provided by their own experience, being forced to choose between the data they obtain and the information published by experts. It is added that from the perspective of effects, the data aren`t perceived as having an identical cognitive weight. Most often, this situation tends to cause them two types of cognitive behaviors: selective exposure to information and active search for information that confirms the theory.

3.3.1. Irrationality

The fundamental assumption under which people who are hesitate to be vaccinated are often placed, is the one of the behavioral irrationality. The intervention of irrationality in the causality of vaccine hesitation can be more easily understood by analyzing some of the models of irrationality proposed by social psychology, behavioral economics, neuro-cognitive sciences, and so on. For example, we suspect that we can use relatively easily the conceptual framework specific to cognitive dissonance or loss aversion (perspective theory) to generate explanations applicable to some of the situations responsible for vaccine hesitation. If we consider that irrationality provides a relevant explanatory context for vaccine hesitation, then we should identify its specific capacity and limitations.

As a principle, we can consider that there are two relevant positions regarding the role of irrationality:

• The enlightenment perspective, this considering that irrationality is related to an avoidable cognitive deficit of the human.

• The realistic perspective, which accepts that irrationality is naturally part of human ways of being, in some cases its existence being justified by context. For example, if rational behavior involves very high costs in terms of very low benefits or risks, then that behavior can be considered appropriate from an adaptive perspective. In fact, the problem is much more complicated than that, one of its ramifications being to judge the rationality of a behavior from the perspective of the environment and the available cognitive resources.

We already know that we, humans, are often the victims of irrational behaviors, and there are many attempts to describe and classify them. Some of the contemporary cognitive theories can give us a more appropriate perspective on this dimension of the human being, an example being the Error management theory (EMT). EMT starts from the idea that the way people think and make decisions, using heuristics and cognitive biases, could be incorporated into our brain structure along our evolutionary path. The practical essence of the theory is the need for training based on making and identifying such errors, reflection on their causes and possible solutions to avoid them in the future.

Admitting an area of human irrationality and identifying cohabitation solutions with it can influence the adoption of appropriate attitudes to reduce the share of vaccine hesitation.

3.3.2. The (intentional) production of ignorance

This era seems to want to change the opinions` ontological status (without being able to change the cognitive one). Somehow, we are called to rely on our own opinions. Because one of the nightmares of the market economy is the absence of consumption, an entire social machinery is destined to mobilize us to consume. Our consumption is conditioned by individual decisions. That is why the social impulse to consume focuses on our belief that we are competent in making decisions. The whole social mechanism meant to build us the illusion of cognitive and decision-making competence, can be considered part of the induced ignorance. The market economy includes a dose of buyer delusion, based on his inability to behave rationally in certain situations. If we find that there is an area of social efficiency of cognitive limitations, then we can ask ourselves how much dose of ignorance is needed for the proper functioning of the consumer society. This gray area of social rationality must be taken into consideration into the analysis of the causal factors of vaccine hesitation.

Danelon (2015) states that corporate science often deliberately produces ignorance in an effort to promote corporate interests, silencing people who are vaccine skeptical. From the arguments on corporate commercial interests regarding the increase of vaccine use (Danelon, 2015) we note the need for a prudent approach to the problem, actions consistent with this variant couldn`t being excluded in the case of vaccines against SARS-CoV-2. Moreover, the hypothesis with the greatest explanatory weight in the causality of the vaccination hesitation that we support, respectively the lack of confidence, has a degree of coherence with this interpretation.

Commercial determinants of health indicate the set of commercial mechanisms that influence individual health decisions. The main mechanism used when citizens face scientific data is doubt (Tomori, 2021). Studies on agnotology (induced ignorance) indicate some classic cases of such approaches, the best known being the one related to the tobacco industry. Danelon uses and develops research on agnontology in the direction of vaccine hesitation, a term originally coined by Robert Proctor (1995), with another public health issue: the effects of smoking and the attitude of corporations on this topic. Proctor develops the idea in a volume of collective studies (Proctor & Schiebinger, 2008) that tries to consecrate the use of the concept and the relevance of the corresponding reality.

The problem of producing ignorance can also be analyzed in the specific horizon of the asymmetries in continuous accentuation that characterize the contemporary society. Some of these approaches can be found in the section about the motivated distrust in this article. The social

production of ignorance (intentional or implicit) is part of the picture of the causality of epistemic vices. To this, we believe we should add the social reproduction of ignorance.

3.4. Cognitive biases

In agreement with Mark Navin (2016), who states that cognitive biases can`t outwork the explanation for vaccine hesitation because they equally affect people who are vaccinated, we note the influence of biases in terms of their partial relevance in generating explanations, analyzing some of those we consider relevant. It is also important that biases can register a community transmission, thus becoming specific to that community (Demichelis, 2018, p. 92), one of the effects being the specific community pressure on individual knowledge.

Risk aversion is a form of information-induced asymmetry, with the potential loss generated by the risk of vaccination having more weight in decision-making than the potential benefit. The analysis of the situation must simultaneously take into consideration other distortions of the information that influence the perception of risk: a) the oversizing caused by the narratives that have as subjects' people who suffer (or seem to suffer) the negative effects of the vaccine; b) the under sizing of the vaccination benefit, generated by the specific ambiguities of uncertainty and understanding the concept of safety in the medical world.

Passive choice or omission bias (Demichelis, 2018, p. 74) indicates situations where the risks associated with the action are perceived as having a greater weight than those associated with the inaction (even if they are equal). The status quo bias seems to reflect the situation more adequately. The inertia of choice (status quo biases), expresses the desire to maintain the current situation, refusing a new choice (Demichelis, 2018, pp. 136-138).

The bias of the present indicates the inconsistent allocation of benefits favoring the present; greater importance given to the present than to the future. Facial competence, based on the tendency to judge a person's competence according to their face, is also relevant in the causation of vaccine hesitation.

Steven Pinker suggests (Pinker, 2021) a new meaning of the formula "bias bias": to think that everyone is affected by bias except you. This interpretation is different from the one given by Brighton and Gigerenzer (2015): "The bias bias: To suffer from the bias bias is to develop, deploy, or prefer models that are likely to achieve low bias, while simultaneously paying little or no attention to models with low variance." Vaccination hesitation can be explained in some cases by "bias bias".

3.5. Epistemic vices

Meyer et al. (2020) states that epistemic defects may predict the acceptance of misinformation on COVID-19, thus suggesting that they should also be considered as an explanatory hypothesis for vaccine hesitation. There are several attempts to construct a hierarchy of epistemic vices. The use of the evaluation scale proposed by the authors (Meyer et al., 2021) to test this hypothesis (Rotilă et al., 2021b) has so far not provided confirmatory data, tending to raise additional issues regarding the validity of the deficit model.

3.6. The limits of the deficit model

The deficit model is rejected by a large number of studies, the best known being the one conducted by Nyhan et al. (2014), who indicated that strategies based on the deficit model, focused on information and education, are ineffective, with the risk of the opposite effect: amplifying the opposition. We can see here some of the problems of the deficit model: the failure of the place that understanding occupies in the behavioral economy of different people, the fact that it doesn`t take into consideration the multiple factors that influence understanding, the use of simplified human model.

The fact that most people who are hesitant about the COVID-19 vaccine don`t refuse the tetanus vaccine is another argument against the reductionism involved in the deficit model, indicating that vaccine hesitation should be considered in relation to the characteristics of each vaccine and its specific social context. One such example shows us that the problem isn`t related to a lack of rationality or knowledge about vaccines in general from the part of these people.

We consider that the deficit model is a misinterpretation when it`s assumed as unique or dominant hypothesis related to the PERV set. However, all the explanations that take into consideration the deficit model must be included in the broad spectrum of the explanatory hypotheses, as they can provide partial explanations. In addition, the deficit model requires a careful analysis of each cause because they have different potential for intervention in determining vaccine hesitation. Because the PERV problem is context dependent, we assume that the causal weight of each category of deficit may also vary by context.

4. The trust

It is well known that vaccine hesitation is generated by low public confidence. For example, the definition of vaccine hesitation given by the

WHO Strategic Advisory Group of Experts (World Health Organization, 2014, p. 17) includes its dependence on specific contexts, the three Cs (complacency, the willingness to follow a predetermined schedule, determined by the perception individual risk and value of vaccines (convenience, refers to vaccine accessibility; confidence/confidence in vaccine efficacy and safety) includes the issue of trust. Trust in science, authority, institution and experts must be seen in this broader context of an inadequacy of social organization.

4.1. Pre-existing distrust

Vaccination against SARS-CoV-2 occurred in the context of a pre-existing distrust of vaccines, the issue of interpretations on the basis of MMR being the headline. It is relevant to the current context that in the study published by Andrew Wakefield and co. in 1998, which erroneously indicated a causal link between the MMR vaccine and autism, vaccines were generally linked to the risk of impaired thinking. The threat of 'less than human ' (derived from a standard of normalcy) poses a sufficiently strong risk to attract attention. Explanations based on alleged human misinterpretation tend to be easier to understand and blame than those that involve chance. The former seems to reduce uncertainty, generating an amplification of the feeling of control, the latter being consistent with the sense of progress. An evolution of science in the conditions in which it brings with it the highlighting of an area of our inability to control seems difficult to understand. Blaming one's peers or one's own person generates the illusion of increased control, while being consistent with the hyper-empowerment of individuals and communities, specific to contemporary society. It should be noted that this is a mechanism for generating the illusion of control present in some religions as a model of the causal relationship between sin and the events suffered by the person.

4.1.1. Decreased confidence in experts

We live in a period that seems to be marked by a decline in trust in experts (Nichols, 2017). Even if the causes are not clear, the lack of confidence in the experts has its effects.

Starting with the Enlightenment, thinking for oneself begins to become a cultivated virtue in society, the last decades registering an unprecedented accentuation of this trend. By its mass aspect, vaccination contradicts this existential imperative, seeming that it suspends the freedom of individual decision where it is mandatory or that it puts significant pressure where vaccination is optional. Epidemiology is a field of existence in which success depends on the possibility of collective decisions and

behaviors, serving social interests. The prevalence of social interest does not cancel out the problem as such, especially for people in such a cognitive position. The problem is accentuated by the tendency to turn vaccination into a political symbol, it generating reactions accordingly, the most important being the overlap of the political opposition with that of resistance against vaccination. With every politician in power and involved in the vaccination campaign, the risk of such attitudes increases, the main cause being the camouflage of the fact that this is an area where the decision of experts has a much greater epistemic weight than individual decisions

Because in the case of the vaccination in question is a mixture of individual and social interest, medical professionals suffer a slight change of status: they tend to slip discreetly to the position of authority, leaving aside a part of the exclusive representation of the individual interest. In a pandemic, a large number of health professionals are pushed at various times to the status of medical authorities interested in public health. This change in status affects their credibility. The damage is even greater as the citizen's concern for the public interest is lower. Reactive mechanisms to public ownership over the past three decades in the former communist states could help to explain the lower share of vaccinated people (via the impact on public interest confidence).

Reducing the problem to experts vs. novices do not prove to be an effective approach because it is not only the medical expertise that matters, but the set of competencies that belong to the understanding of the society.

Confidence is also impaired by the lack of safeguards specific to guarantees: from the fact that the producers or suppliers cannot be sued in case of side effects, the citizens deduce that there is something wrong with the vaccine.

4.1.2. Social capital

A form of assessment of the impact of trust on society is the reference to social capital, its magnitude being a direct indicator of the level of trust in a society/community. Institutions have a special place in the variations of this indicator, often playing the role of catalysts of trust. The level of trust of citizens in institutions is directly reflected in the social capital. To the extent that this assessment is correct, the vaccination hesitation could be inversely proportional to the social capital, with the level of confidence playing a causal explanation for the extent of the vaccination hesitation. Consequently, the variables that cause the deterioration of the social capital or do not allow its amplification can be analyzed from the perspective of their role in determining the vaccination hesitation.

4.1.3. Trust in science

The social responsibility of science is one of the key variables for the existence of trust. The elitist orientation of scientific knowledge present in some societies (visible, for example, in the near absence of the orientation towards solving the daily problems of the majority of citizens) alters the trust in science. Goldenberg (2021) argues in favor of the important role that trust plays in the relationship between scientists and society, vaccine hesitation being also influenced by the level of trust. Moreover, in the analysis carried out by (Goldenberg, 2021, p. 176) trust in science occupies the dominant place in the variables likely to cause vaccine hesitation, distrust being generated by the failure of the relationship between science and the public. This explanatory paradigm should take into account some issues specific to Romania, such as the doctorates of politicians, the privilege of religion over science. We believe that the distrust in science and its associated institutions is a hypothesis with great explanatory power in the case of the differences between Romania and the Western States regarding the share of people. Nor can we rule out "political contamination ", as politicians' intervention in the specific problems of science can contaminate science with distrust. Approaching the issue of scientific knowledge by politicians have the of risks turning it into a political issue, leading to public reactions.

4.1.4. Politicians have subrogated the social function of scientists

The politicization of the problem amplifies the divergences, making vaccination a political battlefield and generating a reduction of trust. The confusion of competencies also marked the political area: from the fact that they have to decide (to exercise their political authority) politicians deduced that they know what they have to decide even in an epidemic context (cognitive competence). Promoting vaccination by politicians carries the risk of transferring the negative image of politicians to the vaccine. Ease of access to doctorates (failure to comply with scientific rigor), amplified by an increase in distrust of experts, further complicated the problem, accentuating distrust of the authorities.

4.2. A classification of distrust

For clarity, we will continue to try to construct a short classification of mistrust, illustrating each of the categories with a few examples.

4.2.1. Justified distrust

By justified distrust we mean those types of causes that justify the distrust of citizens. Poor communication on the vaccine was already responsible for many adverse reactions (backlash) before the onset of the

pandemic (Danelon, 2015, p. 75). There are other issues that justifiably cause distrust (from a citizen's perspective), the most important being the absence or limitation of liability for the adverse effects of SARS-CoV-2 vaccines. We must note that citizens are called upon to take risks on their own, invoking the public interest and, to a significant extent, the individual interest. If this position of the authorities is determined by uncertainty then we find that the risk strategies of people in a situation of vaccination hesitation are relevant cognitive positions.

On a broader scale, we can speak of a level of distrust in science determined by the perception of reduced access to its results, by the perception of some forms of political confiscation or in its commercial interests. The negative impact of financial interests on science (Goldenberg, 2021, p. 143) called the commercialization of science must be considered as a reason for justified distrust. The increasing entry of medicine into the business world also amplifies mistrust, especially because of the conflict of interest (the patient's health interests versus profit interests). The increased monetization of medical services is one of the generators of mistrust and, consequently, of vaccine hesitation.

4.2.2. Motivated distrust

Motivated distrust refers to those types of behavior that, although they are rather unfortunate accidents, are perceived by some citizens as reasons for distrust. Unlike justified distrust, that is based on objective reasons for distrust, motivated distrust is based on either errors (which are exceptional) or accidental deviations from standards.

The various dysfunctions of the medical community have contributed to the cultivation of a dose of distrust of society in experts in this field. Cases of inappropriate behavior or malpractice, the problem of informal payments etc. are standard examples, the indifference of collegial bodies contributing to the hasty generalizations that affect the entire medical profession. Also, the errors that affect vaccination contribute to the maintenance of mistrust, the erroneous information communicated by the coordinator of the vaccination campaign in Romania being just one of many examples.

It is important to remember that vaccination promoters are not without errors, two examples being the testing by Pfizer of the antibiotic Torvan in Kano, Nigeria (1996) and the use of vaccination as a cover to verify the presence of Osama bin Laden.

4.2.3. Cultivated distrust

Cultivated distrust can be intentional or unintentional. From the category of actions aimed directly at cultivating distrust, we are interested in

those aimed at vaccination or medical systems. Relevant is the example of actions taken on the basis of interests in the privatization of parts of the public health system (including the growing distrust of the public health system). Confidence in the medical system and in the vaccination process coordinators is a key element in the issue of vaccine hesitation. Compared to the case study of this article (the vaccination campaign in Romania), the pandemic surprised us with a high level of distrust in the medical body, part of which also affected the decisions taken during this period.

The distrust cultivated in experts also has a secondary meaning, aiming at the failure of the bodies empowered to exercise an effective control of the competence. The best example is the professional organizations of the medical bodies, their main function being to provide guarantees to the public regarding compliance with standards, these being the main point of support of the trust.

Among the causes that unintentionally lead to systematic mistrust, we can mention in particular the rating of negative information.

5. Epistemic communities and cognitive practices

In this section we try to identify some hypotheses of vaccine hesitation by addressing other cognitive perspectives that we consider relevant to this topic.

Free access to knowledge risks often being confused with universal cognitive competence. The problem could be caused by another confusion: the right to choose is considered a cognitive competence, not only in the field of the experts` selection capacity, but also in the matter of issues reserved for experts. This is one of the insoluble problems of democracy, determined by traditional rights and freedoms: freedom of choice brings with it the presumption of competence in the field. However, the rapid change in the environment calls into question the social efficiency of this epistemic model. In the case of vaccination, there is a risk of misidentifying the type of skills needed to solve this category of problems, because there are problems that can be solved by every citizen and problems that are reserved for experts.

The need to choose in terms of vaccination has generated an additional cognitive burden, with many citizens resorting to traditional cognitive solutions. Traditional cognitive hierarchies have proved to be inadequate to make a significant contribution to solving the problems raised by the pandemic. Missing the necessary training in the field of risk/cost-benefit analysis in this area, most citizens have two cognitive resources ready to hand: the use of experts, the use of traditional cognitive resources. Given

that the trust in experts is strongly shaken, a significant number of citizens have found themselves in the situation of solving a highly specialized problem by using cognitive resources that can be used for everyday situations. A set of biases amplified the problem. Because traditional cognitive solutions include those generated within epistemic communities, intervention at this level may have comparable efficacy to vaccine hesitation to restoring confidence in experts.

5.1. Epistemic communities

The importance given to vaccination may differ depending on the membership of one or another of the epistemic communities. Therefore, one of the necessary steps to understand the phenomenon of vaccine hesitation is the discovery of multiple forms of epistemic communities, which have a significant contribution to gathering information and making decisions.

In the literature, the idea of this direction of analysis is based on Kevin Zollman's (2007) article, The Communication Structure of Epistemic Communities, who approaches the issue from the perspective of scientific communities. Even though community social network's function work differently from academic ones (Attwell et al., 2018), the former being focused on support and reinforcement activities, while the latter's communicative practices seem to slip away from the area of enmity, the transfer of the analysis model from scientific communities to other types of epistemic communities may contribute to the generation of explanatory hypotheses relevant to vaccine hesitation.

Epistemic communities allow their members to predict each other's behaviors. In the absence of common epistemic reports (sometimes value-oriented, but most often determined by the assumption of common epistemic standards), the ability to predict is greatly diminished, along with social dilution. As can be easily anticipated, the main generator of the possibility of the epistemic community is the school.

Epistemic communities use cultural knowledge, which involves both the totality of the community cognitive mechanisms we use (community cognitive resources) and the effects of community on knowledge (behaviors likely to maintain adherence to the community are preferred to those based on knowledge).

In the existence of an epistemic community, the epistemic standards assumed by its members are important, the assumption of common standards providing a significant level of coherence. Epistemic standards target the type and extent of evidence required for a statement to be accepted by the community (Demichelis, 2018, p. 104). Epistemic standards

involve the conditions for accepting the risks of false positive (error in accepting statements that are in fact false) or false negative (error in rejecting statements that are in fact true). The efficiency of community epistemic standards regarding vaccine efficacy and risks, inevitably influences vaccination hesitation.

The influences of epistemic communities can also go in the direction of an additional individual accountability: Attwell et al. (2018) suggest that community practices, by focusing on confirmation, tend to strengthen the size of the agency in each individual (especially within CAM), weakening the chance of trust in experts.

Forms of cognitive specialization and adaptations to different types of problems occur in epistemic communities. Addressing the problem from the perspective of network theory could suggest potential criteria for cognitive differentiation between communities. It could aim to identify community cognitive authorities that can play a central role in cognitive support networks, reducing the wrong investment of trust in pseudo-cognitive authorities.

5.1.1. Cultural communities - groupishness

As the problem of vaccination always arises in a social context, we need to take into consideration the specific pressures that our membership in a cultural community exerts. Demichelis (2018, p. 69) indicates three influences exerted by groupishness (our commitments in a cultural community): (a) we tend to reject beliefs that would force us to restructure our cultural identity; (b) violating cultural values generates negative feelings, and we are inclined to reject beliefs that would cause us to experience negative emotions; (c) When choosing experts, we tend to trust those who share our values. The existence of these influences makes relevant the analysis of the social function of knowledge.

5.1.2. The social function of knowledge

In the analysis of vaccine hesitation, we can`t rule out the possibility of specific pressures from the environment and the membership networks, which could bring risks to the integration, in the event of decisions taken different than the group. If we can observe the existence of situations where the pressure of the community causes suicidal gestures or terrorist attacks, then we can understand that in some cases it plays a sufficiently important role to be able to intervene in the vaccination decision equation. The pressure exercised by the community in favor of similarities could be even higher in the case of vaccination if it slips into the area of symbolic, defining behaviors to indicate similarities or differences. In such an alternative,

together with the risks specific to the absence of vaccination (whose perception is mediated/distorted by group-specific mentalities), we must add the risks associated with rejection. Such cumulation of risks significantly changes the judgment criteria of decisions.

Here are some examples of pressure from current social models that may influence vaccine hesitation:

• "Decide on your own/with your own mind!", is a form of pressure that brings with it the implicit need to differentiate oneself from others. The behavior specific to vaccine hesitation is different from the one of the vaccine compliances. In debate is the pressure of subjectivity as a difference.

• The hyperbole of individual expertise reduces the importance given to experts in favor of the decision based on individual cognitive skills and abilities.

• The multiple social protection systems generate the exaggeration of the confidence in one's own decision-making capacity. Along with the side effects of exaggerations specific to political fairness, they cause specific pressures to cancel negative feedback in case of wrong decisions. The absence of skin in the game removes individuals from the consequences of their own actions, generating an indistinction of the effects of individual decisions.

As we have shown in the analysis of trust, vaccine hesitation develops, to a large extent, against the background of the trust structures dissolution, trust in experts being one of the examples. Confidence influences vaccination, which in turn is influenced by vaccination. In this regard, we should also ask ourselves how high the risk of forcing vaccination is to affect something in the structure of social trust.

From the perspective of vaccine hesitation, epistemic communities are relevant both in terms of the resources they provide, as in terms of the difficulties they may generate.

5.1.3. Insufficient cognitive resources/available cognitive models

The analysis of epistemic communities shows that any community must be understood from the perspective of the cognitive models reserve that it puts at the disposal of its members, thus facilitating their existence. Cognitive patterns help to solve everyday problems or positions in the face of the unknown, that members of the community must adopt. The use of community cognitive models meets different needs:

• Ensures the existence of references to verify their own decisions.

• Provides channels for expressing solutions proposed by experts or used by community leaders.

• It`s one of the reference areas for verifying compliance with community practices (proof that a person is one of us, not a stranger).

• Generates the construction of handy solutions that meet the goals of cognitive economy or cognitive difficulty, in conditions of varying the level of cognitive accessibility of the problem and the solution.

5.1.4. "Transcendental contamination"

"Transcendental contamination" refers to situations where there is confusion of cognitive competence, with people/institutions competent in matters of transcendence, sometimes being considered (or being themselves considered) cognitively competent in infectious diseases/epidemiology. Obviously, the most important risk came from institutions specializing in religious issues.

The integrative explanations provided by religion risk conflicting, in the context of the pandemic, with public health interests. Because religion can give meaning to both life and (especially) death, the traditional social solutions that religion proposes, as alternatives to the scientific ones, avoid the possibility of verifying their effectiveness. From the moment the "skin" of each of us either survives in the other world or becomes non-essential, being "absorbed by the soul", it is no longer at stake, being deprived of the opportunity to learn from our own experience. Replacing the possibilities of highlighting our mistakes with "That's how God gave it!" generates behaviors inconsistent with those recommended by the public health interest.

Part of the problem is the confusion between believing and knowing. The difference partially overlaps with that between opinion and knowledge. To believe something is, by definition, different from knowing that something. Our push to consume is going through hiding this difference. The same change in the status of the two cognitive positions is called by the religion. We could even consider that it was prepared by religion, the belief in the validity of people's beliefs being essential for any religion.

Taking over cognitive hierarchies in the field of theology (given that the doctorate is the symbol of a scientific cognitive path, it is difficult to understand the purpose of the doctorate in theology, as an independent form; it can be interpreted at most as a specialization in the history of theology) to "transcendent contamination". Although it presupposes forms of skill acquired through mechanisms related to the sphere of education, competence in a religious belief doesn`t represent knowledge in the scientific sense of the term, but in a social one. The moment we forget the differences between these forms of cognitive specialization we miss the cognitive grip on reality.

5.1.5. Why do vaccinate, the ones that do that?

The narrative of exhaustive cognitive classifications proves its inadequate also related to people who are vaccinated: to consider that they make the decision to vaccinate exclusively because of the correct information and reasoning, is a simplification that misses the structure of reality and causes errors of public policy. Vaccine hesitation strategies are also dependent on understanding the motivation of those who are vaccinated. It is wrong to consider that all those who are vaccinated, do so on the basis of superior cognitive abilities, because the decision to vaccinate also has multiple possible causes. Navin (2016) suggests that some people who get vaccinated are influenced by the mainstream specific to their community, the decision being rather one to proceed like the majority or to trust science. Their choice is more robust, based on the characteristics of the decision made by the majority they chose to follow.

Let's not forget that we live in the age of the consumer society, a good part of our decisions being formed by the policies and marketing strategies specific to consumption. Equally, we should not miss the influence of this social way of being on vaccination policies, the risk of overvaluing the importance of the vaccine compared to other solutions (immunization by disease I think is the most relevant example) being significant.

We can`t deduce the structure of the decision (respectively cognitive making) only on the basis of behavior. At the same time, however, it is relevant to note that from the perspective of the public interest the behavior weighs much more than the decision underlying it, the last one entering the area of interest of vaccine hesitation if the socially desirable behavior isn`t practiced by the number of citizens needed to generate herd immunity.

5.2. The impact of cognitive practices

5.2.1. Insensitivity to relevant information

The vaccination decision contains a number of statistical problems that are difficult to translate into everyday language (Demichelis, 2018, p. 137). The lack of perception about the dangers that vaccines prevent, requires a reclassification from the perspective of changing the structure of existential environments. The emergence of ultra-protective environments (compared to traditional threats) can have the adverse effect of camouflaging information essential for survival. Intensely artificial existential environments are problematic in terms of the relevance of the information they contain. This is one of the essential theses of the article, it going beyond the traditional approaches based only on cognitive biases and epistemic vices. The problem is the emergence of poor media in relevant information, one of

the causes being the lack of feedback. We are somehow "bitten" by our own (overly) protective attitudes against humans. The lack of some existential risks hides the relevant information, anonymizing them in the mass of information flows with quasi-equal densities. In the end, we find that the absence of existential risks in some areas generates other categories of existential risks in different areas. The protection provided by vaccination for more than a century, has taken the form of the insensitivity of some citizens for the characteristics of the protection offered by the vaccine, the last one becoming an existential risk in the new context.

New environments give birth to new cognitive styles, focused on ultra-specialization, characterized by the concentration of the mind on narrow domains. It is a shift of mind from its traditional evolutionary roles that disrupt existential decisions. The new structures offer experts as a solution to support vaccination-specific decisions. The deterioration of trust in experts, generated by the decision-making power of each person (an effect of marketing and virtual media), makes this decision-maker ineffective in many cases.

5.2.2. Cognitive accessibility

The accessibility and level of difficulty in understanding the information is, in some cases, an important factor in determining vaccine hesitation. Ordinary citizens with easy-to-understand information specific to CAM or religion tend to become reluctant to functional explanations that they do not understand. The epistemic need for the existence and development of specialized languages (possibly doubled by some communication disabilities) tends to go against the purpose of action in such cases.

5.2.3. The cognitive parasitism

By cognitive parasitism we mean those types of social interventions that have the effect, intentionally or unintentionally, of substituting other models/cognitive resources in different communities. For example, television (especially) for the rural environment, online social networks for the urban environment have the potential role of cognitive parasitism. Under discussion is the intervention of these pseudo-cognitive resources against the background of the absence of efficient community cognitive structures, respectively the dilution of trust in traditional cognitive authorities.

5.2.4. Amplification (unnecessary of) uncertainty

Moving scientific debates in the area of communities specializing in public space, often risks increasing uncertainty. Public dissent between people identified as belonging to the category of experts takes on a different interpretation in the public sphere: when two novice experts contradict each

other, it lacks the ability to discern the difference in competence between the two of them (responsibility belonging to the expert community). A specific feature of scientific knowledge (taken from critical thinking) is the critical reporting to the cognitive proposals of community members. This feature of the rarity of consensus on certain issues is difficult to accept in societies where dialogue and lack of understanding of how science works are lacking.

Another dimension of the problem can be identified in the level of adherence of the medical school to evidence-based medicine (in an easier to understand reformulation: in the level of training specific to the medical school; only that it`s difficult to identify the contribution of the medical school in the context the existence of additional disruptive factors). What is certain is that the medical epistemic community has proven a number of dysfunctions in transmitting information and scientific beliefs about the pandemic to all its members.

5.2.5. Dr. Google

"Dr. Google" indicates the confusion between free access to information provided by the online environment and access to knowledge. Simplifying: information doesn`t mean (automatically) knowledge, the last one requiring the ability to identify information relevant to each category of problem or problem to which certain categories of information are applicable. It isn`t necessarily the fault of the citizens in question, the problem being generated rather by the rapid change of the cognitive characteristics of the environment (more precisely by the emergence of an environment dedicated to information).

5.2.6. Too high epistemic standards

Examples of epistemic standards inadequacy are the need for unequivocal evidence that the vaccine protects all vaccinated individuals without harm (provided that science indicates an increase in the level of protection resulting from vaccination) as well as the proof that the vaccine is 100% safe. The problem of changing epistemic standards is indicated by Demichelis (2018, p. 105).

5.2.7. (In)ability to separate the reality areas

Financial or social success has been assimilated with cognitive competence in the area of science, missing the fact that some successes can be explained by chance or risk-taking (including those derived from the violation of social norms).

5.2.8. The dogmatism

Dogmatism is a weak explanatory hypothesis because vaccine hesitation often involves opposition to official explanations, which involve a form of engagement in the dispute with them. These people aren`t simply stuck in their own perspective, but strive to defend it by exploring (the weaknesses of) the official presentations (Cassam, 2021). A weak form of dogmatism is involved even in this type of behavior.

5.2.9. Epistemic injustice

The difference in community cognitive resources available to citizens, the effects of decisions influenced by epistemic communities, and the way how individual decisions are judged by the community, bring into question an ethical analysis of the problem. The ethical framework of evaluation also includes the issue of epistemic injustice: to consider that a person has a wrong cognitive position only by reference to his decisions in a certain context (such as the decision to be vaccinated). A partial argument is the situation of people who get vaccinated (have the expected behavior), but for the wrong reasons (Gettier phenomenon). Given that the behavior is determined by the epistemic community to which the person belongs, the problem of epistemic injustice becomes even more obvious.

5.2.10. The risks analysis

Vaccination hesitation seems to be a wrong cognitive position from a probabilistic perspective, the difference between the two types of positions compared to vaccination being possibly highlighted as a difference in percentages. Or, this is a perspective that is difficult to access for the average individual. In addition, the risks of vaccination don`t affect exactly the same people who are at risk due to the infection. This means that, in the abstract, vaccination carries risks (and) for people who are not at risk from the perspective of infection. At the level of profane individual analysis, the distribution of the unknown seems to be symmetrical. (Obviously, the set of additional risks arising from hospitals blockage weighs significantly in favor of vaccination.) It is relevant that people tend to focus on the presence or absence of risk rather than on risk assessment relative to the situation (Goldenberg, 2021, p. 41)

The decision to vaccinate is hampered by the unnatural burden of unilaterally taking risks. Although the existence of risks is officially recognized, the protection mechanisms in case of their occurrence are missing. This is one of the asymmetries of vaccination.

The difference between the general safety of the vaccine and the individual safety is also relevant in terms of risks and risk perception (Goldenberg, 2021). The safety level of the vaccine can generally be

considered acceptable. But this general approach takes a different form at individual level: "Is the vaccine safe for me?". Although the incidence of risks is statistically low, the few information existing about the situations where these risks occur, changes the perception of their likelihood at the individual level. Since it isn`t a random distribution of risks, but a correlation of them with certain pre-existing biological variables, the desire of citizens to know if the vaccine is safe in their case is justified, while complicating the picture of risk perception and need for evidence. Every citizen would like to know if the risks associated with the vaccine are actually higher than the risks associated with the infection. There is a significant information asymmetry between what people know about them (or think they know) and what medical officials know about those people. In this context, seems legitimate the question: "Is individual betting as wrong as social betting?"

Anecdotal evidence has a different epistemic weight. When a citizen deduces that the risk of serious illness is low in his case, based on the examples of infected people who haven`t had a serious form of the disease, he is in a weaker epistemic position than when he uses as a reference the situation of his relatives (with who has in common part of the variability of reactions depending on the genetic field) or his friends (with whom he shares a number of predispositions specific to those that can be transmitted on the network).

6. Case study: the vaccination campaign from Romania

The vaccination campaign in Romania is the implicit theme of the critical approaches developed in this article and the proposed solutions are related to it. From the point of view of concern about vaccination hesitation and the results obtained, this campaign can be considered an example of failure. The central idea of the campaign was a mass vaccination clinical blitz (MacDonald et al., 2021, p. 30), based only on a good logistical organization of vaccine distribution and administration. The authorities behaved as if all Romanians couldn`t wait for the vaccination, the evolution of vaccination in the first months of the campaign strengthening this illusion. There has never been a coherent strategy that includes the issues of vaccine hesitation and vaccine denial, being a pseudo-public policy by industry standards. Privileged vaccination in the first stage has contributed to growing mistrust.

The authorities were aware of the importance of the medical staff attitude, but they never had a coherent policy in the field. Moreover, although they were informed of the relatively low level of vaccination of health workers (Rotilă et al., 2021a), they preferred to hide the problem through false reports (probably considering that the image of success will determine its appearance). The failure of interventions in this area has

proved very costly, with some of those who should`ve been persuaded by an action actually becoming promoters of anti-vaccination.

7. Some recommendations

The multitude of factors involved in determining vaccine hesitation generates the need to understand that a continuum of positions that start from total refusal and that could reach the request for information and support to be convinced (Demichelis, 2018, p. 39). As a result, interventions aimed at increasing the share of vaccinated people share the same distribution, as actions focused on a single cause (usually information) are not enough.

Many of the ideas and analyzes presented in this article suggest a number of recommendations. Before pointing out a few additional problems, given the special nature of some recommendations, we think it`s useful to reflect a little on what we should want, i.e., the ideal goals.

7.1. How do we set the ideal goals for vaccination?

In principle we can speak of the use of two landmarks:

• Vaccination of all citizens - a goal that is easy to understand but very difficult to achieve. In addition, in many cases it may not even be necessary.

• Herd immunity - a goal that seems more realistic, but which contains a high dose of inaccuracy. In addition, this goal has a high degree of consistency with the free rider phenomenon.

It`s good to keep in mind that the wrong choice of the objective can prevent the share of vaccines from increasing; the choice of the ideal can affect the real possible.

7.2. Examples of good practices

The best recommendations are the examples provided by other states, which are well related to the standard of evidence-based public policy. Relevant may be the strategy to increase the level of acceptance of vaccination, proposed by MacDonald et al. to the Canadian Government, indicating as relevant the following problems of vaccine acceptance: knowledge, beliefs and attitudes; social networks; communication environment; the impact of COVID-19 on the community (specificity of the pandemic context); cultural and religious influences; organization of the health system and public policies at the community level (MacDonald et al., 2021, p. 67).

7.3. Nudge strategy

In this strategy, the architecture of choice plays an important role, our decisions being often determined by the nudges that the specially built stimulation structures offer us. Interventions that aim to change behaviors must focus on the design of the choice and the necessary nudges in the desired direction. The authors who proposed this model (Hertwing & Grüne-Yanoff, 2017) state that nudges guide individual choices while maintaining freedom of choice in other areas. This is a vision close to the paternalistic model, which indicates the hypothesis of a greater compatibility with specific mentalities.

7.3.1. Default rules

The context of the decision can be changed by resetting the options, an example being the procedures used by some states for organ transplantation. They differentiate between the opt-in clause (acceptance must be expressly expressed) and the opt-out clause (refusal must be expressly expressed), the last mentioned favoring an increase in impact. In the case of vaccination, it can be transposed in the form of a mandatory vaccination schedule, officially communicated, citizens who don`t want to be vaccinated being able to do so only by expressly indicating this option (possibly through a bureaucratic procedure). The strategy has a relevant level of efficiency because "nothing is what many people will do" (Sunstein, 2014, p. 9).

7.3.2. Framing

Framing (associated with the nudges strategy) mainly involves the use of biases specific to the human mind. The most successful vaccination strategy seems to be the one based on loss aversion; the set of prohibitions can be associated with a set of losses. We can see that this approach is consistent with the explanatory hypothesis of compliance with the rules, presented in the first part of this article. Obviously, the presentation of all the losses that a person can suffer due to the disease is also in question.

7.4. Boost strategy

Boost (stimulation/impulse) interventions require the improvement of the individual's ability to make decisions. In the literature they are presented as being different from those specific to schooling, it being focused on areas such as good financial decisions, risk assessments, healthy food choices, informed medical decisions (Hertwig & Grüne-Yanoff, 2017). Examples include: (a) short-term: replacing probability with natural frequency in public communication; (b) long-term: a training program which

trains the skills to transform probabilities into natural frequencies. Hertwig & Grüne-Yanoff (2017) provides some examples of the boost strategy that suggests the place of possible critical thinking interventions, all aimed at improving decision-making capacity in areas such as health and finance, both of which include an increase in statistical skills. This approach uses the strategy of using automated decision-making processes-heuristic methods (ecological rationality). It should be noted that it opens up to a new dimension of approaching the problem, being an exit from the traditional paradigm (based on a certain direction of improving thinking).

7.5. Public communication

The pandemic and the problems that have arisen during the vaccination campaigns have revealed a category of problems that have benefited from a low level of awareness so far: the difficulties of implementing knowledge. It`s a new field of intervention that seems to be emerging between science and society. Proctor and Schiebinger (2008) indicate the need for a new science aisle as a solution to cover this distance.

In general, a communication campaign on reducing the share of vaccine hesitation requires a cautious approach to the issue, avoiding antagonistic situations and hasty labeling. It involves a campaign focused on values rather than information, involving the invocation of many of the values and behaviors of community members in an attempt to eliminate vaccine hesitation from that cultural closure (Goldenberg, 2021, p. 72). The model may be the "I immunize" campaign from Australia (Attwel & Freeman, 2015). It also involves focusing on overcoming the cognitive dissonance that can occur between vaccination and choosing different values/lifestyles, by designing an identity that includes both those values/behaviors and vaccination (a form of reframing). Demichelis (2018, p. 144) recommends the communication of information in the forms most easily understood by the human mind (privileging the absolute rate - whenever a risk increases, for example - over the relative one). Targeting evidence in communication works better than summarizing the presentation of scientific evidence. There is also a need to differentiate between wrong information and misinformation. Although the effects may be similar, each of the two categories of problems has different solutions.

7.6. Stimulating risk acceptance

Săvulescu (2021) suggests that the best solution for overcoming some of the barriers to vaccine hesitation is the introduction of financial incentives, this being a much more appropriate alternative to the mandatory

vaccination. We believe that the acceptance of risks can also be stimulated by the introduction of compensation for possible damage caused by the side effects of the vaccine.

8. Conclusions

In the introduction I mentioned that the main objective of the article is to understand the phenomenon of vaccine hesitation. The multiple variables presented must be treated as explanatory hypotheses, remaining the burden of proving their causal contribution, i.e.: the weight of this contribution where there is evidence of a causal determination. We thus try to avoid the risks of oversimplification by resorting to a single causal hypothesis. The enumeration of the multiple variables that can have a causal role is meant to highlight the complexity of the problem, while generating the necessary perspective for a set of appropriate public policies. We cannot claim to have exhausted all the causal hypotheses, the approach aiming at identifying those that we considered more important after going through a good part of the specialized literature and a level of knowledge of the specific mentalities of the community that is the object of the case study.

The absence of evaluation of each of the explanatory hypotheses through research reduces the likelihood of interventions with guaranteed efficiency. Given that time is a significant variable, we believe that the best solution is to design interventions based on pilot studies, designed to verify practical effectiveness. Such a procedure would also take into account the fact that the "one size fits all" rule is not applicable.

If we look at the issue exclusively from the perspective of measures aimed at maximizing the number of vaccinated citizens, there is, of course, the solution to compulsory vaccination, which makes irrelevant debates on vaccination hesitation. However, the implicit costs of such an approach must also be taken into account, as they increase over time. The hesitations of decision makers (caused by uncertainty) contribute to the increase of mistrust. Our recommendation is voluntary vaccination combined with increased interventions to reduce the level of vaccine hesitation.

Too much emphasis on ignorance in explaining vaccination hesitation risks leading us down the wrong path from the perspective of possible interventions. It should be noted that insofar as vaccination hesitation is an indication of ignorance, it is part of a broad set of similar social behaviors. An essential feature of these types of behaviors is the high level of resistance, with public policies designed to correct them having limited success, depending on long periods of time.

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