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ORIGINAL ARTICLE

Contrasting information disorder by leveraging people's biases and pains: innovating in the post-truth era

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ABSTRACT

Disinformation and misinformation have been around since the advent of the media. Many solutions have been developed to contrast this phenomenon such as automated fact-checking tools, media literacy programs, or content moderation strategies. However, these endeavours are limited in scope and easily succumb to the ever-changing online information landscape. In addition to that, the human brain is extremely susceptible to fake contents due to frequent biases and illusory effects. On this basis, the present paper describes the application of slightly readapted design thinking methodologies in tackling information disorder as an unconventional approach to global challenges.

Key words: Fake news; internet; social media; disinformation; misinformation; design thinking.

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INTRODUCTION

Today's world is characterized by mounting information pollution. The term fake news is no longer able to capture the nuances of a more complex and sophisticated phenomenon of distortion of information, which has been therefore termed information disorder (ID) (Ireton, 2018).

Information disorder, together with the suffocating competitiveness of the news life cycle and the steady erosion of the mechanisms of societal acceptance and verification of information – commonly referred to a symbolic efficiency (Zizek, 1999) – has led to the so-called menace of unreality (Westneat, 2017), i.e. the diffused perception that no ground truth ultimately exists, but that personal feelings and beliefs have an equal right to be accepted. This exponential drift to relativity elevates opinions and interpretations to ontologically equivalent alternative facts (Phillips, 2020), regardless of their actual robustness.

The problem of ID has been addressed by public and private actors at multiple levels.

At a high level, these strategies can be grouped into two main categories: those aiming at reducing the supply of ID, and those aiming at reducing its demand.

The majority of the endeavours belongs to the first class, and typically focuses on discouraging the creation of fake or misleading contents through sanctions or demonetization of misleading content (Waddell, 2016), while distribution is contrasted with AI-supported fact-checking and tools for journalists (Donohue, 2019). Also, extensive work is taking place between social media platforms and governments to implement better practices, educational campaigns, regulations and content moderation policies (Newton, 2016).

The second class of anti-ID strategies generally aims at teaching people how to better understand, analyse and verify information, thus cultivating a set of skills and abilities commonly referred to as media literacy (Koltay, 2016).

Such a type of strategy promises to empower information consumers with cognitive tools and healthier information consumption habits, and therefore holds the potential to address ID in the longer term, as opposed to the strategies of the first type, which are more susceptible to failure due to delicate regulatory landscapes, pressing economic interests and technological limitations.

However, the COVID-19 pandemic has caused a massive surge in ID, suggesting how current strategies to contrast the phenomenon are lagging behind the ever-changing profile and dynamics of online information.

The present work investigates how the application to the ID reception problem of more adaptive methodologies such as design thinking can lead to surprisingly different results compared to the current landscape.

Can the combination of a start-up mindset and of modern innovation tools with such complex and multifaceted challenges lead to unexpected and unconventional solutions?

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THEORETICAL BACKGROUND

Despite being the most promising over the long haul, current strategies aimed at reducing the demand of ID in the public have some fallacies and drawbacks.

In fact, the guiding principles of several of these initiatives are deeply rooted in the belief that fake can be often distinguished from true and that facts are the main vectors for such an endeavour. This misses two important points: first, that those contents for which a clear distinction between true and false is possible represent only a fraction of the overall amount of disorder-generating information (Allen, 2020). Second, that facts are easily prevaricated by more subtle agents such as biases and previous beliefs.

More nuanced approaches to the problem embrace media literacy and a comprehensive education as a definitive solution for the problem. Readers can learn to think critically, identify the point of view and the objective of the author, put information in context and recognize techniques and methods which are typical of media production. Although such a questioning attitude can be enlightening in analysing media, this also creates voids in one's knowledge and understanding of the world which simply being more media literate cannot help in filling constructively (Boyd, 2018).

It is here argued that a common trait in all the current alternatives in managing ID might therefore be the lack of significant attention to the unconscious part of information reception and elaboration.

By shifting the attention from the diffusion of ID to its reception and management by the public, more focus has to be directed in understanding how the human brain perceives and processes information, and what the underlying mechanisms are that lead to the formation of false or potentially harmful beliefs, as well as to the action of sharing them.

A review of the current literature on the topic shows how the consumption of information is affected by logical fallacies, confirmation biases, and by an illusory truth effect caused by repeated exposure to fake news (Bowman, 2020). These are well known phenomena which are exacerbated inside the so-called echo chambers (Sunstein, 2008). People also tend to believe things more if those are said by people they trust (Polage, 2020), if they are easier to process (Full Fact, 2020) and if they resonate with their values or prejudices (Full Fact, 2020).

Moreover, the brain has a marked tendency to create thought and ideas patterns to make sense of different pieces of information which are not necessarily in strict relation among themselves, following a process called heuristics (Todd, 2001). This underlies humans' scarce ability to recognize and cope with uncertainty, this being particularly time and energy consuming, and therefore evolutionary disadvantageous.

Beside this, several factors encourage the sharing of information such as the willingness to affirm one's ability to understand information and to feel part of a group with shared values and beliefs (Moulding, 2016). Also, sharing one's own feelings is important. This in turn means that information charged with strong emotional content is more prone to be diffused.

Design thinking can be defined as follows:

> Multidisciplinary, human-centered innovation approach inspired by designers
>
> consisting in
>
> set of principles/mindset, practices, and techniques, […] user focus, problem framing, visualization, experimentation, and diversity.

This user-centric approach can therefore be helpful in overcoming the above explained limitations of current solutions to ID by reframing the current problem of ID reception (Carlgren, 2015; Nakata, 2020).

METHOD AND DATA

In order to validate this hypothesis, an online survey has been used as a technique to connect with potential users and to statistically probe the fit between a design thinking approach and the ID problem.

A survey is defined as the "collection of information from a sample of individuals through their responses to questions" (Check, 2012).

For this particular case, a questionnaire has been used to collect answers from a pool of more than 600 participants on a variety of topics related to information disorder. The choice of the online questionnaire as a quantitative tool allowed to detect the recurrence of the above-explained ID-related biases and behaviours and to easily correlate them to specific target demographics (such as age and education groups), thanks to the use of numerically rated items. Despite being a powerful approach in research, surveys are exposed to sources of error (Ponto, 2015). The two most important sources of error in this case are the coverage error – i.e. the possibility that the target population is not properly reached – and the measurement error – i.e. the errors deriving from the inability of the researcher to stimulate truthful answers, or to formulate the questions in a way that is not subject to misinterpretation. The first type of error has been mitigated by increasing the size of the sample and by accurately defining the target population in order to more effectively distribute the questionnaire. The second type of error has been mitigated by clearly defining the questions and by introducing rating mechanisms and questionnaire items which could minimize the ambiguity, as shown in Appendix A.

As previously stated, design thinking starts from an empathization step consisting in breaking down users' concerns, feelings and pains.

However, for the specific case of coping with ID, pains and needs for the user are atypical. Indeed, while a user could potentially feel confused about a topic or overwhelmed by the amount of existing information, other factors such as biases and instincts far more easily escape any cognitive self-awareness. Despite this, they are perhaps even more crucial in establishing a successful solution.

The survey therefore aimed at exploring three aspects in parallel:

- the overall exposure to potentially harmful content;
- the actual difficulties and discomforts experienced during daily information consumption, such as perceived excessive exposure to information or perceived lack of trustworthy sources;
- the prominence and influence of the abovementioned biases and unconscious drivers in governing the interaction with emotions.

The first aspect was investigated by asking participants to rate how frequently they had heard about some selected claims, and where that happened the most (i.e. on social media, on television, etc.). The claims were previously chosen among widespread fake news or controversial topics about CODIV-19, but were not explicitly referred to as such in order not to influence the opinion of the respondents. Examples are: “Coronavirus was created in a Chinese lab and spread on purpose” or “Injecting disinfectant helps fighting COVID-19”.

The second aspect was examined by asking respondents whether they believed that it was difficult to navigate online information or what their habits were in carrying additional research on the proposed topics. In the first case, participants were given the possibility to rate their agreement - on a scale from 0 to 4 - with some proposed statements such as “There is too much information around and it is hard to understand which sources are reliable” or “I feel I do not have enough competences to form a personal opinion on different topics”. In the second case, participants were presented with some actions typically taken after reading an article, such as doing online research, looking for someone trusted to ask to, or simply stop researching that topic. Subsequently, they were asked how likely they were to choose each of those actions on a scale from 0 to 4, 0 being the lowest likelihood.

The selection of a rating answer mechanism as opposed to a single choice mechanism (i.e. simply asking: “Which one of these actions do you take more frequently?”) has a twofold advantage: on one side, it gives the participants a broader context for them to evaluate and compare their answers within defined perspective; on the other side, it gives the surveyor the opportunity to capture the nuances in the behaviours and to determine if and how the behavioural pattern changes with changing demographic data or habits.

The third aspect was instead probed by asking participants to indicate the most recurring motivations and feelings behind their decisions of sharing contents similar to those selected for the survey, such as willingness to share a content perceived as important or willingness to know others’ opinion. They were also asked to rate the most influential factors that caused them to change their mind or to revisit their opinion in the past, such as receiving guidance by trustworthy friends or being exposed to a counter-narrative with more valid arguments.

Moreover, participants were also asked to indicate which emotions they were feeling upon exposure to the reported claims (anxiety, skepticism, anger). Also, their attitude towards helping or receiving help by others was surveyed by asking whether or not they believed younger or elder people were capable of helping them or whether they had helped someone in the past.

The survey was made using Google Forms in three languages (italian, english and persian) and distributed by the authors. In order to achieve a sufficient heterogeneity in the sample of participants (in terms of geographical area, age, education and culture), the survey was spread on social media, and several people were asked to share that in their own networks, either inside and outside social platforms.

The survey was carried starting on May 16th until May 25th. 630 participants filled it, grouped by age, country of residence, country of birth and level of education. Participants were also asked to indicate if they had children and in which environment they lived (city, town or countryside).

At the end of the survey, respondents were given the possibility to give their email address to participate in a follow-up survey aimed at collecting feedback on the solution under development.

This modified empathization and understanding phase was followed by an ideation phase, during which a tailored solution was conceived on the basis of the previously gathered data, eventually consisting in a mobile app. The path to implementation involved the iterative use of lean prototyping and business development tools such as business model canvas, sketches, storyboards and virtual mock-ups.

RESULTS

Results of the survey first revealed how the totality of the participants had heard at least once one of the claims reported in the survey. Subsequently, a portion of the participants was selected for being the most frequently exposed to the claims based on their reaction to the claims, represented by individuals aged over 25 years and with non-academic education, and individuals over 45 years who received academic education (210 individuals in total, with the most populated segment being the 51-60 age group). Smartphone is the most

commonly used device in the target: 203 individuals stated that they use it to inform themselves "often" or "very often". In the group, even though 60% of the respondents declared that they did not believe in the claims reported in the survey, a non-negligible 18% reported scepticism and need for further clarification. Moreover, it emerged how sharing of the suggested claims was mostly dictated by the intention to let others know or to know others' opinion, evidencing the social nature of the phenomenon. Also, this group of people often thinks that younger people are more capable of navigating the web.

Results also showed how this segment distinctly perceives a serious discomfort and overwhelmingness with the information environment (67%), mainly in the form of an excessive amount of information causing difficulty in finding reliable sources, while also showing strong concern about the presence of fake news. A fact-checked and high-quality news offering was reported as highly desirable by more than 70% of the participants.

When asked to indicate the main sources spreading the reported claims, the most frequent one (26%) was close friends, followed by people in group chats (20%) and friends of other friends (16%). Elder family members were reported to spread more of those claims (11%) compared to other family members (5%).

All these findings suggest how people in this reference target are more likely to experience the effects of echo chambers and a progressive deterioration of the quality and diversity of their information landscape.

The survey also allowed to investigate the most common habits following an exposure to a potentially harmful piece of information, such as one of those reported in the questionnaire. It turned out how the most frequent choice is continuing with online research, usually seeking for an expert's opinion. The second most frequent choice was to directly ask for a knowledgeable person is the participant's network. Easy access to reliable sources in both these categories shall therefore be part of the solution.

As further confirmation, to the question of what made their mind change about the suggested topics, the participants answered that the two most critical factors were contents offering a different view of the argument and trusted persons helping them to reconsider their stance, followed by clear access to evidences.

The mobile app, called *Alfie*, has been conceived with a minimal, enjoyable look, characterized by light pastel tones and simple user interfaces. User experience has been designed to be smooth and effortless. Alfie's shall ask access to users' reading history and social media preferences. Alfie will also analyse users' proactive actions - such as comments, shares and posts - to infer an overall quotient of emotional reaction to ID. This will allow Alfie to formulate a brief, customised newsfeed in which articles are selected from a white list to properly temper the most disputed and emotionally irritating pieces of information the user has been exposed to. Alfie shall also be able to assess the activity of the user's social network in order to compute a ranked list of trustworthy contacts. A trustworthiness score for each contact shall be determined on the basis of existing demonstrations of a good relationship between the user and the contact (for instance, based on the frequency and the type of their mutual interactions) and of the information consumption habits and inclinations of the contact, in a way that score is highest for contacts who simultaneously are – most likely - good friends and healthy information consumers. Based on this, Alfie will be able to show the user some of the opinions of this selected portion of his or her network.

Finally, a user-friendly fact-checking tool based on Google APIs will be made available. Some examples of these interfaces are reported in the figures below.

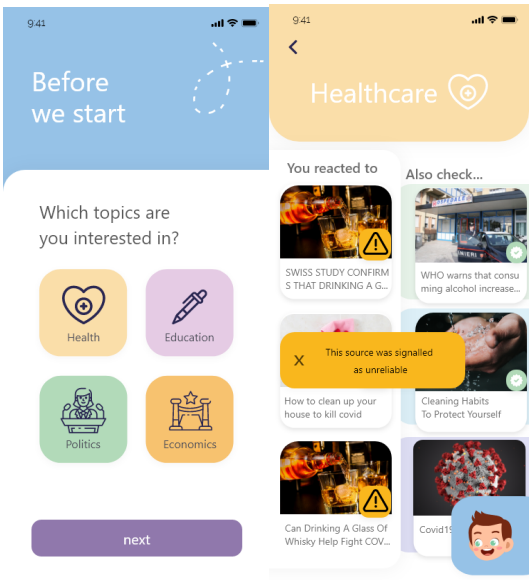

Fig. 1 - Prototype mock-ups: (left) starting set-up page and (right) selection of tailored content based on user experience

DISCUSSION AND CONCLUSION

The recurring presence of discomfort and uncertainty found by the survey is sufficient to cause anxiety and to undermine people's ability to peacefully thrive in the digital world and outside. The name "Alfie" has been chosen to communicate a combination of friendliness, knowingness and wisdom, in order to reduce the stress perceived in using digital media. Despite this, there is still a good attitude towards actively using digital tools to search and refine one's information. This justifies the choice of a mobile app aiming at reducing the effort required to maintain a balanced exposure to information. More specifically, formulating Alfie's newsfeed based on emotional parameters and not only on user's *apparent* interests – such as the majority of the newsfeeds today – purposely aims at reducing the feeling of

overwhelmingness by showing the rationale for the suggested items, in order to let the user feel more supported and understood, as well as to raise the awareness necessary to prevent the consolidation of cognitive biases. At the same time, introducing serendipitous and counterbalancing elements can mitigate the anxiety arising by the progressive overload of sensationalistic contents accumulating in typical newsfeeds. This is supported by the experience reported by the survey respondents, who stated how being exposed to different opinion proved effective in changing their minds. Alfie therefore aims at breaking echo chambers.

Another important finding is how intrinsically social the reaction to ID is: the survey revealed how the network of friends and relatives is at one time a source of ID and a solution, as the forces acting in this framework strongly influence one individual's response in both a positive and in a negative way. This insight has been used to conceive Alfie's features based on social networks. Provided a sufficient degree of reliability, a trustworthy segment of an individual's network can combine the good effects of trust with positive social pressure to self-improvement. This can also satisfy the need for social verification and acceptance that emerged from the survey.

Finally, another feature of the prototype that emerged as a result of design thinking and as a consequence of the data obtained through the survey is effortlessness. In fact, the user who could get the most out of such a solution is also the user which is less proactive in improving the quality of his/her information habits. This translated into minimal visual design, a discrete notification system only intervening if the user is crossing a warning threshold, and the distribution of the final product for free. This also probably represents the main limitation for the early-adoption of this solution, as this user segment might be reluctant in downloading an app for this purpose. Another limitation is the absence of lock-in effects inducing users to use Alfie regularly.

To summarize, the ID demand-supply dichotomy has been rejected in favour of a more nuanced framing of people's experience with today's information, in which the main goal is not the achievement of a verified, doubtless truth, but rather the enhancement of people's ability to handle the lack of that truth, accepting uncertainty when inevitable.

In conclusion, the adoption of design thinking introduced significant innovation in the solution domain to ID, mainly by bringing emotion- and behaviour-related items in the discussion, and by translating them into critical functions for Alfie. It shall be noted how the survey used to statistically support these items is subject to limitations in the possible interpretations of the data. As previously stated, using pre-compiled answers might induce biases in the reader, but it's necessary to statistically elaborate large amounts of data. These limitations can be further mitigated by conducting interviews and field experiments. This option was unfortunately unavailable to authors due to the COVID-19 pandemic and shall be a priority in future researches. The next step will include the test of the prototype app in a relevant environment to verify if this implementation is actually able to deliver the defined functions effectively.

However, this work ultimately suggests that these strategies can in general improve the generation of creative and innovative ideas when applied to challenges which have global dimension, yet are deeply social and behavioural. Environments such as IdeaSquare provide the best resources for these endeavours, where these results could be applied to engage in areas such as education, culture and mental well-being, where strong connections are growing between the digital and the psychological dimensions of our modern world.

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APPENDIX A

The appendix below reports the items included in the questionnaire.

Title: How do you deal with news?
Maximum duration: 10 min
* Compulsory answers

Who we are: We are a team of young researchers working together with CERN and the UN to explore and address the problem of disinformation.

Section 1: About You

1. Your age*: __
2. What is your gender? *
    a. Male
    b. Female
    c. Prefer not to say
    d. Other:
3. Where are you from? *
    a. Italy
    b. Iran
    c. France
    d. Belgium
    e. Germany
    f. Brazil
    g. The Netherlands
    h. Other:
4. In which country do you live? *
    a. Italy
    b. Iran
    c. France
    d. Belgium
    e. Germany
    f. Brazil
    g. The Netherlands
    h. Other:
5. Where do you live? *
    a. City
    b. Town
    c. Countryside
6. What is your education? *
    a. Elementary School Diploma
    b. Middle School Diploma
    c. High School Diploma
    d. Bachelor's Degree
    e. Master's Degree
    f. Doctoral Degree
    g. Other:
7. Do you have children in these age groups? [Yes/No] *
    a. 0-5
    b. 6-10
    c. 11-15
    d. 16-20
    e. 20+

Section 2: Exposure and reactions to information

Description: We would like to understand how people interact with information. By information, we mean news about politics, current events, economics, science and health, etc. An example could be an online article on a vaccine for the new coronavirus.

1. On a scale from 0 to 3, which of these sources contributes the most in keeping you informed and in shaping your knowledge? [0 = No contribution; 3 = Significant contribution] *
    a. Social Media (e.g. Facebok, Twitter, Instagram)
    b. Whatsapp/Messenger/Telegram
    c. News on TV
    d. Blogs or websites
    e. YouTube
    f. Paper journals
    g. Online journals
    h. Podcasts
2. On a scale from 0 to 3, how often do you use these media to actively share and/or comment information? [0 = Never; 3 = Very often] *
    a. Facebook
    b. Twitter
    c. Whatsapp/Messenger/Telegram
    d. Instagram
    e. Phone calls
3. Which device do you use more frequently to inform yourself? [0 = Never; 3 = Very often] *
    a. Smartphone/Tablet
    b. Computer
4. How much do you agree with the following statements about the information system? [0 = Completely disagree, 4 = Completely agree] *
    a. There is much information around and it's hard to understand which sources are more reliable
    b. The whole information system is corrupted, I can only trust my friends
    c. Since I don't know who to trust, I'll no longer care about information
    d. Fake news is a problem, but overall if you know where to search it's possible to avoid them
    e. I prefer to use traditional media (TV news, journals) because online there are too much fake news
    f. Traditional media are just propaganda; therefore, I prefer to inform myself online, where I can find real information
    g. I feel I don't have enough competences to form a personal opinion on some topics
5. Suppose that you encounter a piece of information about relevant implications for people (e.g. Lock-down for COVID-19). Which of these options are you more likely to follow? [0 = Unlikely; 4 = Very likely]*
    a. I research online
    b. I do some offline research (e.g. books, journals)
    c. I don't research any further
    d. I ask friends or relatives
    e. I ask a knowledgeable person that I know
    f. I search for the opinion of an expert
    g. I read the comments in the post
6. When you decide not to research any further, why do you do so? [0 = Completely disagree; 4 = Strongly agree] *
    a. It takes too much time
    b. I don't know how to do it
    c. I don't know which sources to trust
    d. I feel satisfied with what I've read
    e. I think it's useless

Section 3: Today's hot topic

Description: We would like to explore the impact that recent pieces of information had on people.

1. How much did you hear about these claims? [0 = Never; 4 = A lot]*
    a. Coronavirus was created in a Chinese lab and spread on purpose
    b. 5G antennas spread COVID

c. COVID was created by Bill Gates
d. Injecting disinfectant helps fighting COVID
e. Big pharma companies have planned this situation

2. Regardless of whether you've heard about this or not, how do you feel about the content of this news? You can give more than one answer. *

	Anxious, Confused	Angry	Skeptical, but need a deep dive	I don't believe it	I believe it
Coronavirus was created in a Chinese lab and spread on purpose					
5G antennas spread COVID					
COVID was created by Bill Gates					
Injecting disinfectant helps fighting COVID					
Big pharma companies have planned this situation					

3. Where did you hear about this more often? You can give more than one answer. *

	Didn't hear about it	Social Media	WhatsApp Messenger Telegram	Talking	Websites	Other
Coronavirus was created in a Chinese lab and spread on purpose						
5G antennas spread COVID						
COVID was created by Bill Gates						
Injecting disinfectant helps fighting COVID						
Big pharma companies have planned this situation						

4. Who was believing in/advocating for these arguments? *
    a. No one
    b. Close friends
    c. Friends of other friends
    d. Elder family members (45+ years old)
    e. Other family members
    f. Influencer, YouTuber, Social media pages
    g. Someone in a group-chat
    h. Other:
5. When you stumble upon an article/video on the above topics, what do you usually do? [0 = Almost never; 3 = Most of the times] *
    a. I just read the title
    b. I read the title and the comment below
    c. I consume the whole article/video
    d. I consume the article/video and the comments below
    e. I read the title and some parts of the article/video
6. If you have ever shared any content sustaining the above topics, why did you? You can give more than one answer. *
    a. I've never shared any of those content
    b. I thought it was important for others to know
    c. I wanted people to know what I think about the topic
    d. I wanted to express my feelings
    e. I wanted to see if other people in my network feels like I do on that
    f. I wanted to know others' opinions

   g. Other:
7. When you changed your mind about one of the previous topic or similar topics (meaning topics causing a similar emotional reaction), how much did these factors contribute? [0 = Almost nothing; 4 = A lot] *
   a. Someone I trusted helped me change my mind
   b. I have read articles with different viewpoints
   c. I have been faced with strong evidence of the truth
   d. I have lived a mind-changing experience
   e. Other reasons
   f. I have never changed my mind

Section 4: Question about the perception of the information landscape
Description: What are the good and bad things in the current way we have access to and consume information?

1. Information and age. How much do you agree with the following statements? [0: strongly disagree, 3: strongly agree] *
   a. I think younger people are more able to navigate the information online
   b. I tend to ask younger people (e.g. my children and others) help to navigate information online or to check the reliability of news
   c. I tend to help older people (e.g. my parents or others) to navigate information or to find reliable news
   d. I tend to help younger people to navigate information or to check the reliability of news
   e. I tend to ask older people (e.g. my parents or others) to navigate information or to find reliable news
2. What would help you the most in living the information landscape? You can give more than one answer. *
   a. Faster news gathering
   b. Slower news gathering, but of high quality
   c. More clear and simpler explanations of complicated topics
   d. Faster verification of correctness
   e. I don't know
   f. I don't need help
   g. Other:

Thank you!
We appreciate your help, it is of extreme value. Feel free to leave any comment for improvements. If you believe that the scope of this study is important and if you would like to give us other opinions in advancing our research, we would love to hear from you once in a while.

For any question or information, contact us at i4c.information@gmail.com

1. Comments:____

2. Email address for updates:____