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Ilaria Regalbuto

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By Ilaria Regalbuto

ABSTRACT

Fake news are a real-world phenomenon that is affecting the way information spreads and is consumed by society. This paper studies how and why people tend to believe in fake news by using existing literature and previous experiments as a guide. Then, it presents the goals, methods, and results of the Cazamentiras project, a field experiment on fake news detection carried out in Alicante in 2022. The focus of this study is investigating whether there exist psychological, behavioral, or socio-demographic variables that are common across participants and are predictive of a good (or bad) result in the news headlines identification test. Various analyses have been carried out to define the identikit of a good Cazamentiras (i.e., lies buster). The paper concludes with considerations about the problem, the experiment, and some suggestions for future research to replicate the study and increase its internal and external validity.

Chapter 1

INTRODUCTION

Knowledge is power (Hobbes, 1668)– but what if that knowledge is fake?

Nowadays it is harder than ever to trust what it is written online, given that a high percentage of the information available on Internet is false or misleading and creates confusion (Craft et al., 2017; Gelfert, 2018; Kim et al., 2021; Belloir et al., 2022; Barthel et al., 2017). This paper aims at exploring the fake news phenomenon that has now gained increasing importance among the general public and academics (Vegetti and Mancosu, 2020). Fake news are not only a contemporary phenomenon but have been existing since the dawn of time (Aldwairi & Alwahedi, 2018; Belloir et al., 2022). However, the technological progress made it possible to decentralize information sharing, allowing everyone with access to the Internet and a profile on social media to say anything. The proliferation of false news is a problem since it undermines people's informed choice and affects decisions regarding the socio-cultural sphere (Kim et al., 2021; Allcott and Gentzkow, 2017; Vegetti and Mancosu, 2020). People are usually confident in their ability to discern truth and falsehood and to reveal fake news (Barthel et al, 2016), but more recent studies run among students contradict such a statement (Wineburg et al., 2016). Not only people read news without recognizing their falsehood, but many of them believe and internalize them (Silverman and Singer-Vine, 2016). This may become a major issue, especially when fake news concern political choices (Lazer et al., 2018; Vegetti and Mancosu, 2020). Although this is a broadly known problem, there are still many aspects that have been unexplored or require deeper research. As an example, researchers questioned themselves about what role social media play in collective decisions. On the one hand, social media have become a primary source of information since they allow people to access all the news anytime and anywhere by simply clicking some links. On the other hand, the free and easy access to the Internet does not help to fight fake news because it gives power to every user to write and share content online. Although this decentralized nature advantages the diversification of content, it also carries the issue of inaccuracy (Jones-Jang et al., 2019).

Fact checkers may represent a solution against misinformation, and indeed are already employed by social media platforms, journalists, and common citizens (Kim et al., 2021). Nonetheless, the amount of content that is published online every day is infinitely greater than the capacity of fact-checking websites (Pennycook et al., 2020). This is true especially considering that nowadays fake news are spread also through the use of bots (Lazer et al., 2018; Kim et al., 2021). In general, bots represent a challenge because, independently of the accuracy of the information, they give the impression that a piece of news is popular and promoted by many, exerting an influence that, as of now, has not been able to be contained. In addition to these risks, the spread of misinformation is strongly related with cognitive biases. These biases affect human judgment and manipulate people's decision-making process, sometimes even unconsciously (Gelfert, 2018; Charness and Dave, 2017; Aldwairi and Alwahedi, 2018; Kim et al., 2021; Nickerson, 1998; Rollwage and Fleming, 2020). Among these biases, this paper focuses on confirmation bias, overconfidence, and cognitive reflection, that are the ones we recognized to play a key role in affecting the results of our experiment (see Chapter 5.2). Cognitive biases are dear to marketing experts given their shared similarities with the manipulative nature of the discipline. Marketing indeed employs techniques aimed at interfering with people's beliefs and preferences to guide consumption. This explains why cognitive biases have been studied more by marketing scholars rather than other social scientists. The goal of this thesis is to look at the fake news phenomenon using the lenses and the tools in the hands of a marketing practitioner. As an example, in order to better analyze the data and understand whether there exist patterns in the dataset collected, cluster analysis is performed in Chapter 5.3.

This paper reports a field experiment that was conducted in Spring 2022 at the Universidad de Alicante. Economics students were invited to take part in the experiment on a voluntary basis. One of the novelties of this study is that, rather than being a pure behavioral economics investigation, it was presented as a prize game, entitled "Cazamentiras" (i.e., lies busters). The presence of monetary incentives for all the participants, and an extra prize for those who performed best in the experiment, served as a stimulus for the respondents to do their best. Moreover, most of the studies run on fake news focus on pure politics (Allcott and Gentzkow, 2017; Pennycook and Rand, 2022; Guess et al., 2020; Levy, 2021; Thaler, 2021). Differently from this trend, the field experiment presented in this paper includes headlines regarding other topics. However, it is relevant to say that researchers were still interested in understanding the consistency of the fake news phenomenon with the political sentiment of the respondents. On top of all the other personal details, respondents were asked about their online network, meaning the list of their friends on social media. Even though their network was

confined to their class perimeter to simplify the information collection, this still represents the intention to map the dynamics of online social sharing. The goal of this thesis is to find valid insights about the characteristics that make individuals more susceptible to believing in fake news, as there is still little knowledge about it (Amazeen and Bucy, 2019: Kim et al., 2021). In particular, this paper investigates the role played by socio-demographic, behavioral, and psychological variables in the ability to spot fake news. In conclusion, this research joins the existing literature in explaining what fake news are, and how difficult it is to break pre-existing beliefs apart because of cognitive biases. Furthermore, it presents an experimental design that may be useful to better understand the phenomenon and to find solutions to the problem.

Chapter 2

LITERATURE REVIEW

Before designing a study and deciding the aspects to focus on, it is important to understand where the main gaps of the literature are. In the case of fake news, the majority of experiments that have been conducted in the last years focus specifically on the political context (Allcott and Gentzkow, 2017; Guess et al., 2020; Levy, 2021; Thaler, 2021; Pennycook and Rand, 2022). Most of these studies have been run as surveys, so rely on self-reporting rather than direct observation, and have been carried out in the field (Lord et al., 1979; Alysandratos et al., 2020; Thaler, 2021; Pennycook and Rand, 2022; Salovich et al., 2022). In particular, researchers choose articles or headlines and ask respondents to identify whether they are true or false, whether they are congruent with their political party, and if they would share them online (Pennycook et al., 2020; Pennycook and Rand, 2019; Ross et al., 2021; Vegetti and Mancosu, 2020; Pennycook and Rand, 2022; Pennycook et al., 2018). Some of these studies also investigate psychological indicators, by using the Cognitive Reflection Test and some measures of confidence (Alysandratos et al., 2020; Pennycook and Rand, 2022; Pennycook and Rand, 2019; Ross et al., 2021).

2.1 What are fake news?

Gelfert (2018) tries to define what fake news are by analyzing definitions from lawyers, academics, and experts. After a long discussion that underlines the difficulty in defining this phenomenon, he states that it is better to use a "cluster concept" of recurring themes. First, there is the element of disinformation that is likely to generate false beliefs, with different degrees of seriousness. Second, the medium of transmission is likely to be online rather than off-line, especially in the form of social media. Third, fake news are very similar to legitimate news in appearance: this is relevant in enhancing the probability of sharing. Lastly, a crucial ingredient is the human intention to deliberately mislead readers, otherwise that is not deemed as fake news. Consequently, the spread of the news is the result of the reason behind its creation, and not a side effect of its existence.

This is why the researcher defines fake news as "misleading by design", highlighting the pure intention to misinform. A further element that is discussed by Pennycook et al. (2018) is the virality of fake news: it is created to draw attention and facilitate the sharing on social media (Vosoughi et al., 2018).

People cannot distinguish between true and fake news because they are impulsive rather than reflective: they are guided by their instinct, rather than deliberating (Bago et al., 2020). This depends on the little attention users pay when reading information online and the "eat and go" approach to information that is spread nowadays. Some studies prove that most of the links shared online have never been clicked (Kim et al., 2021). This results in a rough and fragmented informative process that does not lead to anything but confusion. On the contrary, when people use some more time to reflect, the accuracy in categorizing news increases (Pennycook and Rand, 2021; Bago et al., 2020). Inaccurate news also create uncertainty in what is true, and consequently reduce confidence in correct judgments, while increasing confidence for false ones (Salovich et al., 2022; Pennycook et al., 2021; Kim et al., 2021). The ability to discern truthfulness and falsehood is strengthened by media literacy and knowledge, including politics and general information (Vegetti and Mancosu, 2020; Anders, 2023; Pennycook and Rand, 2021; Brashier et al., 2021; Jones-Jang et al., 2019; Pennycook and Rand, 2022; Amazeen and Bucy, 2019).

Why do people sometimes share things they do not believe in? (Pennycook et al., 2021; Serra-Garcia and Gneezy). Some of the factors studied in the literature of fake news are the "desirability effect", which consists of publishing content that users think their followers and friends will enjoy as part of the same group (Lazer et al., 2018; Pennycook et al., 2020). The "familiarity effect", instead, makes it more likely to share information that users themselves have already heard (Lazer et al., 2018). Nonetheless, bringing up the matter of accuracy during studies improves the quality of the content shared online, as observed by Pennycook et al. (2021). One drawback underlined by Pennycook and Rand (2019), is that asking respondents to pay attention when assessing the truthfulness of news somehow contaminates the results of the experiments, because the level of concentration demanded does not resemble the one that the majority of people uses daily. Another relevant question is: why do users produce false news? Researchers identify two main reasons: one is ideological, and the other one is economic (Alcott and Gentzkow, 2017; Vizoso and Vazquez-Herrero, 2018; Amazeen and Bucy, 2019; Kim et al., 2021). From a pure political perspective, it is in the interests of a left-wing supporter to discredit the right-wing candidates. Economically speaking, social media generate profits through advertising. The more clicks a newspaper or an information provider generates, the higher the revenues they will earn from advertising platforms. Rationally speaking, what are the news that draw

more attention? The ones with catchy headlines and juicy topics, and fake news usually have both characteristics.

On top of all these discussions, there is currently a debate among academics about whether it is correct to call fake news "news". Amazeen and Bucy (2019) report that various groups prefer "disinformation", given that they do not inform about the true state of the world. The boundary between the concepts of "misinformation", "fake news", "des-information", "news satire", "hoax news" and "propaganda news" is really blurred and does not allow academics to find a common ground (Belloir et al., 2022; Kim et al., 2021). This paper does not enter into the merits of these discussions but sticks to the general cluster definition given by Gelfert (2018), that describes fake news as "misleading by design". Not having a clear identikit of fake news makes it longer to develop a specific framework that can be implemented for the automated detection, or that can be used by people online. This explains why research on fake news is growing exponentially: they became an extremely attractive research domain (Belloir et al., 2022).

2.2 Social media

Technological innovations have unveiled new opportunities for fake news and started a transformation in the patterns of news consumption (Gelfert, 2018; Belloir et al., 2022; Aldwairi and Alwahedi, 2018). One reason why fake news have become central is because social media swiftly substituted newspapers and the other traditional information sources, and completely subverted the media market, destroying the printed paper industry. First of all, social media heavily affect the way users consume information and form opinions online (Brugnoli et al., 2019; Kim et al., 2021). The Internet access is free of charge, and producing content is tangibly costless (Alcott and Gentzkow, 2017). Additionally, the replication cost (i.e., reposting or sharing) is even lower than producing, and transportation costs are negligible (Goldfarb and Tucker, 2019; Aldwairi and Alwahedi, 2018). So, the spread of content is really fast and reaches almost every part of the world (Brugnoli et al., 2019). The presence of real-time feedback on content sharing is another factor that discourages people from paying attention to accuracy. A differentiating feature of social media is that they allow common people not only to consume, but also to produce content, as long as the platform safety guidelines are followed. This produces an extension of voices: every user can indeed transmit information autonomously (Feenstra and Casero-Ripollés, 2014). The digital transformation then resulted in the decentralization of information: no expertise is required, and everyone can potentially become an online information source and have the same audience of a verified online newspaper, or even a wider one (Brugnoli et al., 2019; Aldwairi and Alwahedi, 2018; Kim et al., 2021; Bergström and Jervelycke Belfrage, 2018; Feenstra and

Casero-Ripollés, 2014). Craft et al. (2017) define the XXI Century as the "age of democratized information", that is characterized by an open and more transparent competitive scenario. As a downside, the presence of multiple voices online and the nonexistence of a regulation favor the proliferation of fake news, as noticed by Innocenti (2021) and Kaplan (2023). In addition, having access to an infinite amount of information creates boredom. Users get used to new content very quickly and search for something more new: this implies that their attention cycles get shorter because of the high consumption rates. The speed at which users consume news exhausts users' attention because of saturation (Lorenz-Spleen et al., 2019). The nature of social media does not help to fight misinformation, since it is very difficult to define the edge between control and freedom of expression (Goldfarb and Tucker, 2019). Social media indeed were born with the intention of giving the opportunity to everyone to express themselves. Deciding to block or delete content falls into the definition of "censorship", unless what has been published goes against the platforms' guidelines. At this point, who decides where the border is, when there is an ambiguous situation? Although everyone agrees about the positive potential of social media platforms, their effects on society are still controversial. A debated element, for example, is the algorithms that all social networks use to personalize users' feed. They somewhat bring about a certain degree of segregation on the platform, meaning that what appears on the screen is ideologically aligned with users' prior interactions and interests. This prevents users from reading different content, and at the same time strengthens the polarization of opinions (Levy, 2021; Kim et al., 2021; Azzimonti and Fernandes, 2018).

2.3 Fact checkers

The arrival of fact-checking websites initially represented a good antibody against misinformation, but unfortunately did not turn out as an effective long-term solution. The amount of data posted online every day is enormous and the content evolves rapidly. This causes fact checking not to be efficient or scalable, since manual scrutinizing requires some time (Pennycook et al., 2020). Furthermore, even professional fact checkers struggle to classify news, given its resemblance with truthful one. Nonetheless, academics and experts are helped by technology: software robots (bots), algorithms, and artificial intelligence facilitate and fasten the monitoring process. These tools are able to evaluate the truthfulness of content and detect fake accounts by combining metadata, social interactions, and information about news (Aldwairi and Alwahedi, 2018; Anders, 2023; Vegetti and Mancosu, 2020). On the downside, these instruments still require some adjustments. Their accuracy needs to be continuously improved by training, in order to avoid any mistake. Unfortunately, as anticipated in Chapter 1, bots are also used to massively spread misinformation online and encourage the

transmission of falsehood among users (Lazer et al., 2018). These robots are programmed to share fake news and gather the attention of as many users as possible. The "bad" bots work way faster than the fact-checking ones and are even more effective when supported by real users that share news on their profiles. Plus, bots' technological progress is really quick and difficult to keep up with (Ferrara et al., 2016). Moreover, they incredibly resemble humanlike behaviors. In this regard, artificial intelligence has been making giant steps forward in the creation of content from scratch and it is really hard to imagine social media free from fake news in the future. On the contrary, it will become easier and easier to run across fake videos and false headlines that look perfectly credible.

Chapter 3

THE CAZAMENTIRAS PROJECT

The "lies busters" experiment is a study aiming at gathering a richer understanding of the fake news phenomenon by analyzing the results of some quizzes. This field experiment was carried out in the Spring of 2022 (between April and May) at the Universidad de Alicante, in Spain, by a team of researchers coordinated by Professor Giovanni Ponti. The experiment lasted 5 weeks in total. Respondents were selected among the undergraduate students from the Faculty of Economics and Business Administration of the University. To recruit them, the researchers took in consideration 12 groups of students who belonged to 37 different classes from the faculty. Participants gave their informed consent to take part in the study when starting the enrollment process. They also picked a nickname to guarantee anonymity, but at the same time allowing researchers to match the test results with a name. After that, the interactions between the two parties took place in a completely anonymous fashion by e-mail or through the game website. Students received new tasks by e-mail with all the information needed to complete them on time. Tasks were distributed as Google quizzes using an external platform. This did not allow researchers to control students while doing the questionnaires (e.g., to verify their identity), and it also created issues when sending a large number of e-mails. The researchers tried to use the didactical Intranet website (UA Cloud) but were not granted with all the required permissions. Therefore, it was not possible to adopt any Intranet facility that was accessible only to the students with a valid identity, something that would have helped a great deal to increase the overall efficiency of the process.

3.1 Research Question

Despite being aware of the danger and detriment that fake news cause to society, there is still little knowledge about which human features make some people more susceptible to believing in fake news (Amazeen and Bucy, 2019: Kim et al., 2021). This paper aims at investigating the role that psychological and socio-demographic variables play in identifying fake news headlines. Do some features help individuals in correctly categorizing news? Which characteristics predict a higher probability of guessing? How can we improve such characteristics?

3.2 Methods and Procedures

The experiment consisted of 8 sessions, 5 of which were tasks (sessions 2, 3, 4, 5, 7 – see Appendix), and the other 3 were surveys to collect general information about participants (sessions 1, 6, 8 – see Appendix). Every task included 12 headlines or pictures to be classified according to their degree of truthfulness, for a total of 60 questions. All the news had been verified by established Spanish and international fact checkers and chosen carefully by researchers before starting the experiment. Every correct answer was worth 1 point (0 otherwise) and all the points of the 5 tasks were summed up at the end of the study to identify the participants with the highest results. As it is practiced in experimental economics, this field experiment established monetary incentives for the participants: everyone who completed all the tasks was granted a participation fee of €10. Who did not complete the tasks, did not receive any reward. Moreover, the students with the highest results in the end got an extra €50. All the money was in the form of Amazon cheques. Students were incentivized to compete also through the publication of the ranking, which was updated twice during the duration of the experiment.

The information gathered from the three demographic surveys instead is of different types:

- Socio-demographics (age, gender, income proxies, and wealth);
- Psychological traits proxies, using the existing literature in cognitive psychology; in particular, the Cognitive Reflection Test to measure cognitive ability (Frederick, 2005) and the BIG 5 Personality Test to measure personality according to five dimensions: openness, conscientiousness, extraversion, agreeableness, and neuroticism (McCrae and Costa, 1987);
- Social network maps;
- Proxies of social media use and literacy, employing a selection of questions taken from a survey designed by the Nuffield Data literacy project.

As said before, most of the studies conducted in this area build their hypotheses on pure politics, rather than exploring other types of fake news (Allcott and Gentzkow, 2017; Guess et al., 2020; Levy, 2021; Thaler, 2021; Pennycook and Rand, 2022). Even though it could be assessed that any topic has to do with politics, this goes to the detriment of research, because most studies prove similar points. For example, research reports that Republican supporters read more fake news and tend to visit misinformation websites more than Democrats, and Republican politicians tend to acquire more short-term consensus among the voters using fake news as claims (Pennycook and Rand, 2019; Bucciol, 2018). In the Cazamentiras project, instead, some fake news are related to politics, some

other to real world events of other nature (see Table 1). The full text of the surveys and the tasks used in this experiment have been translated to English and can be read in the Appendix. All the headlines and pictures handed out to participants had already been classified as false, half false, half true, and true by the original fact-checking websites that researchers used as the main source of material. One of the drawbacks of this classification in 4 categories is that the
borders between a false news and a half false one are very thin and sometimes blurred, so it is harder to choose the correct choice. Most of the political statements come from parties active in Spain and are balanced regarding the degree of veracity and the political party. News that were too easy to be spotted, so either too biased or too extreme, were not included to guarantee the application of a certain degree of reasoning before answering.

POLITICS	FALSE	HALF FALSE	HALF TRUE	TRUE	tot
VOX	1				1
PP	6	4	3	5	18
CIUDADANOS		1	1		2
PSOE	3	5	4	2	14
PODEMOS	1	1	2		4
BIDEN				1	1
tot	11	11	10	8	40
	27.5%	27.5%	25%	20%	100%

OTHERS	FALSE	HALF FALSE	HALF TRUE	TRUE	tot
CLIMATE	1	1			2
COVID		1		1	2
POP CULTURE	5			2	7
UKRAINE	3			2	5
OTHER	1		1	2	4
tot	10	2	1	7	20
	50%	10%	5%	35%	100%

Table 1: Distribution of the political and non-political questions and positions present in the tasks.

Chapter 4

COGNITIVE BIASES

Research suggests that cognitive biases are crucial in favoring irrationality both in the production and consumption of fake news (Kim et al., 2021). As anticipated, the cognitive biases that are most relevant for this study and are considered to inhibit human critical reasoning, are confirmation bias (4.1), cognitive reflection (4.2), and overconfidence (4.3).

4.1 Confirmation bias

In addition to what is explained in the sections 2.1 and 2.2, another reason why fake news are shared is when they reaffirm pre-existing beliefs (Kahne and Bowyer, 2017; Charness and Dave, 2017; Azzimonti and Fernandes, 2018; Vizoso and Vazquez-Herrero, 2018; Vegetti and Mancosu, 2020; Jones and Sugden, 2001; Thaler, 2021). It is known that everyone approaches a decision-making process with some prior beliefs (Lord et al., 1979). Once new information is received, though, these beliefs are usually updated and changed. The problem is that this cognitive process is often performed inefficiently, if it is performed at all, and the common regularities of this behavior have been the object of study by cognitive psychologists for decades under the heading of "cognitive biases". It is then reasonable and quite natural to look at this literature when searching explanations for the fake news phenomenon. For example, people interpret new information so as to strengthen their pre-existing opinions, and consistently avoid news contradicting them. Moreover, people tend not to bring the credibility of news into question as long as it confirms their preconceptions (Lazer et al., 2018). All of this results in judgments that are more biased and riskier, but for which people are overconfident about (Robin and Schrag, 1999).

Confirmation bias is the tendency to search and interpret evidence in support of pre-existing views. Essentially, two mechanisms prevail over rational thinking: the challenge avoidance and the reinforcement seeking (Brugnoli et al., 2019). Basically, people do not want to know if they are wrong but want to know when they are right, increasing the probability of incurring into biased choices. Charness

and Dave (2017) explain the three different cognitive processes at the basis of confirmation bias. First, humans are more likely to look for information that confirms a hypothesis, rather than one that goes against it (Nickerson, 1998; Kim et al., 2021; Jones and Sugden, 2001). Second, it is likely that people make more mistakes by interpreting evidence to support their beliefs (Lord et al., 1979; Rollwage and Fleming, 2020; Rabin and Schrag, 1999). Third, disconfirming evidence is likely to be ignored or weighted less in decisions, compared to the one supporting it (Lord et al., 1979; Lazer, 2018; Nickerson, 1998). Human beings are fundamentally limited: they can think about one thing at a time. Once focused on a hypothesis, it is quite hard to think of its opposite too, so they tend to concentrate only on the first option, which is likely to be also the most familiar one (Nickerson, 1998; Innocenti, 2021). This attitude is related with the so-called "primacy effect bias": any information presented previously has a stronger and more durable effect on memory and consequently on decision making, than more recent information. If people read fake news and do not critically elaborate about their content, they may form wrong attitudes about an issue (Kim et al., 2021). This effect is strictly related with the concept of resource allocation: before the decision-making process takes place, people need to consider what to prioritize or ignore to optimize the time and effort. This impacts the attention level that is directed to the phenomenon under analysis and may incentivize familiar knowledge against disconfirming one (Wiederholt, 2010). Robin and Schrag (1999) describe some situations where cognitive bias is stronger. In particular, when people need to interpret ambiguous evidence, when they selectively collect and analyze the evidence, and when they interpret statistical evidence to assess the correlation of phenomena that are separated by a certain amount of time. Moreover, confirmation bias is not likely to be overcome by getting extra information (Pennycook and Rand, 2019).

Most research agrees that since people are usually unaware of their confirmation bias, their decision process may be irrational and inaccurate (Robin and Schrag, 1999; Lord et al., 1979; Kim et al., 2021; Rollwage and Fleming, 2020). This bias has been proven to amplify once people use social media platforms. Social media are indeed more effective in segregating users, compared with other information channels (Levy, 2021; Azzimonti and Fernandes, 2018). The concept of segregation refers to an intangible and ideological prison where users are locked up. This isolation favors the creation of the echo chambers, within which all users share a congruent ideology and are driven closer together and farther from other groups of individuals (Sustein, 2001; Acemoglu et al., 2021; Cota et al., 2019; Innocenti, 2021; Lazer et al., 2018; Kim et al., 2021; Stroud, 2010; Rollwage and Fleming, 2020).

Another bias that has been recognized to influence the confirmation bias is cognitive dissonance, which happens when actions are not aligned with beliefs, causing a conflict in the human brain (Charness and Dave, 2017; Pennycook et al., 2018). When it happens, individuals feel uncomfortable and need, somehow, to re-establish a balance (Festinger, 1957). To minimize this effect, people look for information that they expect to agree with their own belief (Iyengar and Hahn, 2009; Frey, 1986; Festinger, 1957; Craft et al., 2017). In this regard, echo chambers allow members to communicate with like-minded others and to strengthen shared points of view, reducing any possible dissonance. Nevertheless, it is important to say that in the case of group situations, this always holds. Matz and Wood (2005) describe why people do not like disagreement. Firstly, humans devalue inconsistency, so we are motivated to keep balanced judgements. Secondly, when others agree with somebody's thoughts, there is an increased confidence in the validity of that person's attitudes. Thirdly, human beings naturally tend to share common attitudes in their group because they form relationships with ideologically closer ones. This implies that, independently of whether people feel a cognitive inconsistency, belonging to an online group of users with aligned perspectives affects their decision-making process, strengthening the effect of confirmation bias (Frey, 1986).
In the experiment described in this thesis, confirmation bias has been measured through proxies gathered from the answers given by the participants (see Chapter 5.2 for further details). In particular, question 11 and 12 in task 8 (see Appendix).

4.2 Cognitive reflection

An important player in the fake news identification is attention, which is the result of more developed cognitive abilities. Cognitive ability plays a key role in helping people deliberating in a decision process (Cueva et al., 2015). Following this reasoning, Kahneman (2011) explains in detail how the human brain works from a psychological point of view. When a decision needs to be taken, there are two systems that can be engaged. System 1 is fast and automatic, and that is why it is used on everyday decisions and is more error prone. System 2 is slower and more effortful, but also more reliable and conscious. It is usually used to make complicated decisions and does the "dirty work" of providing the post-hoc rationale for a choice taken by System 1 (Vegetti and Mancosu, 2020; Belloir, et al., 2022). People lacking the ability to analyze and think deeply are more likely to believe in fake news because they believe what sounds plausible to their ears, relying only on system 1 (Bago et al., 2020; Ross et al., 2021). According to Pennycook and Rand (2019) and Pennycook et al. (2018), cognitive reflection increases the likelihood of classifying news in a correct way. Reflective people are indeed more skeptical and therefore are better at using implausibility as an indicator of inaccuracy. What Pennycook and Rand (2019; 2021) notice in

addition is that being reflective does not increase the acceptance of politically concordant fake news. Instead, reflective people are more accurate when reading news coming from the political party they support and are very confident in rejecting the inaccurate information. In the context of information, it has been observed that frequent exposure to news may result in higher likelihood to believe in them (Lazer et al., 2018; Pennycook and Rand, 2021; Salovich et al., 2022; Pennycook et al., 2018; Gelfert, 2018). Another case where System 1 is more likely to be involved is in the case of a credible source, or a source that users consider accurate (Sadler, 2021; Pennycook and Rand, 2021; Belloir et al., 2022).

The questions that aim to measure cognitive abilities in this experiment were taken from the well-established Cognitive Reflection Test (CRT) that was introduced by Frederick (2005). CRT is an effective tool that was designed after the operationalization of psychological theories to verify whether someone is more reflective (or intuitive), meaning who uses System 1 more easily. CRT is recognized by psychologists as a test on cognitive reflection, that is a force that resists responses that first come to mind. This tool has been applied in many studies regarding fake news and misinformation (Alysandratos et al., 2020; Pennycook and Rand, 2019; Pennycook and Rand, 2022; Ross et al., 2021). In this experiment it was useful to assign every participant to one of the CRT categories, as described in Chapter 5.1. This test consists of three questions that stimulate intuition and trick the human brain by suggesting intuitive but incorrect answers.

A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? _____ cents (correct answer: 5 cents)
If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? _____ minutes (correct answer: 5 minutes)
In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? _____ days (correct answer: 47 days)

Frederick (2005) reports some study results. First, the most popular wrong answers are exactly those which were deliberately designed by the test creator to provide a quick, although incorrect, response: 0.10 cents, 100 minutes, and 24 days. Second, by default people take into consideration these wrong answers as correct, even though at the end they change their mind. Third, those who do not answer correctly think that these questions are easier than those who answer correctly. In general, Frederick observes that high CRT scores are positively correlated with better discernment abilities, i.e., not easily believing in fake news. Guess et al. (2020) report instead that respondents who search for information on untrustworthy websites score low on CRT. Cueva et al. (2015) elaborate on the CRT application and present three categories of subjects: reflective, impulsive, and

a residual group of people belonging to neither of them. Reflective respondents are those who got at least two of the three CRT questions correctly. Impulsive ones follow their intuition and are incorrect in at least two of the three questions. In their study (2015), they show that CRT is positively correlated with mathematical abilities and numerical literacy, confirming Frederick's results (see Figure 1).

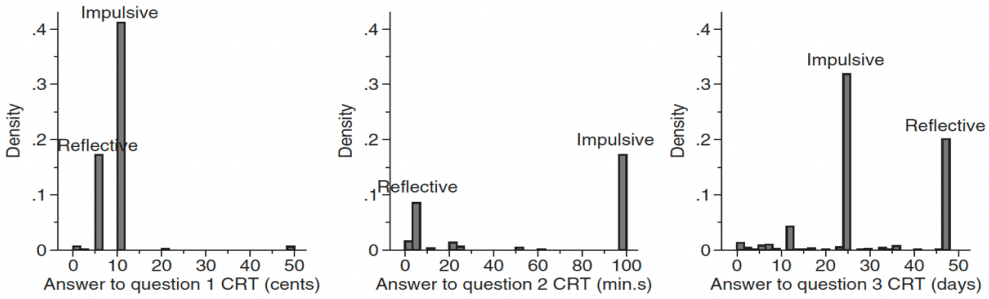


Figure 1: CRT answers distributions (Cueva et al., 2015)

Lastly, it is relevant to say that CRT is not only a tool to measure cognitive ability but also an indicator of impulsiveness. In the last few years, indeed, CRT has become a valid tool in behavioral economics studies because it highlights impulsive decisions. With its own sly design, the test is able to measure impulsiveness by counting the number of times people fall into the trap of the questions. This makes it twice a valid instrument in running studies on fake news.

4.3 Overconfidence

Overconfidence relates with individuals' ability to assess the accuracy of their knowledge and occurs when one's belief in their ability exceeds their real one. In the context of fake news, overconfidence is a further obstacle in understanding the true state of the world, as it increases the susceptibility of believing in false information (Pennycook and Rand, 2021). This happens because people appear more resistant to information that challenges previous beliefs when they are very confident about their choices. This bias is exacerbated in an echo chamber, especially in the case of ideologically extreme groups, where members believe that their opinions are superior to opposed ones (Wojcieszak, 2010; Bright et al., 2020). In addition to increasing attitude extremity, past research reports that having discussions with ideologically aligned people increases certainty that a belief is correct (Frey, 1986; Sunstein, 2001; Bennett and Iyengar, 2008; Iyengar and Hahn, 2009; Stroud, 2010; Sustein, 2001). Reading content on forums indeed

affects members' susceptibility to information, meaning that users are offered valid arguments that reinforce their already strong opinions. However, it has been observed that some people are able to be self-aware and impartially consider new information, when they realize they are wrong (Rollwage and Fleming, 2020). This is the result of a strong metacognitive ability that comes from lacking overconfidence, which derives from making mistakes and understanding fallacies. In conclusion, when confidence and metacognitive abilities work together, confidence does not win over critical thinking: making mistakes makes people more open to corrective information (Rollwage and Fleming, 2020).

As in the case of cognitive reflection and confirmation bias, a proxy of overconfidence has been collected by asking participants "In general, would you say that you are smarter than what % of the UA student population?" (question 4, task 8). Further observations on this bias are described in Chapter 5.2.

Chapter 5

RESULTS

The Cazamentiras experiment allowed researchers to collect a multitude of data along very diverse dimensions. This information has been collected over a time of 5 weeks. The study sample size initially included 375 students but only 188 respondents completed all the tasks and surveys. The observations associated with the students who had not completed all the tasks and surveys were discarded to balance the panel. Figure 2 shows the distribution of the final score among those students. The maximum possible score was 60, although no one reached it. The minimum registered score was 7/60 and the mean is 27.7 (see Table 3 for further details). Looking at the graph, the scores are heterogeneous across the score range: this indicates that the headlines presented by researchers were neither too easy, nor too difficult to be identified.

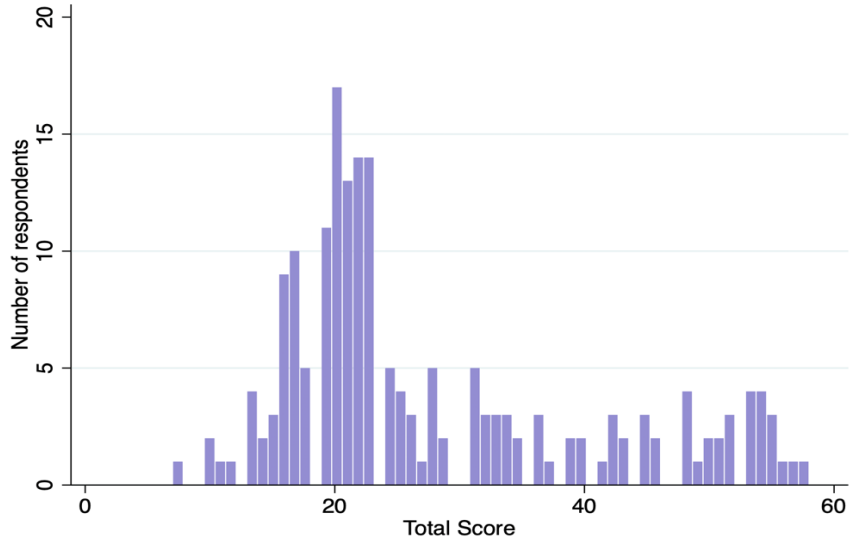


Figure 2: Distribution of TotalScore across the participants of the Cazamentiras game.

TotalScore is the result of the sum of the points collected for every correct answer in the tasks.

5.1 The Dataset

It is important to underline two challenges that came up in the manipulation of the data. First, this dataset includes data of different types: binary (i.e., gender), categorical (i.e., category of CRT matched with), ordinal and interval (i.e., the Likert scales used to assess political beliefs), with discrete and continuous variables. To make all these characteristics comparable, it was crucial to standardize and to use similar scales before calculating distances between observations. Nonetheless, this did not come without a cost: after the standardization, it is possible that some information was lost, resulting in a change of the influence of each variable on the variable of interest. The second challenge is that the dataset is a panel data. The panel built for this study is an artificial one where every question in the tasks corresponds to a period, for a total of 60 periods, per student. This implies that the dataset includes 60 rows per student, for a total of 11280 rows. Despite that, some of the subjects' personal details (such as gender, GPA, income, political party, …) are constant across the 60 periods. This means that when any analysis was run on STATA, the dataset firstly needed to be identified as such by the software. With some commands, STATA identified that there are 188 respondents (n) and 60 periods (T), at a time distance of 1 unit (see Figure 3). As explained above, T does not identify periods in this dataset, but each of the 60 questions asked to participants.

```
id:      1, 2, …, 188                          n = 188
 t:      1, 2, ..., 60                         T = 60
                        Delta(t) = 1 unit
                        Span(t) = 60 periods
                        (id*t uniquely identifies each observation)
```

Figure 3: Output from STATA that confirms the identification of panel data.

Some of the socio-demographics variables and their summary statistics obtained from the demographic surveys (task 1, 6, 8) are summarized in Table 2 (see Appendix).

Female is a dummy variable, that is equal to 1 in the case of a female respondent, and 0 in the case of a male.
Income indicates the self-reported weekly income of the student.

RSR (Room Size Ratio) is the ratio between the number of rooms in the main household of respondents, divided by their family sizes. It is usually employed as a proxy of family wealth.
Work_D is a dummy that equals 1 in the case the respondent works (at any level) and equals 0 in the case of unemployment.
GPA is the self-reported Grade Point Average at university.
Languages is the self-reported number of languages spoken. In Spain, being fluent in more than two languages tends to be indicative of a relatively high socio-economic status: the average university student is indeed unlikely to know more than two languages without any additional investment in private education.
EduPE_NEW is the Education of the Primary Earner, meaning the level of education of the household member that earns the highest salary. Education ranges from 1 = no academic education to 5 = post-graduate education.

Other variables derive from the questions of the surveys and the tests that researchers ran. Some of these have been transformed into dummies or have been standardized according to the analyses requirements (see Table 2).

CRTgroup identifies which respondents belong to the impulsive, reflective, or residual group according to their score in the Cognitive Reflection Test. The criteria of assignment was the following one: reflective are those who answered 2/3 or more correct answers, impulsive those who got 2/3 or more impulsive and incorrect answers, and the residual group includes the subjects who did not appear neither as reflective nor impulsive. CRT is a test used as a proxy for cognitive reflection.
Conf_D is a proxy for overconfidence. It is equal to 1 when confidence is greater than 50%, and 0 otherwise (see Table 8 for further details).
Media_Literacy_1 is a proxy of media literacy and is generated by the sum of the dummy variables of the social media used by participants (read Chapter 5.2 for further details). Media_Literacy_1 = Facebook_D + InfoJobs_D + Instagram_D + Linkedin_D + Pinterest_D + Reddit_D + Snapchat_D + Telegram_D + TikTok_D + Tumblr_D + Twitch_D + Twitter_D + WeChat_D + Weibo_D + Whatsapp_D + Youtube_D
Media_Literacy_2, instead, is the sum of the dummy variables indicating some of the activities that can be carried out online (read Chapter 5.2 for further details). Media_Literacy_2 = Watch_Video_n + Listen_Music_n + Blog_n + Finance_n + Gaming_n + Amazon_n + Email_n + Video_n + Pub_Serv_n + Admin_n + Pet_n + News_n.
Conf_Bias_DUMMY is a proxy for confirmation bias. It is equal to 1 if respondents stated that they agree or totally agree with question 11 in task 8 (read Chapter 5.2 for further details).

SuperDiff measures the absolute distance between what is said by a politician and a participant from a political standpoint. It is measured on a Likert scale from 1 to 7, where 7 indicates that the participant is on the opposite side of the politician. PartyNEW_D is a dummy variable that equals 1 when partyNEW is greater than 4 and 0 otherwise. PartyNEW is a proxy of the political position of the respondents and is measured on a Likert scale from 1 (extreme left – Esquerra Republicana del País Valencià) to 7 (extreme right – Vox).

Before running further analyses, it is interesting to look at the answers given by each participant and understand the nature of their mistakes. Each answer has been categorized as False_N, False_P, SlightWrong or Ans_right. Considering that these four categories indicate what answer individuals gave, they can be deemed as behavioral variables, meaning that they embody a behavior carried out by each participant by choosing one of the available options (false, half false, true, half true). Ans_right indicates that the student's answer is the same one given by the fact checkers. False_N suggests that the participant stated that the headline is false or half false, while it is true or half true. False_P is used if the student said that the information is true or half true, while it is flase or half false. SlightWrong indicates a situation where the answer given is on the correct side, but does not fully coincide with the fact checker's opinion. Table 3 reports the summary statistics of these four variables, alongside TotalScore and CatAns, a variable that was introduced to generate a naturally-ordered classification of False_N, False_P, SlightWrong and Ans_right.

Correct, CatAns = 0.
False Negative (FN), CatAns = –2. The answer is false or half false, although it is true or half true.
False Positive (FP): CatAns = 2. The answer is true or half true, although it is false or half false.
Overly untrustful (OverU): CatAns = –1. The answer given is correctly classified as false, but does not coincide with the correct answer (i.e., half false instead of false, or the other way round).
Overly trustful (OverT): CatAns = 1. The answer selected by the participant is true, but does not fully coincide with the fact checker's answer (i.e., half true instead of true, or the other way round).

Variable	Obs	Mean	Std. dev.	Min	Max
female	188	0,606383	0,4898561	0	1
RSR	188	1,893672	0,6830251	0,75	5
Work_D	188	0,2180851	0,4140482	0	1
GPA	188	6,51383	1,234582	1	10
languages	188	2,43617	0,9314299	1	5
income	188	40,50532	54,81690	0	500
EduPE_NEW	188	3,148936	0,9069836	1	5
CRTgroup	188	2,345745	0,6643182	1	3
Conf_D	188	0,2234043	0,4176393	0	1
Media_Literacy_1	188	8,835106	2,200982	2	16
Media_Literacy_2	188	23,54255	6,416331	4	36
Conf_Bias_DUMMY	188	0,4308511	0,4965176	0	1
SuperDiff	188	4,042553	1,447217	1	7
partyNEW_D	188	0,6276596	0,4847193	0	1

Table 2: Summary statistics of some socio-demographic variables and CRT results. Female, Work_D, Conf_D, Conf_Bias_DUMMY and partyNEW_D are dummy variables, with values included in (0, 1). RSR is the ratio between the number of rooms in the house where respondents live over the number of people living there. Languages indicates the number of languages spoken and goes from 1 to a maximum of 5. EduPE_NEW measures the education level of the primary earner of the family and is on a 5-level scale, where 5 indicates a post-graduate education. CRTgroup identifies the group that each respondent has been included in according to the CRT test (where 1 = residual; 2 = reflective; 3 = impulsive). Media_Literacy_1 and Media_Literacy_2 are the sum of the dummy variables that are used as proxies for social media and Internet literacy. SuperDiff is built on a 7-level Likert scale and its absolute value indicates the distance between the respondent and the politician who is speaking from a political standpoint.

TotalScore is the sum of the points obtained from correctly recognizing truth and fake headlines. The score of each respondent in this study is a proxy of their cognitive ability, following Frederick's theory (2005). From Table 3, we notice that the mean of Ans_right (0,463), once multiplied by 60, equals 27,78, that is the mean of TotalScore. This happens because the number of correct answers (Ans_right = 1) coincides with the value of TotalScore, being TotalScore the sum of all the points collected during the game (1 for every correct answer, 0 otherwise). Therefore, the informative content of the variables is the same.

Variable	Obs	Mean	Std. dev.	Min	Max
TotalScore	11280	27,7766	12,55694	7	58
CatAns	11280	0,2054078	1,253741	-2	2
False_N	11280	0,1348404	0,3415682	0	1
False_P	11280	0,2241135	0,4170156	0	1
SlightWrong	11280	0,1781028	0,3826162	0	1
Ans_right	11280	0,4629433	0,498647	0	1

Table 3: Summary statistics of TotalScore, CatAns, and the four categories used to classify participants' answers. Here the data were treated as a panel, since the answers given change and indeed represent 60 different periods T.

Looking at Figure 4 and Table 4, it can be seen that false positives are more frequent than false negatives (almost half). This means that participants believed in headlines (even though they were false or half false) much more than being "untrustful". Even though the respondents are all students with similar backgrounds and the headlines are mostly dedicated to politics, which might not be the favorite topic of undergraduates, these results are still indicative of the reason why fake news are dangerous. People tend to believe in them because they are somewhat credible and it is not easy to identify them. As said in section 3.2, the cases of OverU and OverT can be explained by the difficulty in choosing whether a headline is half true or true (or half false or false), since the difference is sometimes not evident.

CatAns	Freq.	Percent	Cum.
FN	1521	13,48	13,48
OverU	853	7,56	21,05
Correct	5222	46,29	67,34
OverT	1156	10,25	77,59
FP	2528	22,41	100,00
Total	11280	100,00	

Table 4: Summary statistics of CatAns and its classification in FN, OverU, Correct, OverT, FP.

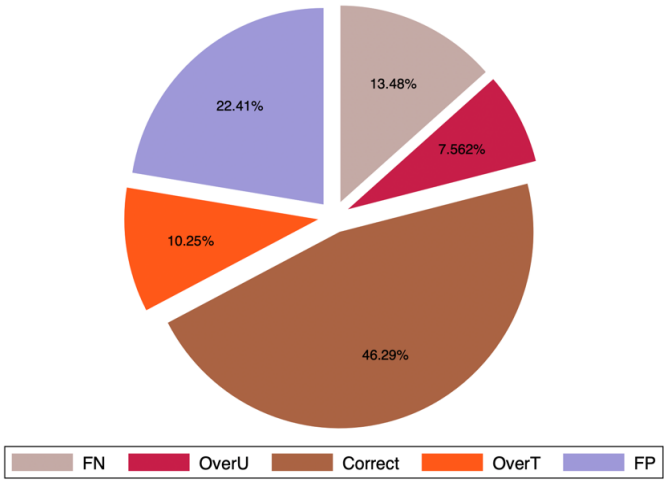


Figure 4: Pie chart representing CatAns, that is a naturally-ordered classification of the type of mistakes made by respondents when answering the questions.

5.2 Analysis of socio-demographics and psychological traits

Looking at the correlation coefficients between TotalScore and some of the socio-demographic variables described in Table 2, it can be seen none of them is significantly correlated with TotalScore (see Table 5). This means that apparently there is no correlation between any of the socio-demographics and the ability to perform in the Cazamentiras game. To investigate better what are the implications of this insight, we run a linear regression with TotalScore as the dependent variable and all the variables listed in Table 2 as explanatory variables (see Table 6). It results that no socio-demographic variable has a statistically significant role in predicting the final score in the Cazamentiras game. Even though there is no statically significant result, this is still an interesting insight. Considering the variables included, such as GPA, EduPE_NEW, and RSR, it is totally unexpected to see that none of them has a predictive role on TotalScore. Usually, the university average grade is an indicator of intelligence: this result seems to suggest that being clever in academic terms does not imply being able to identify fake news. RSR and EduPE_NEW are proxies of family wealth and family education respectively, and none of them, again, is relevant to explain changes in TotalScore. The only variables that are statistically significant in explaining changes in the dependent variable are CRT_CAT and Media_Literacy_2. According to the literature described in Chapter 2, having a media and news literacy and training cognitive reflection are two of the main aspects to work on and strengthen in the fight against fake news.

	TotalScore	female	languages	Work_D	BMI	GPA	EduPE_NEW	income	RSR
TotalScore	1.00								
female	-0.0299 0.6833	1.00							
languages	-0.0058 0.9372	-0.0788 0.2824	1.00						
Work_D	-0.0439 0.5493	-0.0227 0.7570	0.0571 0.4365	1.00					
BMI	-0.0103 0.8879	0.0589 0.4224	0.0444 0.5455	-0.0386 0.5990	1.00				
GPA	0.0762 0.2989	-0.1236 0.0911	0.1514 0.0380	-0.0321 0.6620	-0.0305 0.6776	1.00			
EduPE_NEW	0.0053 0.9428	0.0243 0.7403	0.0493 0.5017	-0.0015 0.9835	-0.0929 0.2049	0.0750 0.3061	1.00		
income	-0.0308 0.6744	-0.0575 0.4334	-0.1191 0.1035	0.1968 0.0068	0.0796 0.2775	0.0136 0.8530	0.1323 0.0704	1.00	
RSR	0.0912 0.2133	-0.0653 0.3734	-0.0325 0.6580	-0.0129 0.8605	-0.0137 0.8522	-0.0039 0.9575	-0.0944 0.1974	0.0556 0.4487	1.00

Table 5: Correlation coefficient matrix between some socio-demographic variables and TotalScore.
No explanatory variable is significantly correlated with TotalScore.

As explained in section 3.2, some of the questions coming from the Nuffield Data literacy project have been included to understand the level of social media use and literacy (Yates et al., 2023). The Nuffield project aims at understanding how governments and industries use the data citizens share on digital platforms and how this use varies among different demographic groups. In the context of the fake news research, this project may help to understand the dynamics of social media and to test whether subjects' degree of media literacy really helps in detecting fake news, as some papers seem to suggest (take, e.g., Vegetti and Mancosu, 2020; Anders, 2023; Pennycook and Rand, 2021; Brashier et al., 2021; Jones-Jang et al., 2019; Pennycook and Rand, 2022; Amazeen and Bucy, 2019). Question 13 in task 8 asks respondents to state how well they know some websites and apps, such as Google, Yahoo, Ask.com, and Bing. They are also asked in question 10 (task 8) to say whether they have ever reported harmful or inaccurate information online, used online search engines to find information, or to help other people to stay safe online (see Appendix). Question 15 in task 6 asks about respondents if they have heard of or have a profile on a list of social media, such as Facebook, TikTok, Instagram, and so on. The proxies of these answers have been transformed into dummies (1 = I have a profile, 0 = I have heard about it), and have been merged together to generate a single variable, that is Media_Literacy_1 (read Chapter 5.1

for further details). A similar approach has been applied to question 12 (task 6), that asks about the activities that students usually use social media for (signing petitions, listening to music, reading news, buying or selling online, …). Here the variable generated is called Media_Literacy_2 (read Chapter 5.1 for further details). What appears clear from the data is that students use social media for different reasons.

TotalScore	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
female	0,078869	1,980242	0,04	0,968	-3,829835	3,987573
income	-0,0016418	0,017815	-0,10	0,924	-0,0355555	0,0322719
RSR	0,801800	1,344517	0,60	0,552	-1,852078	3,455678
Work_D	0,1125461	0,758926	0,15	0,882	-1,385461	1,610553
GPA	-6,49E-01	2,261703	-0,29	0,775	-5,112868	3,8156670
languages	-0,1052875	1,001301	-0,11	0,916	-2,081707	1,871132
EduPE_NEW	0,7213347	1,025691	0,70	0,483	-1,303227	2,745897
CRT_CAT	4,575947	1,540832	2,97	0,003	1,534573	7,617322
Conf_Bias_DUMMY	-2,585799	1,828748	-1,41	0,159	-6,195478	1,02388
Media_Literacy_1	-0,5308889	0,4230875	-1,25	0,211	-1,366001	0,3042232
Media_Literacy_2	0,2937066	0,1470945	2,00	0,047	0,0033638	0,5840494
Conf_D	-2,331512	2,254513	-1,03	0,303	-6,781588	2,118563
SuperDiff	-1,406612	1,019108	-1,38	0,169	-3,418181	0,6049578
partyNEW_D	-1,384667	2,912009	-0,48	0,635	-7,132543	4,363209
_cons	23,02847	8,439582	2,73	0,007	6,369986	39,68696

Table 6: Estimated coefficients of an OLS regression where TotalScore is regressed against a set of socio-demographic, Internet usage, political, and psychological variables. This regression was manipulated not to treat the data as a panel, since these variables measure features that are constant during the 5-week study period.

Alongside media literacy, there are three important psychological phenomena analyzed in Chapter 4. As said before, confirmation bias, overconfidence, and cognitive reflection are the biases that most research recognizes as fundamental in the study of fake news (Pennycook & Rand, 2021; Bago et al., 2020; Ross et al., 2021; Wiederholt, 2010; Pennycook and Rand, 2019; Pennycook et al., 2018). According to the regression in Table 6, the dummy variables of overconfidence (Conf_D) and confirmation bias (Conf_Bias_DUMMY) do not play a significant role in explaining changes in TotalScore, while cognitive reflection (CRT_CAT) does. This means that answering correctly to at least 2/3 of the Cognitive Reflection Test questions and having developed cognitive abilities, helps in the fake news detection. Focusing specifically on the cognitive biases analyzed in Chapter 4, these are the most interesting insights. First of all, there is a relationship between cognitive abilities and gender. Looking at the answers given to the CRT test, students were classified in three groups (i.e., reflective, impulsive, or residual). Comparing the results with past literature (Cueva et al., 2015; Frederick, 2005), our data confirm that females tend to be significantly

more impulsive than males (see Figure 5). It needs to be highlighted that CRT has gained more relevance in the academic context of cognitive abilities because, differently from other proxies like the SAT test or various IQ quizzes, in the case of CRT females score significantly less than males. Table 7 shows the number of female and male subjects belonging to the CRT groups of reflective, impulsive and residual: 60% of males belong to the impulsive group, while 57% of females are included in the impulsive one, confirming these past findings. Nonetheless, these results are not predictive of a lower final score for females, with respect to male respondents. By looking at Table 6, that includes gender as one of the explanatory variables of TotalScore, it is evident that gender is not statistically significant. Said so, it cannot be concluded that being categorized as reflective by this test automatically results in a higher score in the Cazamentiras experiment.

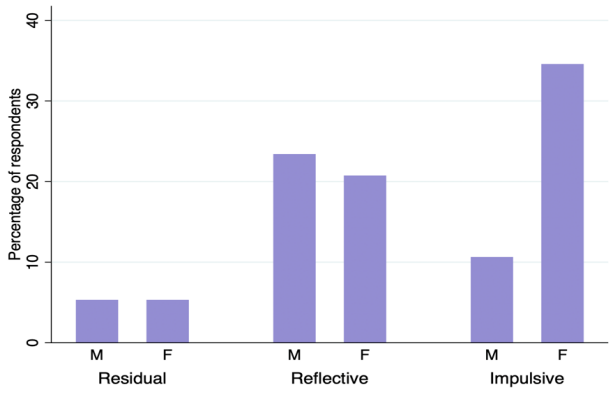


Figure 5: Graph picturing gender distribution across CRT groups (residual, reflective, impulsive).

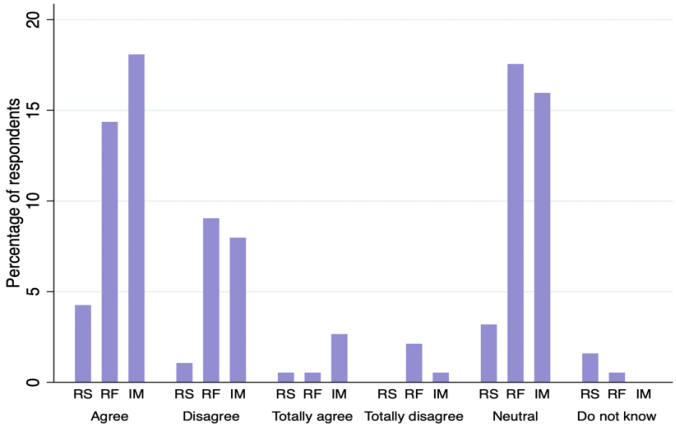


Figure 6: Graph representing the individuals belonging to each CRT group and their answers to the questions used as a proxy for confirmation bias.

CRTgroup = Residual

female	Freq.	Percent	Cum.
0	10	50,00	50,00
1	10	50,00	100,00
Total	20	100,00	

CRTgroup = Reflective

female	Freq.	Percent	Cum.
0	44	53,01	53,01
1	39	46,99	100,00
Total	83	100,00	

CRTgroup = Impulsive

female	Freq.	Percent	Cum.
0	20	23,53	23,53
1	65	76,47	100,00
Total	85	100,00	

Table 7: Summary table representing the split of CRT groups across genders.

Question 11 in task 8 asked respondents to state how much they agree with the statement "I mostly read news websites and apps that seem to share my values and opinions". This question is one of those used as proxies for the confirmation bias (see Chapter 4.1), that the literature identifies as going against the ability of discerning between true and false news (Robin and Schrag, 1999; Lord et al., 1979; Kim et al., 2021; Rollwage and Fleming, 2020). In Figure 6 it is possible to see how subjects belonging to CRT groups (RS = residual, RF = reflective, and IM = impulsive) answered to this question (Agree = De acuerdo, Disagree = En desacuerdo, Totally agree = Muy de acuerdo, Totally disagree = Totalmente en desacuerdo, Neutral = Ni de acuerdo ni en desacuerdo, Do not know = No lo sé). It can be said that the most popular answers are "Agree" or "I do not agree nor disagree". Looking at Figure 6, it appears clear that, independently of the CRT group, both impulsive and reflective subjects have a similar approach towards confirmation bias. By answering "I agree", participants indicate that the majority of them consciously know that what they read every day is biased and strengthens their beliefs, and they somewhat agree with that. Another question that is used in this study as a proxy for confirmation bias is question 18 in task 8 (see Appendix), that asks about the news published on the TV, in a radio transmission, or on a newspaper. For example, "I trust what my friends publish on social media", "I trust everything posted on social media", or "The information I see online mostly depends on the people with whom I am connected on social networks".

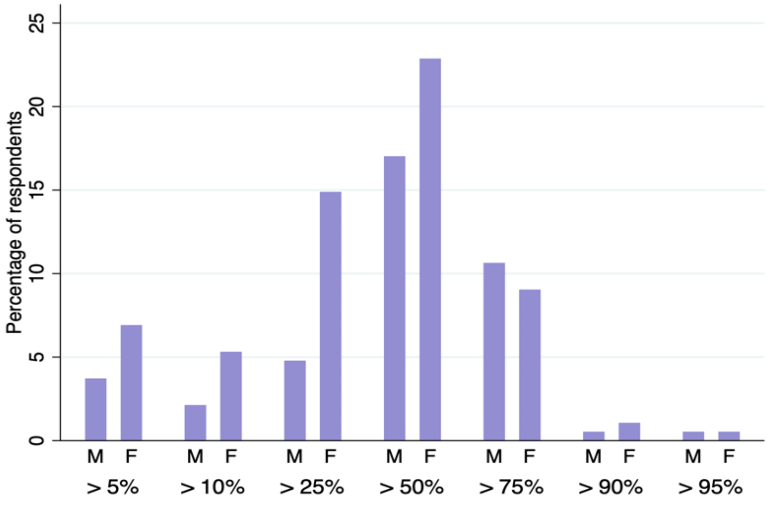


Figure 7: Distribution of confidence levels across genders.

Conf_TEST_n	Freq.	Percent	Cum.
> 5%	20	10,64	10,64
> 10%	14	7,45	18,09
> 25%	37	19,68	37,77
> 50%	75	39,89	77,66
> 75%	37	19,68	97,34
> 90%	3	1,6	98,94
> 95%	2	1,06	100,00
Total	188	100,00	

Table 8: Participants' answers to the question on (over)confidence.

Overconfidence (see section 4.3), instead, is measured through the question "In general, you would say that you are more intelligent than what percentage of the population of students in the Universidad de Alicante?" (question 4 in questionnaire 8). The possible answers are more than 5%, more than 10%, more than 25%, more than 50%, more than 75%, more than 90%, and more than 95% (see Table 8). It results that there is a gender effect: males are on average more confident than females, as shown in Figure 7, which actually confirms the ample literature on this matter (Bengtsson, 2005; Barber and Odean, 2001; Correll, 2001). To verify whether the explanatory variable that derives from the answer given to this question, that is Conf_D, the dummy version of the original variable Conf_TEST_n, a regression needs to be run having TotalScore as dependent variable, as reported in Table 6. Although it might be intuitive to think that overconfidence obfuscates the ability to discern between true and false, from this regression it results that the negative effect of Conf_D on TotalScore is not significant, differently from what is described by Pennycook and Rand (2021).

The linear regression computed in Table 6 has TotalScore as the dependent variable, and has been run by treating the data not as a panel, in the sense that the dependent variable did not vary across the 60 observations associated with each participant, so it was always constant. This variable represents the points that every participant scored in the entire Cazamentiras contest, which includes both political and non-political questions. Now, we thought it could have been interesting to see if the same explanatory variables used in the regression on TotalScore can predict a correct (or incorrect) headline categorization of the political and non-political questions singularly. In this case, the regression needs to be run with all the 11280 observations, because every question has a different answer and answers change across the 60 "periods". In order to take into

consideration only the non-political questions, the panel of data needs to be transformed from a 60-period one (60 questions) to a 20-period one, by simply dropping the observations where QuestPOL_DUMMY equals 1. This means that the new panel includes only 3760 values. The same has to be done to include only the 40 questions of the political headlines (7520 observations). Table 9 reports the coefficients of a panel linear regression model where the dependent variables are the behavioral dummies Ans_right, False_P, False_N. The explanatory variables are some of the ones already used in the other regression in this chapter (see Table 6). The cells colored in lilac indicate the coefficients having significant p-values.

In the case of the non-political questions, not many variables are significant in explaining changes in Ans_right. RSR suggests that those who are wealthier and have access to more cultural services are better at choosing the correct answer. A result that confirms what is stated in section 2.2 is that the subjects that use fewer social media are a bit better than those who use numerous ones (-0,0115). In the case of the dependent variable False_P, Media_Literacy_1 is again significant, but this time with a positive effect: this means that those who use more social media are more likely to classify fake news headlines as true or half true, while they are false or half false. Surprisingly, female and income play a role in predicting False_N, even though the effect of income tends to zero. Analyzing, instead, the political questions, we find more significant variables. This was predictable, considering that some variables make sense only when we are dealing with political beliefs (i.e., SuperDiff and partyNEW_D). Both in the case of Ans_right and False_P, Media_Literacy_2 and partyNEW_D are significant predictors. The interpretation of partyNEW_D is that the participants who stated that their political position is close to the extreme right, are less likely to choose the correct answer. They are, indeed, more “optimistic”: they state that news that are false or half false, are true or half true. Media_Literacy_2, instead, has a positive effect on Ans_right: doing more and different activities on the Internet helps identify the correct answer. SuperDiff has the same effect of Media_Literacy_2, and it makes sense: the further someone is, from a political point of view, from a politician, the easier it is for them to understand if that person is telling the truth or not. Conf_Bias_Dummy has a significant negative effect on Ans_right. This is what Serra-Garcia and Gneezy (2021) call “motivated beliefs”: people are more inclined to follow what their political party states, independently of the truthfulness of the information received. This is exactly the effect that confirmation bias plays on individuals. Conf_D, instead, is significant in predicting a false positive response: this confirms what literature says, that is that overconfidence makes people feel more confident of their own knowledge and somewhat obfuscates their ability to discern true from false (Pennycook and Rand, 2021).

	NON-POLITICAL QUESTIONS			POLITICAL QUESTIONS		
VARIABLES	**Ans_right**	**False_P**	**False_N**	**Ans_right**	**False_P**	**False_N**
female	0.0268	0.0286	-0.0264*	0.0208	-0.0106	-0.00527
	(0.0322)	(0.0176)	(0.0149)	(0.0364)	(0.0209)	(0.0115)
income	2.95e-05	-0.000136	0.000297*	-0.000102	5.59e-05	-8.24e-08
	(0.000275)	(0.000151)	(0.000127)	(0.000324)	(0.000186)	(0.000101)
GPA	-0.00520	0.00431	0.00453	0.00855	-0.00329	-0.00438
	(0.0121)	(0.00664)	(0.00560)	(0.0141)	(0.00808)	(0.00442)
RSR	0.0357*	-0.0173	-0.00956	-0.00490	-0.00746	0.00645
	(0.0215)	(0.0118)	(0.00992)	(0.0252)	(0.0145)	(0.00791)
Work_D	0.0178	0.00175	-0.0151	-0.0365	0.0298	-0.00470
	(0.0361)	(0.0198)	(0.0167)	(0.0422)	(0.0242)	(0.0132)
languages	-0.0109	0.0111	-0.00693	0.00513	-0.00238	-0.00510
	(0.0160)	(0.00876)	(0.00738)	(0.0188)	(0.0108)	(0.00589)
EduPE_NEW	0.000105	0.000718	-0.00334	0.0137	-0.00424	-0.00364
	(0.0164)	(0.00896)	(0.00756)	(0.0191)	(0.0109)	(0.00597)
CRT_CAT_1	0.0222	0.00366	0.00430	-0.00731	0.0189	-0.0209
	(0.0613)	(0.0336)	(0.0283)	(0.0722)	(0.0413)	(0.0226)
CRT_CAT_2	0.0922	-0.0285	-0.0213	0.108	-0.0623	-0.0327
	(0.0612)	(0.0335)	(0.0283)	(0.0720)	(0.0412)	(0.0225)
Conf_Bias_DUMMY	-0.0237	-0.00419	0.00828	-0.0609*	0.0227	0.0197*
	(0.0292)	(0.0160)	(0.0135)	(0.0339)	(0.0194)	(0.0106)
Conf_D	-0.0226	0.00409	0.0178	-0.0604	0.0466*	-0.00249
	(0.0360)	(0.0197)	(0.0166)	(0.0419)	(0.0240)	(0.0131)
Media_Literacy_1	-0.0115*	0.00917*	-0.00137	-0.00640	0.00240	0.00222
	(0.00674)	(0.00370)	(0.00312)	(0.00792)	(0.00454)	(0.00248)
Media_Literacy_2	0.00214	-0.000665	-0.000704	0.00579*	-0.00278*	-0.000774
	(0.00235)	(0.00129)	(0.00108)	(0.00276)	(0.00158)	(0.000865)
SuperDiff	-0.00611	0.00297	0.00721	0.00852*	0.00473	-0.00187
	(0.0162)	(0.00890)	(0.00751)	(0.00486)	(0.00452)	(0.00353)
partyNEW_D	-0.0458	0.0210	0.00301	-0.0825*	0.0421*	0.000251
	(0.0464)	(0.0254)	(0.0215)	(0.0356)	(0.0204)	(0.0111)
Constant	0.553*	0.0527	0.153*	0.280*	0.318*	0.200*
	(0.142)	(0.0777)	(0.0655)	(0.158)	(0.0904)	(0.0495)
Observations	3760	3760	3760	7520	7520	7520
Number of id	188	188	188	188	188	188

Table 9: Linear regression coefficients using panel data and including the political and non-political questions of the Cazamentiras game separately.

5.3 Cluster Analysis

Regression and cluster analysis have two different and well-defined goals: the former aims at understanding which independent variables are better at explaining changes in the dependent variable, while the latter allows to generate groups of participants with characteristics in common to segment a population of interest (see Statistics summary for further details). As anticipated in Chapter 1, cluster analysis has become a very popular marketing tool to target customers, especially in the contexts of promotion, customer acquisition and retention management. In particular, Mooi et al. (2018) underline how in the last few years there has been a shift from socio-demographic clustering variables to behavioral and psychometric ones. Given this consideration, this thesis uses behavioral variables to cluster subjects. Participants were divided in terms of their relative score in the two sections of the test, the first one related to the political questions, and the second one to the non-political ones. Basically, this means that they were analyzed according to their performance and, as explained in section 5.2, performance has been assessed through the variables Ans_right, False_P, False_N. The aim of this cluster analysis is to build the identikit of a good Cazamentiras (i.e., lies buster) by segmenting the sample of our experiment and understanding which variables are more important in characterizing it.

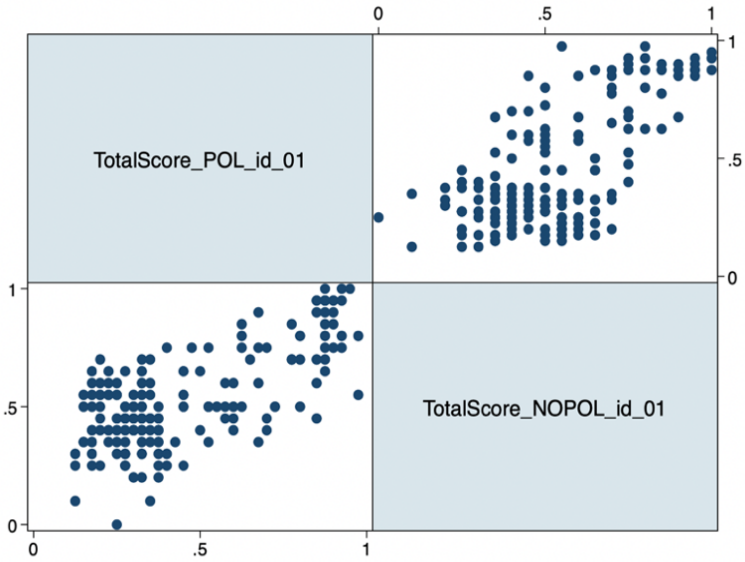
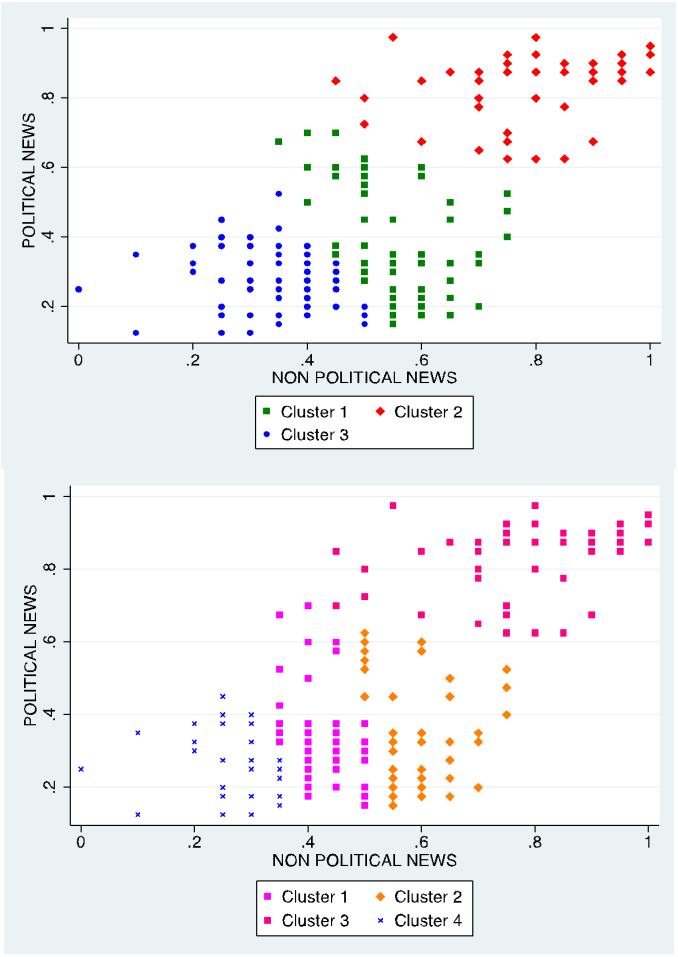


Figure 8: Scatterplot matrix plotting the variables TotalScore_POL_id_01 and TotalScore_NOPOL_id_01 used to cluster the dataset.

In general, the variables of interest in a cluster analysis should not be highly correlated with each other ($\rho_{x,\,y} > 0.9$ would be problematic) but should be somehow correlated. The two variables identifying the relative scores (TotalScore_POL_id_01 and TotalScore_NOPOL_id_01) have a correlation coefficient of 0.6843, that is enough to satisfy these requirements. If they had not been correlated at all, that would have been counterintuitive. Indeed, it is highly unlikely that a participant scored high on the political questions and significantly lower on the non-political ones. As described in Table 1, the political questions in the quiz are 40, while the non-political ones are 20. Given the explorative nature of this thesis, there is no reason to assign different weights to the sections, so each of the two scores are scaled according to the number of questions. In the case of the political part, the score was divided by 40, and the other part by 20. Each participant then corresponds to a point in the unit square and identifies the percentage of correct answers in each section of the test. Figure 8 shows a scatterplot matrix, useful to visualize the relationship between TotalScore_POL_id_01 and TotalScore_NOPOL_id_01.


POLITICAL NEWS
0
.2
.4
.6
.8
1
NON POLITICAL NEWS
Cluster 1
Cluster 2
Cluster 3
POLITICAL NEWS
0
.2
.4
.6
.8
1
NON POLITICAL NEWS
Cluster 1
Cluster 2
Cluster 3
Cluster 4

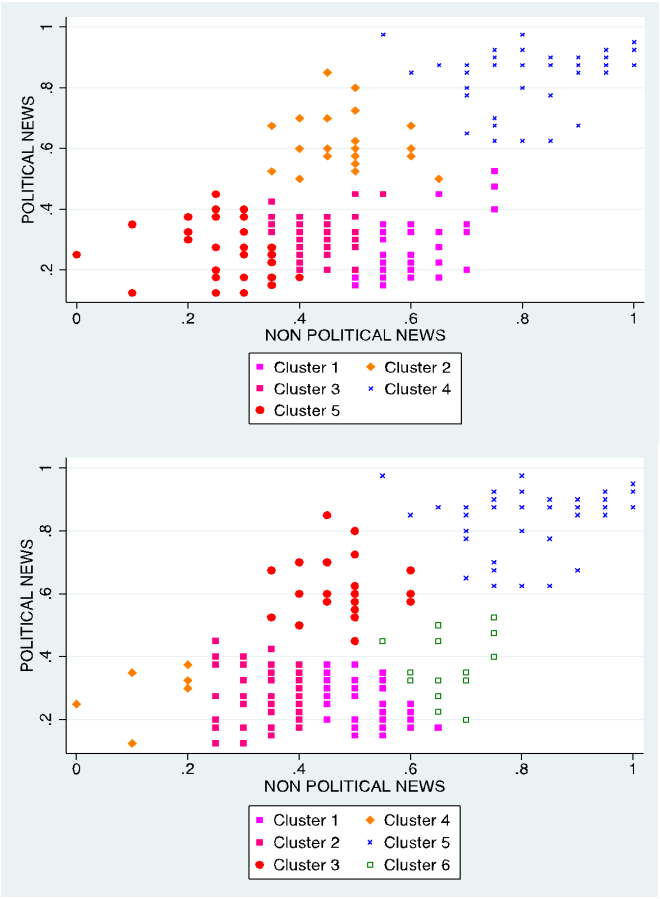


Figure 9: Two-way scatterplots representing the clusters generated from the k-means clustering, using k=3, k=4, k=5, and k=6 respectively.

To build the clusters, we need to picture subjects as points in a multi-dimensional space, points that are put together considering their relative distance to generate homogeneous groups. Considering the high variety in the variables and the fact that this thesis uses a first-exploration type of approach on this complex dataset, the best way to compute clustering is the non-hierarchical one, that is the k-means method. The distance between subjects is calculated through the Euclidean distance between them in the artificial metric. The k-means method requires a set number of clusters k in which divide the observations. Since there is no preference or limitation for the number of clusters, any k between 2 and 15 has been computed. In order to keep the discussion about heterogeneity manageable, k has been then set equal to 3, 4, 5 and 6 (see Figure 9). By looking at the scatterplot on the top left, we can describe the case when k = 3. Considering the two variables of

political news (TotalScore_POL_id_01) and non-political news (TotalScore_NOPOL_id_01), the three clusters are placed in three different areas of the space. Cluster 2 (the red one) is the one including the respondents who were able to answer more correctly to both the sections of the quiz: they indeed have a mean higher than 0.78 for the non-political questions, and higher than 0.82 for the political ones. Instead, cluster 3 (the blue one) has the lowest means for both the types of questions (political = 0.28; non-political = 0.36). Cluster 1 (the green one) is better at answering non-political questions (mean = 0.55) with respect to the political ones (mean = 0.38).

To verify that our results are reliable, the Calinski-Harabasz index has been applied. It is also called the variance ratio criterion (VRC), and it calculates the ratio of the between-variance (variance between clusters) over the within-variance (variance within a cluster). Well-defined and stable clusters have a large between-variance and a quite small within-cluster variance. The optimal number of clusters is the one that has the highest Calinski-Harabasz index value. Nevertheless, since the VRC tend to decrease by increasing the number of clusters, Mooi et al. (2018) suggest computing the difference in the VRC values (ω_k) of each solution by using this formula $\omega_k = (VRC_{k+1} - VRC_k) - (VRC_k - VRC_{k-1})$. Table 10 reports the values of the Calinski-Harabasz index and the ω_k for each k value. As said above, in order to manage the heterogeneity of the cluster in the best way, this thesis takes only into consideration k = 3, k = 4, k = 5 and k = 6. Looking at these values, the highest Calinski-Harabasz index value corresponds to k = 4 clusters, that is the best cluster solution in the case of the Cazamentiras game dataset.

K	Calinski-Harabasz index value	ω (k)
2	370,64	-
3	**280,67**	**-**
4	**298,91**	**108,21**
5	**260,69**	**-56,46**
6	**242,85**	**20,38**
7	274,76	49,75
8	238,3	-68,37
9	259,4	57,56
10	191,43	-89,07
11	235,66	112,2
12	245,6	-34,29
13	233,31	-22,23
14	267,17	46,15
15	224,27	-76,76

Table 10: Summary of the Calinski-Harabasz index value for k = i (i = 2, …, 15) and the corresponding ω values.

To verify that the distribution of variables in a cluster is statistically different from the other clusters, it is possible to use the Kruskal-Wallis H test (see Statistics summary for further details). Table 11 reports some of the variables used in the previous analyses and reports the p-values of the K-Wallis ANOVA. This test helps us identify the significant variables that differentiate the clusters the most: this is useful because it allows us to understand what are the features that play a major role in differentiating clusters between them. CRT and Conf_Bias_NEW have a statistically significant p-value, meaning that their distribution across clusters is different, almost in the case of any number of clusters k. Lang_Dummy and GPA_H, that are the manipulated variables of languages and GPA, result identically distributed across clusters until k=5. In conclusion, CRT is the only variable that is significant in the case of any k, so it means that it is the variable that weights the most in differentiating clusters, followed by Conf_Bias_NEW (significant when k = 3, 4, 6). Looking at Table 12, we can see the summary statistics of CRT and Conf_Bias_NEW in the four clusters. Cluster 1 (the magenta one) has a CRT mean of 1.20, which makes it the cluster with the subjects with the lowest CRT score. On the contrary, cluster 3 (the hot pink one) has the highest mean in CRT (1.91). Cluster 4 (the blue one) not only has the second lowest mean of CRT but is also the group with the highest confirmation bias mean (4.63). Cluster 3 is also the best one in terms of confirmation bias: it has the lowest mean (3.88) among the four clusters.

Variables	k=3	k=4	k=5	k=6
female	0,851	0,766	0,858	0,419
CRT	**0,008**	**0,083**	**0,001**	**0,002**
lang_DUMMY	0,269	0,444	0,531	**0,019**
GPA_H	0,829	0,639	0,201	**0,097**
income_NEW	0,587	0,179	0,350	0,283
RSR_NEW	0,874	0,788	0,691	0,516
EduPE_NEW	0,786	0,827	0,266	0,368
partyNEW	**0,084**	0,130	0,162	0,410
Conf_Bias_NEW	**0,008**	**0,074**	0,564	**0,098**
Media_Literacy_1	0,444	0,668	0,177	0,631
Media_Literacy_2	0,367	0,172	0,360	0,447

Table 11: Summary of the Kruskal-Wallis p-values.

Cluster 1

Variable	Obs	Mean	Std. dev.	Min	Max
CRT	83	1,204819	1,266443	0	3
Conf_Bias_NEW	83	4,493976	1,223485	1	7

Cluster 2

Variable	Obs	Mean	Std. dev.	Min	Max
CRT	32	1,875000	1,313700	0	3
Conf_Bias_NEW	32	4,093750	1,253624	1	7

Cluster 3

Variable	Obs	Mean	Std. dev.	Min	Max
CRT	35	1,914286	1,379928	0	3
Conf_Bias_NEW	35	3,885714	1,105373	1	5

Cluster 4

Variable	Obs	Mean	Std. dev.	Min	Max
CRT	38	1,236842	1,261364	0	3
Conf_Bias_NEW	38	4,631579	1,261082	3	7

Table 12: Summary statistics of the proxies of cognitive reflection and confirmation bias across the four clusters generated by the cluster analysis. The first cluster includes 83 subjects, the second one 32, the third one 35, and the fourth one 38 students.

Chapter 6

CONCLUSIONS

Everyone should know the truth, and there are private and social reasons why this is desirable, especially in democracies (Allcott and Gentzkow, 2017; Kahne and Bowyer, 2017). The democratic systems indeed work better if citizens care about accuracy and are in danger when they are not able to judge the truthfulness of political claims. Fake news are a global phenomenon that will continue to grow exponentially in the next few years, and identifying and defining them has become a key theme in information research (Belloir et al., 2022). It is a debated topic especially because it deals with the collective decision process and the common good (Vraga and Tully, 2015). That is why some deem fake news as new political weapons, since they do not allow citizens to take conscious decisions and confuse minds (Lazer et al., 2018; Belloir et al., 2022; Vegetti and Mancosu, 2020; Rollwage and Fleming, 2020; Kim et al., 2021). The primary goal of false news is indeed to persuade people by triggering emotional responses and exploiting human cognitive biases (Belloir et al., 2022). One of the most relevant results would be to stop sharing fake news online, because they feed excitement and curiosity and create a vicious cycle of falsehood that expands to reality (Kim et al., 2021). This paper does not aim at solving the problem of misinformation spread, as it represents a small tile in the behavioral economics literature. However, it is useful to strengthen the existing knowledge and emphasize the most critical features of studies on fake news. The Cazamentiras project also brings some innovations, such as the format of a prize game with economic incentives and the intention to repeat the experiment in other universities in the future.

6.1 Solutions to the Issue

Some believe that governments should regulate fake news online by implementing efficient detection systems and punishing those found uncompliant. 45% of US adults state that the government, public officials, and politicians are responsible for preventing false news from gaining attention (Barthel et al., 2017). Even though this could seem a good solution, many would consider it as a form of

censorship, because there would be no guarantee that these powers do not block profiles to their own advantage. Others think that online platforms themselves should find an effective method to detect and block users that spread misinformation. They could work in partnership with academics to develop platforms that stop or at least slow down the loop (Lazer et al., 2018; Kahn, 2023; Barthel et al., 2017; Susarla, 2023; Acemoglu et al., 2021). Another possibility is to employ the algorithms that build users' feeds to diversify the content consumption and decrease polarization and media segregation. It is indeed proved by research that once exposed to aggregated information about the true state of the world, people are willing to consider alternative views, and, as a consequence, polarization vanishes (Levy, 2021; Azzimonti and Fernandes, 2018). However, social media platforms need to find strong incentives to implement this option, since they earn more by doing the opposite. A further option is to invite common users to evaluate the accuracy of articles, and to aggregate the ratings to give every publisher a score (Pennycook and Rand, 2021; Feenstra and Casero-Ripollés, 2014). This may be more effective because of an exponentially greater number of single scores that generate an average, instead of the evaluation of a couple of fact checkers, but the evaluations are likely to be biased by the familiarity effect or personal preferences in political or economic matters.

Many studies suggest that media literacy is the most powerful and already-available method that every user can implement (Vegetti and Mancosu, 2020; Kaplan, 2023; Anders, 2023; Pennycook and Rand, 2021; Brashier et al., 2021; Jones-Jang et al., 2019; Pennycook and Rand, 2022; Amazeen and Bucy, 2019; Vraga and Tully, 2015). This type of literacy includes the skill to analyze, judge, and process the information coming from the media that is necessary to participate in democratic and social life (Craft et al., 2017). It has already been demonstrated that higher levels of media literacy help understanding events better, developing critical thinking, and judging the accuracy of political news (Vraga and Tully, 2016; Kahne and Bowyer, 2017; Craft et al., 2017). News literacy also decreases the likelihood of believing in conspiracy theories and facilitates the comprehension of the dynamics of media industries and content (Kim et al., 2021; Amazeen and Bucy, 2019). Some researchers recommend carrying this type of education to schools and universities to teach students to discern true and false news. A downside of this approach is that the older population or people that do not have access to higher education would be excluded by this initiative (Kim et al., 2021; Vraga and Tully, 2015).

In this field experiment, researchers decided to measure literacy by generating proxies of usage, familiarity, and experience with different media. As an example, question 13 in task 8 asks: "Which of the following websites or apps have you ever heard of? Which of them do you usually use?" And researchers listed some very popular websites, such as Google, Bing, Yahoo, Msn, Ask.com, Baidu, that

participants have to classify either in “I have heard of that one” or “I usually enter that webpage or use that application”. Question 10, instead, asks to tick the options that answer to “Which of the following things, if any, have you ever done?”. Some of the activities included report harmful or inaccurate information that you have seen online on the Website or App, for example, reporting an offensive post on Twitter, or search online to verify information during a conversation with friends or family, for example, “let's Google this…”, or explain or show others how to stay safe online, for example, by showing them how to change their privacy settings or use software such as virus scanners. From the results of the statistical analyses described in Chapter 5.2, we can state that media literacy is a good predictor of fake news detection and correct headlines classification, alongside developing cognitive skills. On the other hand, socio-demographic variables do not play a significant role in discerning truth from fake news.

In general, a solution to the spread of fake news is hard to find also because it would somehow limit individuals’ freedom of speech online (Anders, 2023). In that case, what would be the difference between expressing an unconventional opinion and a false claim? It is highly unlikely for authorities to find a solution that allows to exclude “bad” users and is constitutionally acceptable (Sustein, 2001). Another boundary is represented by the nature of the Internet itself. Who controls the content published and decides where to set the limit? Is it really necessary for anyone to have this power? What are the consequences of a decision as such? As long as these questions do not have a clear answer and academics do not decode the universal “recipe” of fake news, there will always be doubts and confusion online. Moreover, there is another factor that favors the spread of fake news, and that is word-of-mouth. People enjoy gossip and eccentric news, and this negatively contributes to the purpose of this fight. This attitude implies that removing fake news online by identifying and blocking the misinformation sources may not be enough, especially if people spread news among their acquaintances. However, the reach that a person can cover offline is incomparable with the prominence of online viral content. After these considerations and the analysis of past literature, it appears clear why fake news are sneaky and challenging. This explains why authorities invite citizens to pay attention when reading news online and to educate themselves through the use of fact checkers. Critical thinking and attention to accuracy are the main ingredients for a safe information consumption.

Unluckily, this may not be enough. As discussed in section 2.3, a relevant progress to keep an eye on is the one of artificial intelligence and its applications. It is indeed fundamental to understand that the more learning and training AI tools are able to get, the more easily fake news will be spread online. As of now, most of the generative AI has been used to entertain and make satire, but the learning is

growing fast (Kahn, 2023). For any progress in the detection of fake news, there is a corresponding increase in the quality of produced fake content. The editing skills of current technologies are so developed that they can produce realistic photos and videos that show something that has never happened (Susarla, 2023). Having said so, it is simple to imagine what headlines will look like in a couple of years. These abilities, tied up with the features of high speed and virality of social media, are likely to permanently affect the information market.

6.2 Limitations and Further Research

Every study presents some critical aspects that need to be improved to make future replications less biased and more generalizable. An experimental setting like the one of Cazamentiras does not allow for a high degree of control, and this is true for the majority of research run on the field. This implies that, differently from lab studies, there can be confound variables that influence respondents' answers. From a purely academic standpoint, studies about online misinformation and fake news are a powerful educational tool to test theories about socio-cognitive psychology. Moreover, experiments such as the Cazamentiras one that are carried out on the field are ecologically valid, given their real-world setting. In addition, there is also the possibility to mix field experiments on fake news with large-scale social media data to capture the dynamics of news circulation and consumption (Pennycook and Rand, 2021). Having said so, the Cazamentiras project has some limitations. First, it is important to underline that the dataset collected is very homogeneous: students share many characteristics, from age to academic background, and are exposed every day to similar inputs. This results in a low external validity, which means that these results are not generalizable to other settings, people, or situations. Secondly, as already mentioned earlier, asking respondents to evaluate whether a headline is true or false increases their attention level over the standard and contaminates results, to a certain extent. Besides, the feature that distinguishes Cazamentiras from other fake news studies potentially exacerbates this issue. The competition-prize format indeed foments students to put more effort and attention when answering the tasks to win. Related to this aspect, it is important to say that researchers took certified pieces of information from fact-checking websites and presented them to the participants. It is possible that some of the students understood where the news were from and went searching for them to win the final prize. Unfortunately, this is impossible to know, and represents a limitation.

Frederick (2005) reports an observation regarding the Cognitive Reflection Test. He states that there exists a correlation between a measure of cognitive ability (i.e., CRT) and some response that is useful to identify the "better response". Some researchers do not agree with his inferences. They state that CRT is useful to

identify a specific type of cognitive abilities, but it is not able to evaluate the quality of thinking or the absolute truth. This could potentially hold for the Cazamentiras experiment too. A general drawback of experiments on fake news has been underlined by research (Lazer et al., 2018; Pennycook and Rand, 2021; Pennycook et al., 2018; Gelfert, 2018; Salovich et al., 2022). Once respondents are exposed even once to a headline, it is more likely they will believe it, because of the familiarity effect, and this happens independently of the consistency with the political partisanship. As in many other studies, a trade-off is needed to address whether the positives outweigh the negatives in experiments as this one.

Another limit of the Cazamentiras study is the sample: randomization was not respected, being the test units selected on a voluntary basis without controlling for potential biases. This implies that results might not be generalizable to the whole population under analysis. An additional drawback is represented by the low number of respondents. Although the researchers collected plenty of data from the attitudinal tests, the socio-demographic information, and personal details, they expected a higher participation rate. Being the experiment on a voluntary basis to respect ethical guidelines, many students did not feel nudged to participate, even though the tasks were designed to be short and accessible through any device. This potentially affected the clustering too, alongside the generalizability of results. The more representative the data, the more precise and reliable the clusters, and with a small number of test units it is difficult to confidently look at these results. The sample could be broadened by involving the university in recruiting participants and promoting the experiment in the campus, or by considering this experiment as part of a course requirements (Lord et al., 1979). In any case, this study is useful to stimulate attention and develop critical thinking, so it should be replicated in other settings and with different typologies of respondents, too. For the future, it could be interesting to test whether results obtained in universities are significantly different from those in other contexts. As a further development, the researchers of this study would like to replicate it at LUISS University in Rome. In particular, the LUISS School of Journalism has a digital publication called Zeta with a fact-checking unit that could serve as a database of original and yet unpublished content. This would be a solution to the first limitation. Additionally, it seems necessary to involve the university in the project more formally than in this study.

Statistics summary

Linear regression (Mooi et al., 2018)

Linear regression is a useful statistical tool to study if one or more independent variables (also called explanatory) have a significant effect on a dependent variable. They do so by estimating the regression coefficients, that indicate the strength of each variable on the dependent one. The aim of an analysis as such is to make predictions based on the data of a sample, to eventually extend the findings to a bigger population and to build a general framework, if the results are strong and valid enough. There can be regressions with only one explanatory variable (simple regression), or with more than two (multiple regression). The multiple linear regression takes this form:

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_p X_{ip} + \epsilon_i$$

Y is the dependent variable, so the phenomenon aimed to be studied. The Xs are the independent variables, those that need to be tested to verify whether they play a significant role on Y. β_0 is the intercept of the model and it is a constant value. This constant indicates what is the dependent variable, in the case the explanatory variables are equal to 0. The βs represent the estimated regression coefficients for every independent variable included in the model. Most of the times, these coefficients are estimated through the OLS method (ordinary least squares). This arbitrary methodology fits the regression line to the data so that it minimizes the sum of the squared distances from the data to the line. The distance between the observations and the regression line are squared not to cancel positive distances (above the line) with negative ones (below the line). Plus, this method allows to account for the observations that are further from the line, putting more weight on them, while somewhat reducing the relevance of those very close to the line.

Cluster analysis (De Giovanni and D'Urso, 2018; Mooi et al., 2018)

The cluster analysis is a learning method that aims at creating groups of statistical units (i.e., respondents) that are similar between them according to some variables decided a priori by the analyst. In this study, each respondent is assigned exactly to a cluster, meaning with a membership degree equal to 1 (hard clustering). In clustering, similarity is calculated through distance: the more distant two clusters, the more dissimilar the units included in each of them. This means that, considering a whole dataset, each cluster should be the furthest possible from other clusters, implying that the members belonging to each of them are very different. At the same time, though, the units included in a cluster have many characteristics in common. There are two methods to create clusters: hierarchical and non-hierarchical clustering. On the one hand, in the hierarchical method, the number of clusters is unknown until the analysis has not been carried out. The number of clusters then depends on the software output, that includes the distances from units and their cluster and in-between clusters. On the other hand, the non-hierarchical clustering allows to find the best partition possible having a pre-specified number of clusters. It is possible to apply two different techniques for hierarchical clustering: the agglomerative one allows to merge single units into a single and bigger one, while the divisive one splits the single one into many smaller units.

Distance is expressed through a distance matrix n x p where n = number of units and p = number of variables. Each row, then, describes a statistical unit according to p variables. In order to create clusters, a software (such as STATA) measures the coordinate distances among units to assign them to the group they are the closest to. There exist different ways to calculate distance between two points p and q in the space, but in this paper only the Euclidean distance is employed, which is $d(p, q)^2 = (q_1 - p_1)^2 + (q_2 - p_2)^2$. Basically, the closer units are merged in one cluster and a new distance matrix is created. At this point, this repeats again and again until there is only one big cluster. From this, software generates a dendrogram that should be interpreted to pick the best fitting number of clusters.

K-means, instead, is the technique used in non-hierarchical clustering: starting from a pre-defined artificial number of clusters, it measures the distance between these and their centers and repeats the calculation in order to reduce such distance. This method is preferred in the case of very rich datasets: given that the number of clusters is define a priori, it is faster to compute than a hierarchical clustering.

The aim of clustering is to be able to sufficiently discriminate between cluster, following a specific objective. In this paper, cluster analysis is used to generate groups according to behavioral variables that should help us building the identikit of a good Cazamentiras, that is a student who is able to spot fake news and categorize them correctly.

Kruskal-Wallis H test (Mooi et al., 2018)

This test is the non-parametric equivalent of the ANOVA, meaning that it does not assume that the data follow a normal distribution N (μ, σ^2). It is a method to compare two or more independent samples. The null hypothesis is that the distribution of a variable across groups is identical, against the alternative hypothesis that states that they are different.

H_0 = there is no difference in the median values of the groups
H_A = there is a difference in the median values of the groups

Rejecting the null hypothesis implies that the distributions vary in dispersion or variability. In this paper, this test is used in the context of a cluster analysis to understand if the clusters differ (i.e., are distant in an artificial multidimensional space) between them according to some variables of interest.

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Appendix

Task 1

Please answer these questions so that we have a little more information about you. Remember that your answers will not be related to your personal data. It is important that you are honest all the time.

1. E-mail @alu.ua.es
2. Pseudonym of this contest
3. What grade do you study?
   ADE
   LATE
   DADE
   Economics
   I2ADE
   Marketing
   International relations
   Law + International Relations
   Advertising and public relations
   Labor Relations and Human Resources
   Other

4. If you have marked "other", write here what degree you study at the University of Alicante.
5. What grade class are you in? Please answer with a number.
6. In which group of that course do you go to class?
7. Please, write here the full name of your class friends (put a maximum of 10 friends).
8. Mark all the subjects on the list in which you are enrolled this semester:
   Introduction to statistics
   Statistics I
   Intermediate Macroeconomics
   Econometrics I
   Advanced Microeconomics

Public Economy
Introduction to Economics
Quantitative Methods Applied to International Relations
Labor Economics (from the degree of Labor Relations and Human Resources)
None of the above

9. If you have marked more than one subject, in which of them do you have more friends in class? Write only one subject where you feel most comfortable with your classmates.

Personal data

10. Age
11. Gender
F
M

12. How many languages do you speak?
1
2
3
4
More than 4

13. Are you?
Left-handed
Right-handed
Ambidextrous

14. How many siblings do you have? Please answer with number/s.

15. How are you related to the main earner in your family?
It's me
is my husband/wife
is my father/mother
is my brother/sister
He is my grandfather/grandmother
is my son/daughter
no blood relation
no relationship at all

16. What is the situation of the main source of income in your family?
    Pensioner
    Jobless, looking for a job
    No job, not looking for a job
    Self-employed worker
    Employee
    Student
    Housewife
    Other

17. What is the education level of the main income earner in your family?
    No academic training
    Primary
    Secondary
    university
    Post University

18. How many people live in your house? Please, answer with number/s.

19. How many rooms does the house you live in have (including bathroom and kitchen)? Please, answer with number/s.

20. Have you worked (work activity) during the last week?
    No
    Yes, less than 5 hours
    Yes, from 5 to 10 hours
    Yes, from 10 a.m. to 3 p.m.
    Yes, from 15 to 30 hours
    Yes, more than 30 hours

21. On average, how much money do you have weekly (in euros)? Please answer with numbers.

22. What is your average grade (out of 10)? Please, answer with number/s.

23. What is your height (in centimeters)? Please answer with numbers.

24. What is your weight (in kilograms)? Please answer with numbers.

Three “mathematical” questions

25. A bat and a ball cost €1.10 in total. It is known that the bat costs €1.00 more than the ball. What is the value of the ball (in cents)? Please, answer with number/s.

26. If 5 machines are needed to run 5 minutes to produce 5 cans: How long should it take 100 machines to produce 100 cans (in minutes)? Please, answer with number/s.

27. In a lake there is an area that contains lilies. Every day that area doubles in size. If in 48 days the lake is completely covered with lilies: How long does it take to cover half the lake (in days)? Please reply with number/s.

Postures and attitudes

28. Please tell me: in general, to what extent are you willing or not willing to take risks? Please rate this on a scale from 1 to 7, where 1 means "not at all willing to take risks" and 7 means "very willing to take risks".

29. Now I am going to ask you about your willingness to act in certain ways. Please indicate your answer again on a scale of 1 to 7. A 1 means "not at all willing to do that" and 7 means "very willing to do that". You can also use any number between 1 and 7 to indicate where would you be placed on the scale.

How much are you willing to give up something that is beneficial to you today, in order to benefit more from it in the future?
How much are you willing to punish someone who treats you unfairly, even if it might cost you?
How much are you willing to punish someone who treats other people unfairly, even if it might cost you?
How much are you willing to make donations to charitable causes, without expecting anything in return?

30. To what extent do the following statements describe you as a person? Please indicate your response on a scale of 1 to 7. 1 means "it does not describe me at all" and 7 "describes me perfectly".

When someone does me a favor, I am willing to return it.
Unless I am convinced otherwise, I assume that people have only the best intentions.
I am good at math.
I tend to put things off even when I know it would be better to do them right away.

31. Which would you prefer: a raffle with a 50% chance of winning €100 and the same 50% chance of receiving nothing, or the amount of x € as a secure payment? (They have to choose RAFFLE or SECURE PAYMENT for the following options)

If x=€10?
If x=20€?
If x=30€?
If x=40€?
If x=50€?
If x=60€?
If x=€70?
If x=€80?
If x=90€?

32. Imagine the following situation: Today you unexpectedly receive €700. How much of this amount would you donate to a good cause? (Values between 0 and 700 are acceptable).

33. Imagine being given a choice between receiving a payment today or a payment 12 months from now. Now we are going to present you 15 situations. The payment today is the same in each of these situations. The payment in 12 months is different in each situation. For each of these situations we would like to know which one you would choose. Please imagine no inflation. That is to say, that the prices are like those of today. (They have to choose TODAY or WITHIN 12 MONTHS for the following options)

Receive €100 today or €102 in 12 months?
Receive €100 today or €103 in 12 months?
Receive €100 today or €105 in 12 months?
Receive €100 today or €107 in 12 months?
Receive €100 today or €110 in 12 months?
Receive €100 today or €115 in 12 months?
Receive €100 today or €120 in 12 months?
Receive €100 today or €125 in 12 months?
Receive €100 today or €130 in 12 months?
Receive €100 today or €140 in 12 months?
Receive €100 today or €150 in 12 months?
Receive €100 today or €175 in 12 months?
Receive €100 today or €200 in 12 months?
Receive €100 today or €250 in 12 months?
Receive €100 today or €300 in 12 months?

Task 2

1. This graph was published on its social networks by the Popular Party.

Partido Popular
24 de marzo ·

De cada 100€ que echas de gasolina, 57€ se los lleva Sánchez.

El Gobierno hace caja mientras los españoles cada día se empobrecen más.

#MenosImpuestosYA

2 500 comentarios 1570 veces compartida

Me gusta Comentar Compartir

2. Donald Tusk, former Prime Minister of Poland, and current Chairman of the European People's Party posted this photo on his Facebook and Twitter accounts with the caption: “Just don't tell him, please, that tougher sanctions would be too expensive for Europe!”, referring to the sanctions on Putin due to the war in Ukraine.

Donald Tusk
11 de marzo ·

Tylko nie mówcie jej proszę, że ostrzejsze sankcje byłyby zbyt kosztowne dla Europy!

2103 comentarios 4521 veces compartida

Me gusta Comentar Compartir

3. The president of the Xunta de Galicia, Alberto Núñez Feijóo (PP), highlighted in an interview that "Vox did not get a single deputy in the autonomous community", nor "has a single councilor in any town hall of the 313" in which Galicia is politically distributed.

"Vox did not get a single deputy
in the Autonomous Community in
government (Galicia), Vox does not have a
single councilor in no Town Hall
of the 313"

Alberto Núñez Feijóo
Presidente de Galicia

06-07-21

4. Pablo Casado, former leader of the Popular Party, stated in an electoral debate regarding Spain that: "Of every 500,000 pregnancies, 100,000 end in a voluntary interruption"›.

"Of every 500,000 pregnancies,
100,000 end in an outage
voluntary"

Pablo Casado

5. The former president of the Junta de Andalucía, Susana Díaz (PSOE), assured in an interview that Andalusia has "the same number of graduates as countries like Germany.

"We have the same number
of graduates which countries
like Germany"

Susana Díaz Pacheco

6. The president of En Comú Podem in the Parliament of Catalonia, Jéssica Albiach, assured in a press conference that: “While in Catalonia we have lost a decade with renewable energy, on the islands energy from renewable sources has almost tripled”, referring to the Balearic Islands.

“While in Catalonia we have
a decade lost with the energies
renewable, on the islands they have almost
tripled the source energy
renewable”

Jéssica Albiach
Presidenta de En Comú Podem en el Parlament de Catalunya

25-03-22

7. The deputy and president of the New Generations of the Popular Party (PP), Bea Fanjul, assured in the act of her party that “40% of young people are unemployed, 20% suffer school failure and 60% cannot even go live away from their parents' house.

“While 40% of young people are
unemployed, 20% suffer school failure and
60% can't even go live
away from his parents' house

Beatriz Álvarez Fanjul
Diputada

01-04-22

8. The deputy and spokesperson for the PSC in the Parliament of Catalonia, Alícia Romero, stated in an interview: “When we [the deputies] finish our term, we do not have the right to unemployment, we do not have compensation.”

“We [the deputies] when
we finished our term
we have no right to unemployment
We don't have compensation”

Alícia Romero

Portavoz del PSC en el Parlament catalán

19-02-22

9. “And by the way we are the fifth in Europe in vaccination and the twelfth in the world, we are not so bad,” said Salvador Illa, Minister of Health between 2020 and 2021 and current First Secretary of the PSC, in a debate on RTVE.

“We are the fifth in vaccination
in Europe and the twelfth in the world”

Salvador Illa

31-01-21

10. The spokesman for Ciudadanos in Congress, Edmundo Bal, assured that “they have fallen off the horse and have opted to extend the useful life of the German nuclear power plants and interrupt the nuclear closure program.”

[In Germany] “they have opted for
extend the useful life of power plants
German nuclear weapons and to disrupt
the nuclear shutdown program”

Edmundo Bal
Portavoz y diputado

19-04-22

11. The deputy general secretary of the PSOE, Adriana Lastra, assured in a press conference that “it cannot be that the Spanish Popular Party (PP) allows the extreme right to enter to govern for the first time in a European region.”

“The PP is the first party in Europe
that gives entrance to the extreme right
in a regional government

Adriana Lastra
Portavoz del PSOE en el Congreso

09-03-22

12. Una fotografía de una pancarta colgada en el balcón del Palau de la Generalitat de Cataluña, donde se lee “Bienvenidos ucranianos, fuera andaluces y extremeños”, se ha compartido más de 500 veces en redes sociales desde el 23 de marzo de 2022, coincidiendo con la llegada de refugiados tras la invasión rusa.

Task 3

1. During the closing of the XV Congress of the PP of the Canary Islands, the former leader of the PP, Pablo Casado, said: “Mr. [Pedro] Sánchez, since he is incapable of managing European funds, since he has not even been able to execute 100 million of 24,000 that I had budgeted for 2021 (...) take the hand of the Popular Party “

“[Pedro Sánchez] has not been able or
to run 100 million 24,000
that I had budgeted for 2021”

Pablo Casado

23-01-22

2. The President of the Government, Pedro Sánchez, at the inauguration of the XIV Congress of the Canary Islands PSOE, said during his speech:

"When I see the right vote against the revaluation of pensions, or vote against the minimum vital income, or vote against the scholarships –2,100 million euros that we are going to put in the budgets to benefit, among others, 96,000 Canarian students– what I wonder is what interests does it defend?"

Pedro Sánchez
Presidente del Gobierno

20-11-21

3. The president of the Community of Madrid, Isabel Díaz Ayuso, assured in the presentation of a new campaign with which the region intends to recognize Hispanic talent that "almost 12% of Madrid residents were born on the other side of the Atlantic."

"Almost 12% of Madrid residents
They were born on the other side of the Atlantic"

Isabel Díaz Ayuso
Presidenta de la Comunidad de Madrid

31-03-22

4. The leader of Ciudadanos, Inés Arrimadas, said in an interview in La Razón that "Andalusia has gone from being the region with the highest unemployment in Spain to the region that creates the most employment. And it is Cs who runs the Employment Council".

"Andalusia has gone from being the region
with more unemployment from Spain to the region
that creates the most employment, and it is Cs who leads

Inés Arrimadas
Presidenta de Ciudadanos

11-04-21

5. The Second Vice President of the Government and Minister of Labor and Social Economy, Yolanda Díaz, in the Breakfasts of Europa Press, highlighted the impact that the increase in the interprofessional minimum wage has had and assured that "we have reduced the pay gap between men and women by five points".

"We have reduced five points the
pay gap between men and women"

Yolanda Díaz
Vicepresidenta segunda del Gobierno y ministra de Trabajo y Economía Social

04-05-22

6. The president of the United States, Joe Biden, of the Democratic party, affirmed in the Union Address this 2022: "we have enabled patrols with Mexico and Guatemala to capture human traffickers."

"We have enabled patrols with Mexico
and Guatemala to capture traffickers
of people"

Joe Biden
Presidente de los EEUU

01-03-2022

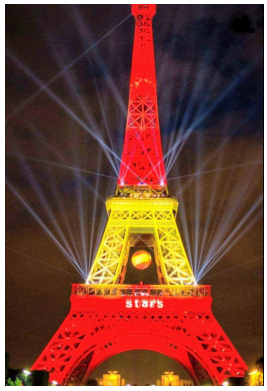
7. The deputy secretary of the PP, Antonio González Terol, in an interview on the Hoy Responde program of OkDiario said that "The legacy of King Juan Carlos I makes it very possible that this return could take place (...) Because, I insist, he is not being investigated for no matter, is not imputed for any matter. And, therefore, as an ordinary citizen that he is, today he meets all the conditions to be able to be wherever he wants".

"[To Juan Carlos I] Because I insist, I don't know
investigates him for no matter, no
He is indicted for no matter"

Antonio González Terol
Diputado

03-08-21

8. A photograph of the Eiffel Tower illuminated with the colors of the Spanish flag was shared by nearly a thousand users in 2020, following tennis player Rafael Nadal's thirteenth victory at the French Roland Garros tournament, ensuring that the Paris monument was He dressed in red and gold for the victory.



9. In March 2022, an image went viral on social media showing a building illuminated in blue and yellow, the colors of the Ukrainian flag. Protesters in

Lisbon, Portugal illuminated the Russian embassy in Lisbon with the colors of the Ukrainian flag projected onto the building.

10. In April 2022, a meme was shared on Facebook that read “A Michigan State University professor has created transparent solar panels that have the potential to power buildings and can be retrofitted to windows or older glass exteriors.”

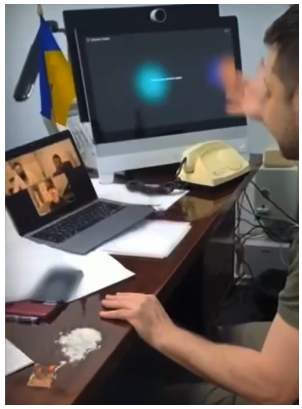
11. Bill Gates, the billionaire co-founder of Microsoft, had a few run-ins with the law in his youth, including one that led to an infamous mugshot that continues to haunt the internet today. The mugshot shows a young Bill Gates after he was arrested in 1977 in Albuquerque, New Mexico, for running a stop light and driving without a license.

12. During the Russian offensive against Ukraine, terrified Ukrainian parents tried to safeguard their children. A viral photo that clearly captured the desperation felt by these parents showed a toddler, dressed in diapers, with her name, date of birth, and her parents' phone numbers scrawled on her back in black ink. It was posted on Twitter in April 2022 by Ukrainian journalist Anastasiia Lapatina.

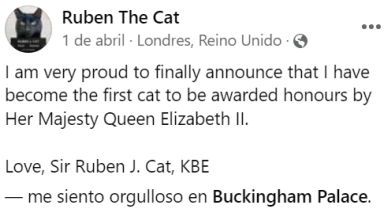
Task 4

1. Social media users claimed that Amber Heard uttered lines taken verbatim from the movie “The Talented Mr. Ripley” last May in her testimony during a defamation trial brought by Johnny Depp.

2. A viral video that surfaced in the spring of 2022 showed cocaine on the desk of Ukrainian President Volodymyr Zelenskyy during a video call with billionaire Elon Musk.



3. Social media users shared a post last April about “Sir Ruben J. Cat, KBE,” a cat named Ruben who was knighted by Queen Elizabeth II.



4. A photograph shows Chris Rock wearing a protective pad on his cheek before Will Smith came onstage and slapped him at the 2022 Oscars.

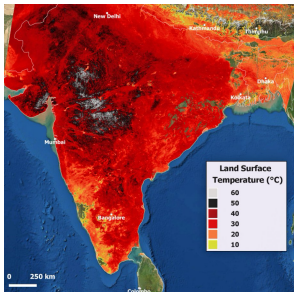
5. A photograph shows a mother and son from the Mangbetu tribe, where they practiced head-lengthening from an early age, believing it to be a sign of intelligence and beauty.

6. In 1963, Dutch businessman Alfred “Freddy” Heineken created a bottle that could also function as a brick to build houses in impoverished countries.

7. The family of a 31-year-old patient, in January 2022, protested that he was denied a heart transplant at a Boston hospital because he had refused to be vaccinated against COVID-19.

8. Several memes circulated on Facebook and Twitter after actress Jada Pinkett Smith's husband, Will Smith, slapped comedian Chris Rock at the Oscars, with a quote from the actress saying: “Don't let your husband stop you from finding love. of your life”.

9. A map of India has been shared on social media more than 7,000 times since April 29, 2022, highlighting the “extreme weather” or “extreme heat” forecast for that day or the day after. Users indicated temperatures of 62 or 63 degrees Celsius in the post.



10. Posts on social networks warned that the "aphelion phenomenon" began in April 2022, which occurs when the Earth is further from the Sun and, as a consequence, brought cold temperatures and negative effects on human health.

11. Since May 9, 2022, the claim that U.S. federal judge Mark Pittman forced the pharmaceutical company Pfizer to release otherwise classified Covid-19 vaccine documents has been shared dozens of times online. 75 years.

12. The Deputy Secretary of Economy of the national PP and Minister of Finance and European Financing of the Junta de Andalucía, Juan Bravo, assured in an interview on TVE on April 28 that the State has up to 20,000 million in "almost extraordinary" collections.

"The State is collecting more than never, is that it has up to 20,000 million collection almost extraordinary"

Juan Bravo

Consejero de Hacienda y Financiación Europea en la Junta de Andalucía

28-04-22

Task 5

1. Publications shared more than 5,000 times on social networks in May 2022 ensure that the draft Law on sexual and reproductive health, approved in Spain on May 17 by the Council of Ministers, will allow women to have three days off per month " by the rule".

2. A message circulates on social networks that ensures that mothers keep custody of the children in 90% of divorce cases, in addition to "the house" and "furniture". "Deleting dad: In 90% of divorces, the woman keeps the house, the children...", says the viral message. In addition, he affirms that "the man will see his son only 4 days a month" and that "this is gender violence."

3. During the control session with the Government held last October, the deputy of the Popular Party Cuca Gamarra addressed Nadia Calviño, First Vice President and Minister of Economic Affairs and Digital Transformation, to ask her about aid to the self-employed, SMEs and large companies. "Of the 40,000 million planned for ICO investment loans, only 8,000 have been granted, 20%," said Gamarra in his speech.

"Of the 40,000 million foreseen
for ICO investment loans
only 8,000 have been granted, 20%"

Cuca Gamarra
Diputada

13-10-21

4. Pablo Casado, former leader of the Popular Party, assured last year that during the stage in which Mariano Rajoy governed they recovered all the destroyed female employment.

"With Rajoy we recovered all the
female employment destroyed in the
Governments of Zapatero"

Pablo Casado

5. The former president of the Junta de Andalucía, Susana Díaz (PSOE), highlighted during her candidacy the good progress of employment in recent years. In a debate prior to the elections, Díaz assured that "Andalusia is the region that has created the most employment in recent years."

"Andalusia is the region that most
employment has been created in recent years.

Susana Díaz Pacheco

6. Juan Manuel Moreno Bonilla, current president of the Junta de Andalucía since 2019 (PP), in a debate prior to the elections, assured that "Andalusia is the Autonomous Community that spends the least on Health per inhabitant."

"Andalusia is the community
who spends less on health
Per inhabitant"

Juan Manuel Moreno Bonilla

7. The First Vice President and Minister of Economic Affairs and Digital Transformation, Nadia Calviño, spoke about the measures adopted by the Government to deal with the price of gasoline and diesel, and stated that, comparing Spain with the rest of the European countries, Spain is one of the countries with the lowest (gasoline and diesel) prices, before and after taxes.

"Comparing Spain with the rest
of European countries, is one of the countries
What are the prices (gasoline and diesel)
lower, before and after taxes"

Nadia Calviño
Vicepresidenta tercera y ministra de Asuntos Económicos y Transformación Digital

06-05-22

8. Juan Bravo, Minister of Finance of the Junta de Andalucía and deputy secretary of Economy of the PP, affirmed that "73% of those surveyed in the CIS what matters most to them is inflation."

"73% of those surveyed in the CIS
what matters most is inflation"

Juan Bravo
Consejero de Hacienda y Financiación Europea en la Junta de Andalucía

07-04-22

9. In the weekly press conference of Unidas Podemos last March, the party's spokesman, Pablo Fernández, criticized: "It cannot be that, in the current

context, last year the large electric companies have increased their profits by four, while at the Families find it hard to pay the electricity bill".

"(...) last year the big electricity have increased by four its benefits"

Pablo Fernández
Secretario general de Unidas Podemos en Castilla y León

21-03-22

10. Last May, the Prime Minister, Pedro Sánchez, stated at a PSOE event in Jaén that in Andalusia "the first law on climate change in democracy in Spain was approved".

"Here [in Andalusia] the first climate change law of the Democracy in Spain"

Pedro Sánchez
Presidente del Gobierno

14-05-22

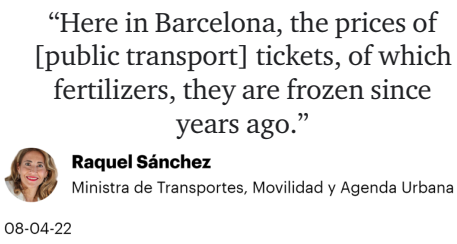
11. "I am concerned about the humanitarian crisis in Ukraine", said the president of Galicia and candidate to preside over the PP, Alberto Núñez Feijóo, in an act in La Palma last March. Feijóo insisted that "Ukrainians are here," but "we don't even have a law or a decree that allows us to care for these people who are fleeing their countries because they are being killed in an illegal war," he said.

"We don't even have a law or a decree that allows us to serve these people who are fleeing [from Ukraine]"

Alberto Núñez Feijóo
Presidente de Galicia

14-03-22

12. The Minister for Transport, Mobility and the Urban Agenda (PSOE), Raquel Sánchez, stated in an interview that the prices of public transport tickets in Barcelona "have been frozen for years".



Task 6

This task will not modify your contest score in any way. Please answer these questions so that we have a little more information about you. Remember that your answers will not be related to your personal data. It is important that you are honest at all times.

1. Write here your pseudonym of this contest.
2. Write your email @ alu.ua.es.
3. Gender
   F
   M

4. Please indicate your answer on a scale from 1 to 7. 1 means "not at all agree" and 7 means "strongly agree". You can also use any number between 1 and 7 to indicate where you would place yourself on the scale.

   Religion is an important part of my life.
   I participate regularly in religious activities.
   Politics is an important part of my life.
   I regularly participate in political activities.

5. Please tell us: in general, on a scale where 1 is "Vox" and 7 is "Esquerra Republicana del País Valencià", where would you place yourself?

6. Please tell us: in general, on a scale where 1 is "Vaccines are useless and are harmful to health" and 7 is "Vaccines are the only effective instrument to combat diseases like Covid", where would you place yourself?

7. Please tell us: in general, on a scale where 1 is “Global warming is a natural cyclical phenomenon that pertains to life on our planet” and 7 is “Global warming is mainly a result of human activity and is a serious danger to the survival of our planet”, where would you place yourself?

8. Select the devices from the list that you personally use, for any purpose (please select all the ones you use, without needing to own them):
   Smart TV (television that connects directly to the Internet)
   standard tv
   Digital Video Recorder/DVR
   Radio equipment (either DAB or AM/FM)
   Tablet (such as an iPad, Kindle Fire, or Google Nexus)
   Computer: laptop, desktop, or netbook (PC or Mac)
   Game console or portable game player

   Wearable technology like a smartwatch (like an Apple Watch or Fitbit)
   Smart speakers that respond to voice commands (Amazon Echo/Google Home/etc.)
   None of the above

9. Mark the answer for yourself to each of these questions:
   Do you use a mobile phone personally?
   The mobile you use, is it a smartphone?
   Mobile phone that has a touch screen, allows you to connect to the Internet, manage email accounts and install applications and resources like a small computer.
   Do you ever connect to the Internet? Think of any reason you might have for connecting: use social networks, look at a website or use an app, watch a TV show, or video clip, play online games or check emails, no matter where you do it from.
   Have you ever connected to the Internet through a Smart TV?
   Have you ever connected to the Internet through a Tablet?
   Do you ever connect to the Internet through a computer (desktop or laptop)?
   Have you ever connected to the Internet through a mobile phone?
   Have you ever connected to the Internet through a game console or portable game player?

10. How many hours do you spend connected to the Internet in a typical week? Think of any form of connection and from any device. Please, answer with number/s.

11. How safe do you feel when you do things online?
    Very sure
    Pretty sure
    neither safe nor unsafe
    something insecure
    Nothing sure
    I don't know

Task 7

1. Last March at an act of the Popular Party, Alberto Nuñez Feijóo, president of the Xunta de Galicia and next leader of the party, stated that Spain "is the oldest nation in the world, along with France."

[Spain] "is the nation
oldest in the world,
together with France

Alberto Núñez Feijóo
Presidente de Galicia

11-03-22

2. The Minister of Foreign Affairs, European Union, and Cooperation (PSOE), José Manuel Albares, defended the improvement in international relations with Morocco at the government control session in Congress on April 27. "The agreement reached with Morocco establishes compliance with the commitments between the parties and the rejection of unilateral actions. Migration cooperation was relaunched, meeting a working group that had not done so for two and a half years and which has meant that irregular entries in the Canary Islands have fallen by 45% compared to March of last year, "he said.

"Irregular entries in the Canary Islands
They are down 45% compared to
to the month of March of last year."

José Manuel Albares
Ministro de Asuntos Exteriores, de Unión Europea y de Cooperación

27-04-22

3. Vox vice president and MEP Jorge Buxadé said at a press conference this month that there are "30,000 companies that have disappeared in Spain from January to March 2022."

"[There are] 30,000 companies
disappeared in Spain
January to March 2022"

Jorge Buxadé
Eurodiputado

09-05-22

4. The PP spokesperson in the Congress of Deputies and general coordinator of the party, Cuca Gamarra, stated in an intervention last April that "In February 2020 there was more unemployment than there was in June 2018 and these are not two casual dates. June 2018 means the arrival of Pedro Sánchez and, therefore, the Socialist Government to the Government, and February 2020 is the moment in which the pandemic began, and there was already an economic situation that was latent there."

"In February 2020 there was more unemployment
than the one in June 2018, and
They are not two casual dates. June of
2018 means the arrival of Pedro Sánchez"

Cuca Gamarra
Diputada

20-04-22

5. The general coordinator of the Popular Party (PP), Cuca Gamarra, stated at an informative breakfast last March that "a sector such as agriculture, livestock and fishing, and hunting have been abandoned. And the PP will be there, not only in that demonstration, but also with the policies that we want to promote. It is important that the agricultural income recovers, and the farmers know that when the Popular Party has governed the agricultural income has risen and, however, when we are not in the Government that decreases".

"Farmers know that when the
PP has governed the agrarian income has

risen and yet that when not
we are in the government that goes down"

Cuca Gamarra
Diputada

15-03-22

6. Joan Mena, spokesman for Catalunya en Comú and representative in Congress for En Comú Podem, stated in an interview last April that "the entrance exams to selectivity […] tell us that the student body in Catalonia is above average in Spanish than the rest of the State and it is the bilingual community in the entire State with the best results in Spanish".

[In Selectivity] "The students of
Catalonia is above average
in Spanish than the rest of the
State and is the bilingual community of all
the state with the best result in
Spanish language"

Joan Mena
Diputado

01-04-22

7. A week after the extraordinary congress of the Popular Party, the only candidate to preside over the formation, Alberto Núñez Feijóo, criticized the economic situation in Spain and, specifically, the increase in prices. "We are the country with the highest inflation in the European Union," said the still president of Galicia, Feijóo, in an interview last March.

"We are the country with the highest inflation
of the European Union"

Alberto Núñez Feijóo
Presidente de Galicia

27-03-22

8. In the last government control session last March, the Popular Party deputy Juan Diego Requena addressed the third vice president and minister for the Ecological Transition and the Demographic Challenge, Teresa Ribera, whom he attributed to having "multiplied by three the Russian oil imports since 2018".

[To Teresa Ribera] "You have
Multiplied by three imports
Of Russian oil since 2018"

Juan Diego Requena Ruiz
Diputado

09-03-22

9. The President of the Government, Pedro Sánchez, in the Federal Committee of the PSOE last March, assured that "comrades, we have to say it with pride, despite all the difficulties that we have encountered along the way, both external and internal, Spain was the country that created the most employment in Europe in the last year".

"Spain was the country that most
jobs created in Europe
this last year"

Pedro Sánchez
Presidente del Gobierno

06-03-22

10. In the presentation of the draft of the Organic Law of the University System (LOSU) last May, the Minister of Universities, Joan Subirats (PSOE), made reference to the Spanish universities attached to the European education network and assured the following: "We have and 24 universities in our system that are part of these European universities, of these networks, and it is a very respectable figure above Germany or Italy, for example".

"We already have 24 universities
Of our system that form
Part of those European universities (...)
Above Germany or Italy"

Joan Subirats
Ministro de Universidades

09-05-22

11. After last May 24, when a gunman entered Robb Elementary School in Uvalde, Texas, and killed 19 children and two teachers, Steve Kerr, former American basketball player and current coach of the NBA's Golden State Warriors, He stated that 90% of Americans, regardless of political party, want universal background checks for gun purchases.

12. Last January, Íñigo Errejón, deputy of Más País, wrote on his Twitter account: "The Government has just acquired a hole of 35,000 million from the Sareb bank for €1. 43% of public health spending in Spain in 2021 in the midst of a pandemic".

"The Government has just acquired for €1
A hole of 35,000 million
Sareb Bank. 43% of public spending
Sanitary in Spain in 2021 in the midst of a pandemic"

Íñigo Errejón
Diputado

18-01-22

Task 8

This task will not modify your contest score in any way. Please answer these questions so that we have a little more information about you. Remember that your answers will not be related to your personal data. It is important that you are honest at all times.

1. Write here your pseudonym of this contest.

2. Write your email @ alu.ua.es.

3. Please tell us: In general, on a scale where 1 is “most people can be trusted” and 7 is “you are never careful enough when dealing with people”, where would you place yourself?

4. In general, would you say that you are smarter than what % of the UA student population?
   Smarter than 5%
   Smarter than 10%
   Smarter than 25%
   Smarter than 50%
   Smarter than 75%
   Smarter than 90%
   Smarter than 95%

5. When you visit social networks or applications such as Facebook, Instagram, Snapchat, Twitter, or YouTube, what do you think about the information published on these pages or applications?
   Everything is true.
   Most is true.
   Some things are true.
   Don’t know.
   I do not wonder if the information published is true.

6. When you search for factual information online, for example on search engines like Google, what do you think about the information you find?
   Everything is true.
   Most is true.
   Some things are true.
   Don’t know.
   I do not wonder if the information published is true.

7. When you find factual information online, for example through search engines like Google, do you check if the information is accurate in any of the following ways? Check all the options that apply to you.

I check if it comes from an organization I've heard of.
I check if it comes from an organization that I think is trustworthy.
I look at how professional the page/app looks, for example, if there are typos, if the images and videos are of good quality, etc.
I look at how credible the page/application looks, for example, I check the web address, links to other sources, etc.
I think about the content to see the probability that it is true.
I check if the information appears anywhere else.
I wonder if I trust the author.
I look at the comments, what people have said about the page/app.
I check the information with another person (a friend, a family member, a colleague), and see what they think.
I do other checks.
I don't do any checking.
Don't know.

8. When people browse online, they often share information about themselves. This can happen, for example, by giving your name when you register or enter your profile on a new website or application, or by giving a postal address when you make an online purchase. Of the following information, what do you think, if any, that companies like Google, Facebook or Amazon keep about their users? Check all the options that apply to you.
Online searches they have done.
What they do on social networks and applications.
Your friends and family.
Your financial situation.
Your health and well-being.
Your gender, sexual orientation, or cultural background.
Their location at any time when they are online.
The type of device and connection they use to surf the web.
What other people are sharing about them online.
What they have bought online.
Anything else.
These companies do not collect any of this information from their users.
Don’t know.

9. In your opinion, which of the following reasons, if any, apply to why companies like Google, Amazon, or Facebook might collect information about their users?
   Target advertising, information, or other content to its users.
   Sell user information/data to other companies.
   Create a profile of your users and what they like/dislike.
   Custom prices for products and services.
   Personalize your experience when using the Website/App.
   Track your online behavior over time.
   Influence the opinions and behavior of users.
   Other reasons.
   Don't know.

10. Which of the following things, if any, have you ever done?
Report harmful or inaccurate information that you have seen online on the Website or App, for example, reporting an offensive post on Twitter.
Report harmful or inaccurate information that you saw online to other authorities, for example, the police, the National Commission for Markets and Competition (CNMC), etc.
Search online to verify information during a conversation with friends or family, for example, "let's Google this…"
Explain or show others how to stay safe online, for example, by showing them how to change their privacy settings or use software such as virus scanners.
Encouraging or showing others how to check things online, for example by doing other searches or using other sources.

   Help others protect their personal data online.
   I have never done any of these things.
   Don't know.

11. Think of all the ways you can read news online, for example, on news websites or apps like El País or El Mundo news, as well as any news or articles you might read that other people have posted on social media pages or blogs. offering comments or opinions. Indicate the best option for each question for your case. (They are asked to state whether they totally disagree, disagree, do not agree nor disagree, agree, totally agree, do not know)

I trust the news websites and apps that I use regularly.
I trust information I read offline, such as in a print newspaper or magazine, more than information I read online.
I mostly read news websites and apps that seem to share my values and opinions.

I try to make an effort to view news websites with a different political perspective than mine.

12. The following statements relate specifically to any comments or posts you may see on social media or messaging pages or applications, such as Facebook, Instagram, Twitter, or WhatsApp. Say to what extent you agree with the following statements.

I trust what my friends post on social media.
I trust everything posted on social media.
I mostly read posts on social media that seem to share my values and opinions.
I try to see media posts with a different political perspective than mine on social media.
The information I see online,
It depends mainly on the people with whom I am connected on social networks.

13. Which of the following websites or apps have you ever heard of? Which of them do you usually use? (They are asked to state whether they have heard of that or if they usually enter that web page or use the application)

Google
Bing
Yahoo
Msn
Ask.com
AOL.com
Baidu
Wolframalpha
DuckDuckGo
InternetArchive
Yandex.com
None of the above
I don't know

14. Do you ever look for objective information in books, newspapers, or other sources?
Yes
No

15. In general, when you look for objective information in books, newspapers or the like, do you ever wonder if the information you find is true?
    Yes
    No

16. Do you think that all the information you find in newspapers, books and the like is true, most of it or only part of it?
    Everything is true.
    Most is true.
    Only part of it is true.
    Don't know.

17. When you find factual information in books, newspapers, or other similar sources, do you check if the information is true in any of the following ways?

    Check all the options that apply to you.
    I check if it comes from an organization I've heard of.
    I check if it comes from an organization that I think is trustworthy.
I look at how professional the font looks, for example, if there are typos, if the images are of good quality, etc.
    I think about the content to see the probability that it is true.
    I check if the information appears anywhere else.
    I wonder if I trust the author.
I check the information with another person (a friend, a family member, a colleague), and see what they think.
    I do other checks.
    I don't do any checking.
    Don't know.

18. Now think about when you read news in the newspaper, listen to news on the radio or You watch the news on TV. Tell me to what extent you agree or disagree with the following statements. (They are asked to state whether they totally disagree, disagree, do not agree nor disagree, agree, totally agree, do not know)

I trust the sources of news that I read, I see and I'm listening to.
I mostly read, I see and I'm listening to sources of news that look like sharing my values and opinions.
I make the effort to read, watch and hear news with a perspective different from the mine.

Summary

The Cazamentiras project (literally, lies busters) is a field experiment designed to investigate the fake news phenomenon in a Spanish university. Research on fake news has been growing exponentially in the last years: understanding how and why they spread has become an extremely attractive domain (Belloir et al., 2022). The relevance of this topic in today's information panorama is central: many researchers indeed describe the damage that false information cause on contemporary democracies (Allen et al., 2020; Anders, 2023; Vegetti and Mancosu, 2020; Allcott and Gentzkow, 2017; Kahne and Bowyer, 2017). False information undermines people's informed choice and affects decisions regarding the socio-cultural sphere, especially in political matters (Kim et al., 2021; Lazer et al., 2018; Allcott and Gentzkow, 2017; Vegetti and Mancosu, 2020). Citizens, governments, and academics have already understood the importance of receiving truthful information, but awareness is still not enough to avoid Internet users to run into false or misleading news online (Craft et al., 2017; Gelfert, 2018; Kim et al., 2021; Belloir et al., 2022; Barthel et al., 2017; Vegetti and Mancosu, 2020). Fake news have been existing since the dawn of time but have been strengthening and becoming more and more popular because of the spread of Internet and social media (Aldwairi & Alwahedi, 2018; Belloir et al., 2022).

The way people access and consumer information has dramatically changed (Brugnoli et al., 2019; Kim et al., 2021). Information now is read on smartphones or listened to on podcasts, while going to work, walking, or cooking: it has become something people usually dedicate some minutes a day in between their daily tasks. The speed at which news are consumed and the possibility of accessing information anytime and anywhere discourage people from paying attention to accuracy. Social media allow every user to post and read any kind of content online. On the one hand, this is positive because it grants freedom of expression and gives people the opportunity to produce and transmit information autonomously, independently of their degree of expertise in a topic (Feenstra and Casero-Ripollés, 2014; Brugnoli et

al., 2019; Aldwairi and Alwahedi, 2018; Kim et al., 2021; Bergström and Jervelycke Belfrage, 2018; Feenstra and Casero-Ripollés, 2014). On the other hand, giving anyone the means of reaching a potentially infinite number of people worldwide may be concerning, especially considering that, as of now, social media have not defined any specific criteria regarding censorship. Even international authorities have not passed a regulation on fake news yet: this is because there are still many dynamics regarding social networks and the information spread that require a deeper understanding by law makers (Kaplan, 2023). A further obstacle that is hard to overcome is the nature of social media themselves: they were born with the intention of giving everyone the possibility to express themselves and their opinions, even when these maybe are nonconformist. It is then very difficult to define the boundary between freedom of expression and misinformation (Goldfarb and Tucker, 2019). This technological and cultural development, alongside the lack of a set of laws, has then facilitated the fabrication and circulation of false and deceptive stories online (Gelfert, 2018; Innocenti, 2021).

One of the reasons why it is easy to believe and spread fake news is because of their low recognizability in general terms. Researchers themselves are still not able to define what fake news are specifically, and this is because finding a definition that fits with any content that could be deem as false or misleading, is hard. This paper reports the umbrella definition given by Gelfert (2018), that describes fake news as "misleading by design", similar to legitimate news in their appearance, and more likely to circulate online than off-line. In spite of examples like this one, agreeing on a common definition is resulting in a lack of a specific framework that can be used by citizens to identify misinformative content online, or by any automated detection method. There exist, indeed, numerous fact-checking websites that are employed by social media platforms, journalists, and common citizens to spot and signal fake news online (Kim et al., 2021). Even though most of them use technology to help human fact checkers in their job, their capacity is infinitely smaller against the amount of content that is published every day online (Pennycook et al., 2020). Moreover, it should be considered that technology is currently used also to spread fake news, through the implementation of software robots (Lazer et al., 2018; Kim et al., 2021). It is thanks to these bots that fake news spread so fast. Another reason why fake news spread faster than true information is because they are about controversial contemporary events that stimulate users' curiosity and increases their intention to share (Vosoughi et al., 2018).

Alongside the issues caused by the decentralization of information and the use of bots to increase virality, the spread of misinformation is strongly related with cognitive biases. These biases influence human judgment and manipulate the decision-making process, generally unconsciously (Gelfert, 2018; Charness and Dave, 2017; Aldwairi and Alwahedi, 2018; Kim et al., 2021; Nickerson, 1998;

Rollwage and Fleming, 2020). Literature on fake news suggests that cognitive biases are key in favoring irrationality both in the production and consumption of informative content (Kim et al., 2021). This thesis focuses on confirmation bias, overconfidence, and cognitive reflection, that are the ones recognized by the academics to play a major role in affecting judgment. All these biases have been measured in the Cazamentiras experiment through some proxies generated from the questions present in the 8 tasks. Confirmation bias makes people search and interpret evidence in support of pre-existing opinions. This bias does not allow to interpret evidence impartially and favors confirming information over disconfirming one. Overconfidence relates with the capability to assess the accuracy of a fact and occurs when one's belief in one's ability exceeds their real one. Overconfidence is an obstacle to a truthful informative process because it increases the susceptibility of believing in false information, once exposed to it (Pennycook and Rand, 2021). Cognitive ability, instead, helps individuals deliberating during a decision process (Cueva et al., 2015). Pennycook and Rand (2019) and Pennycook et al. (2018) state that cognitive reflection increases the probability of classifying news in a correct way, distinguishing truthful news from fake stories. According to them, reflective individuals are more skeptical and therefore use implausibility as primary indicator of news inaccuracy. In particular, Frederick (2005) developed a three-question quiz called Cognitive Reflection Test (CRT) that can be used to assess whether an individual is reflective or impulsive. In general, overconfidence and confirmation bias tend to strengthen once people are on social media. They are indeed very effective in isolating and segregating users through the creation of the echo chambers, where users with similar views are grouped together and brought far from other groups of individuals (Sustein, 2001; Acemoglu et al., 2021; Levy, 2021; Azzimonti and Fernandes, 2018).

The Cazamentiras experiment was carried out at the Universidad de Alicante in Spring 2022 and had 375 economics students as participants. Only 188 of them, though, completed all the quizzes and gave all the information required, so that is the sample used to conduct the statistical analyses. The 5-week study consisted in 60 questions divided into 8 tasks, 3 of which were surveys about demographics, psychological traits, and personal beliefs. The other 5 questionnaires included headlines and photos of news and participants were asked to categorize them according to their truthfulness (true, half true, false, half false). Every correct answer was worth 1 point, and the final score was generated by the sum of the points collected. The novelty of this study is that it was designed as a prize game where every participant had the opportunity to compete against the others to win €50 in the form of Amazon cheques. This kind of mechanism stimulated students to do their best and increased the interest to participate. A feature that differentiates this experiment on fake news from similar others, is that it is not only focused on political news, like in the cases of Allcott and Gentzkow (2017), Pennycook and

Rand (2022), Guess et al. (2020), Levy (2021), and Thaler (2021). The focus of this thesis focus is on cognitive biases, even though the ratio of political versus non-political headlines in the 5 questionnaires is 40/20 and there are still some useful insights that we can gather.

This paper aims at analyzing the data collected during the Cazamentiras experiment to find and describe patterns that explain which factors positively (or negatively) influence the ability to spot fake news and discern truth from falsehood. Despite being aware of the danger and detriment that fake news cause to society, there is still little knowledge about why some people are more susceptible to believing in fake news (Amazeen and Bucy, 2019: Kim et al., 2021). This thesis investigates the role played by psychological, behavioral, and socio-demographic variables in identifying fake news headlines. Do some characteristics help individuals in correctly categorizing news? Which features predict a higher probability of guessing? How can we improve such characteristics, if possible? In conclusion, this research joins the existing literature in explaining what fake news are, and how difficult it is to break pre-existing beliefs apart because of cognitive biases. Furthermore, it presents an experimental design that may be useful to better understand and study the phenomenon to find solutions to the problem of misinformation.

This rich-of-information dataset was not easy to manage. First of all, it includes variables of almost any type, from binary, to ordinal, and categorical. This implies that, before running any analyses, the variables needed to be standardized to make them comparable. The second important feature is that the data were manipulated to generate an artificial panel, where every question asked in the tasks corresponds to a period. This resulted in a dataset having 60 periods per every student, for a total of 11280 rows. Nevertheless, we should consider that some of the information collected was constant across the study, such as the participants' gender, average income, and GPA. This means that for every period, the information repeats for every student. We needed to be careful when running analyses, because sometimes data needed to be managed as a panel, while other times in the aggregate form. The most interesting variables from a behavioral economics perspective are the following ones:

TotalScore is the sum of the points obtained from correctly recognizing truth a fake headlines.

Female is a dummy variable, that is equal to 1 in the case of a female respondent, and 0 in the case of a male.

Income indicates the self-reported weekly income of the student.

RSR (Room Size Ratio) is the ratio between the number of rooms in the main household of respondents, divided by their family sizes. It is usually employed as proxy of family wealth.

Work_D is a dummy that equals 1 in the case the respondent works (at any level) and equals 0 in the case of unemployment.
GPA is the self-reported Grade Point Average at university.
Languages is the self-reported number of languages spoken. In Spain, being fluent in more than two languages tends to be indicative of a relatively high socio-economic status: the average university student is indeed unlikely to know more than two languages without any additional investment in private education.
EduPE_NEW is the Education of the Primary Earner, meaning the level of education of the household member that earns the highest salary. Education ranges from 1 = no academic education to 5 = post-graduate education.
CRTgroup identifies which respondents belong to the impulsive, reflective, or residual group according to their score in the Cognitive Reflection Test. The criteria of assignment was the following one: reflective are those who answered 2/3 or more correct answers, impulsive those who got 2/3 or more impulsive and incorrect answers, and the residual group includes the subjects who did not appear neither as reflective nor impulsive. CRT is used as a proxy for cognitive reflection.
Conf_D is a proxy for overconfidence. It is equal to 1 when confidence is greater than 50%, and 0 otherwise (see Table 9 for further details).
Media_Literacy_1 is a proxy of media literacy and is generated by the sum of the dummy variables of the social media used by participants (read Chapter 5.2 for further details). Media_Literacy_1 = Facebook_D + InfoJobs_D + Instagram_D + Linkedin_D + Pinterest_D + Reddit_D + Snapchat_D + Telegram_D + TikTok_D + Tumblr_D + Twitch_D + Twitter_D + WeChat_D + Weibo_D + Whatsapp_D + Youtube_D
Media_Literacy_2, instead, is the sum of the dummy variables indicating some of the activities that can be carried out online (read Chapter 5.2 for further details). Media_Literacy_2 = Watch_Video_n + Listen_Music_n + Blog_n + Finance_n + Gaming_n + Amazon_n + Email_n + Video_n + Pub_Serv_n + Admin_n + Pet_n + News_n.
Conf_Bias_DUMMY is a proxy for confirmation bias. It is equal to 1 if respondents stated that they agree or totally agree with question 11 in task 8 (read Chapter 5.2 for further details).
SuperDiff measures the absolute distance between what is said by a politician and a participant from a political standpoint. It is measured on a Likert scale from 1 to 7, where 7 indicates that the participant is on the opposite side of the politician.
PartyNEW_D is a dummy variable that equals 1 when partyNEW is greater than 4 and 0 otherwise. PartyNEW is a proxy of the political position of the respondents and is measured on a Likert scale from 1 (extreme left – Esquerra Republicana del País Valencià) to 7 (extreme right – Vox).

Moreover, each participant's answer has been categorized as False_N, False_P, SlightWrong or Ans_right. Considering that these four categories indicate what

answer individuals gave, they can be deemed as behavioral variables, meaning that they embody a behavior carried out by each participant by choosing one of the available options (false, half false, true, half true). Ans_right indicates that the student's answer is the same one given by the fact checkers. False_N suggests that the participant stated that the headline is false or half false, while it is true or half true. False_P is used if the student said that the information is true or half true, while it is flase or half false. SlightWrong indicates a situation where the answer given is on the correct side, but does not fully coincide with the fact checker's opinion. CatAns is a variable that was introduced to generate a naturally-ordered classification of False_N, False_P, SlightWrong and Ans_right.

1. Correct, CatAns = 0.
2. False Negative (FN), CatAns = –2. The answer is false or half false, although it is true or half true.
3. False Positive (FP): CatAns = 2. The answer is true or half true, although it is false or half false.
4. Overly untrustful (OverU): CatAns = –1. The answer given is correctly classified as false, but does not coincide with the correct answer (i.e., half false instead of false, or the other way round).
5. Overly trustful (OverT): CatAns = 1. The answer selected by the participant is true, but does not fully coincide with the fact checker's answer (i.e., half true instead of true, or the other way round).

By running a multiple linear regression on the whole dataset, it results that no socio-demographic variable is significant in predicting TotalScore. On the other hand, CRT_CAT, that categorizes people according to the cognitive reflection test, is significant, alongside Media_Literacy_2. This means that cognitive reflection and media literacy skills have a positive effect on TotalScore. In general, we observe that female tend to be significantly more impulsive than males, according to CRT. This result confirms past findings (Cueva et al., 2015; Frederick, 2005), but, at the same time, from the linear regression it is clear that gender is not a statistically significant variable. This implies that being reflective does not automatically result in a higher TotalScore. Looking instead at the summary statistics regarding confirmation bias, a worrying insight that we got is that, independently of the CRT group, both impulsive and reflective subjects have a similar approach towards this bias. With their answers, indeed, participants stated that the majority of them consciously know that what they read every day is biased, and they somewhat agree with that by not changing this habit. Talking about overconfidence, we expected it to obfuscate the ability to discern between true and false. However, from the linear regression it results that the negative effect of Conf_D on TotalScore is not significant, differently from what is described by Pennycook and Rand (2021).

Next, we ran a panel data regression having False_N, False_P, and Ans_right as dependent variables. The peculiarity of this regression is that it was run twice: once including only the political questions, and the second time the non-political ones. Looking at the p-values of the coefficients estimated by STATA, it is clear that variables like SuperDiff, Conf_Bias_DUMMY, and partyNEW_D are significant when considering political questions only. This happened because some of the variables described above were built to measure political distances and opinions, so it makes sense that they are not relevant in the context of non-political headlines. In particular, Conf_Bias_DUMMY has a negative effect on Ans_right, as stated by previous research (Serra-Garcia and Gneezy, 2021). SuperDiff, instead, tells us that the bigger the difference in political terms between a politician and a participant, the higher are the probabilities of spotting fake news. Finally, students that support right-wing parties result more likely in being "overtrustful", according to the interpretation of partyNEW_D. On the other hand, the variable Media_Literacy_1 is significant in the case of Ans_right. This could be interpreted as following: spending time using social media has a negative effect on the probability of correctly identifying the headline as true or false. This is confirmed also by the fact that, instead, the effect of this variable on False_P is positive, meaning that frequently using social media results in a higher likelihood of being "overtrustful".

False_N, False_P, and Ans_right are the behavioral variables used also to conduct a cluster analysis aimed at finding the main and most significant features that make a good Cazamentiras (i.e., lies buster). Each participant was considered as an observation in a multidimensional artificial space where the two axes were built over the weighted sum of the relative scores of political and non-political questions of every participant (TotalScore_POL_id_01 and TotalScore_NOPOL_id_01). Thanks to a k-means non-hierarchical clustering method and the Calinski-Harabasz index to verify the stability of our results, we identified 4 different clusters: the first one includes 83 students, the second one 32 people, the third one 35, and the last one 38. By using the Kruskal-Wallis H test, we were able to understand which variables were distributed differently from one cluster to another, meaning the significant variables that differentiate the clusters the most. We found out that these clusters are different mainly because of two characteristics: cognitive reflection (CRT) and confirmation bias (Conf_Bias_NEW). Specifically, cluster 3 is "the best" both in terms of CRT mean (1.91, against mean = 1.20 of cluster 1) and confirmation bias (the lowest mean among the 4 clusters, mean = 3.88).

To sum up, it can be stated that some of our results are aligned with previous literature, so they were not completely surprising. Among these, one of the most relevant ones is the importance of media literacy and cognitive reflection to fight online fake news. A second fundamental result is that confirmation bias negatively affects media consumption, and people seem not to care much: this is why research

on fake news is so important. However, it was quite unexpected to find out that none of the socio-demographic variables has predictive power on TotalScore. One of the most interesting analyses carried out in this research is the cluster analysis to draw the identikit of a good lie detector. In the end, we found that the variables that really differentiate a good Cazamentiras are the proxies of two cognitive biases: cognitive reflection and confirmation bias. Again, this underlines how much cognitive biases are important in today's information context. Cognitive biases have become key in marketing research, too: by sharing a manipulative nature with this discipline, they have gained relevance, especially when talking about preferences of consumption.

In conclusion, a democratic system works better if its citizens care about information accuracy and are able to judge the truthfulness of political claims, in particular (Allcott and Gentzkow, 2017; Kahne and Bowyer, 2017). Fake news are a global deeply-rooter phenomenon that will continue to grow in the next years and identifying them is in the interest of many. Finding a definition to fake news has become a key topic in information research, according to Belloir et al., 2022, which makes this phenomenon even more interesting to observe. One of the most relevant factors to take into consideration when dealing with fake news, is that they interfere with the collective decision process and the common good (Vraga and Tully, 2015). That is why some deem fake news as new political weapons, since they confuse people and do not allow citizens to take conscious decisions (Lazer et al., 2018; Belloir et al., 2022; Vegetti and Mancosu, 2020; Rollwage and Fleming, 2020; Kim et al., 2021). The primary goal of misinformative content is indeed to persuade people by triggering emotional responses and exploiting human cognitive biases (Belloir et al., 2022).

Many are the reasons why fake news are not likely to disappear very soon from our screens: not only they become viral once shared by thousands of users online, but their spread is also backed up by artificial intelligence. Even though some AI tools are helpful for the cause, for any progress in the detection of fake news, there is a corresponding increase in the quantity and quality of produced fake content. It is indeed important to understand that the more learning and training AI tools are able to get, the more easily fake news will spread online. As of now, most of the generative AI has been used to entertain and make satire, but the learning is growing fast (Kahn, 2023). The editing skills of current technologies are so developed that they can produce realistic photos and videos that show something that has never happened (Susarla, 2023). Having said so, it is not difficult to imagine what headlines will look like in a couple of years. These abilities, tied up with the features of high speed and virality of social media, are likely to permanently affect the online and off-line information markets. A further obstacle is the fact that fighting fake news automatically means to limit people's freedom of speech online

(Anders, 2023). What is the difference between an unconventional opinion and fake news? It is highly improbable for any authorities to find a solution that allows to exclude only the "bad" users and is constitutionally acceptable (Sustein, 2001). This boundary is strengthened further by Internet itself: according to its law of nature, no one should control the content published and decide where to set the limit. There is no one with this power, as of now, but what about the future? What would be the consequences of giving this power to a group of people, or a company? As long as these questions do not have a clear answer and academics do not decode the universal "recipe" of fake news, there will always be doubts and confusion.

Numerous studies suggest that media literacy is the most powerful, easy, and already-available tool that every user can use (Vegetti and Mancosu, 2020; Kaplan, 2023; Anders, 2023; Pennycook and Rand, 2021; Brashier et al., 2021; Jones-Jang et al., 2019; Pennycook and Rand, 2022; Amazeen and Bucy, 2019; Vraga and Tully, 2015). Media literacy includes the skills of analyzing, judging, and processing the information that is necessary to participate in the democratic and social life (Craft et al., 2017). It has already been demonstrated in past studies that higher levels of media literacy help understanding the world better, developing critical thinking, and judging the accuracy of political news (Vraga and Tully, 2016; Kahne and Bowyer, 2017; Craft et al., 2017). This is why also in the Cazamentiras experiment, researchers decided to measure media literacy by generating some proxies of usage, familiarity, and experience with different media. Ultimately, academics agree that critical thinking and attention to accuracy are the main ingredients for a safe information consumption online and off-line.

This paper does not aim at solving the problem of misinformation spread, as it represents a small tile in the behavioral economics literature. However, it was written to join the existing literature in describing the challenging issue of fake news, and underlining how important it is to educate citizens about the detriment caused by misinformation. It is also a warning about cognitive biases, that are sneaky mechanisms that silently influence individuals' choices. The Cazamentiras project also brings some innovations, such as the format of a prize game with economic incentives and the intention to repeat the experiment in other universities in the future. As a further development, indeed, the researchers would like to replicate the experiment at LUISS University in Rome. In particular, this is because the LUISS School of Journalism has a digital publication called Zeta with a fact-checking unit that could serve as a database of original and yet unpublished content. Lastly, the Cazamentiras study is useful to stimulate attention and develop critical thinking, that have been recognized as the most important antidotes to misinformation. Moreover, it represents an occasion for students to test themselves and be more involved in the politics of their country.