

# Towards Ethical Argumentative Persuasive Chatbots —*full paper*—

Caren Al Anaissy<sup>1</sup>[0000–0002–8750–1849], Srdjan Vesic<sup>2</sup>[0000–0002–4382–0928], and  
Nathalie Nevejans<sup>3</sup>[0000–0003–0030–2984]

<sup>1</sup> CRIL Université d’Artois & CNRS, France  
`alanaissy@cril.fr`

<sup>2</sup> CRIL CNRS Univ. Artois, France  
`vesic@cril.fr`

<sup>3</sup> Research Center in Law, Ethics and Procedures, Faculty of Law of Douai,  
University of Artois, France  
`nathalie.nevejans@univ-artois.fr`

**Abstract.** Argumentative persuasive technologies are technologies that use argumentation in order to persuade the persuadee to believe in something or not, which can later lead the persuadee to perform an action or not. The use of such tools opens numerous ethical considerations. In this paper, we survey the literature on persuasion that might be useful for argumentative persuasive chatbots, we cover the existing legal framework and ethical principles and we critically analyze the new proposal for a regulation on artificial intelligence of the European Commission. We also show how to use argumentation to enhance explainability and transparency of the persuasion systems. We propose to show the graphical representation of the arguments used during the persuasion to the user at the end of the dialogue, containing the relations between the arguments (attacks, supports), their origin (source), who uttered them (i.e. the machine or the human participant) and the persuasive methods employed. Our approach has several benefits. Namely, it makes the system more transparent and enhances the human understanding of the system, which is a benefit per se. Furthermore, the fact that the system is transparent increases the trust of the user, which (apart from being one of the goals of AI in general) can increase the chance that the user is persuaded by the system. Finally, the user can give a feedback on the presented arguments (e.g. how much they believe the arguments are ethical), which can be later used to improve the persuasion system.

**Keywords:** Persuasive chatbots · Ethics of persuasive technology · Computational argumentation.

## 1 Introduction

Persuasion aims to change people’s attitudes or behaviours [13]. Persuasive technologies are very powerful tools because of the simulation they can create. They

help shaping the perception and interpretation of reality to users by amplifying specific perceptions and reducing others. They also help shaping the users' actions in reality by encouraging specific forms of actions and discouraging others [29]. Persuasive technologies can also convey social presence when interacting with the user. Many studies have identified persuasive strategies that can be used to influence users and enhance persuasion. Argumentative persuasive chatbots deploy argumentation graphs as their knowledge base. Some of the chatbots even use argumentation semantics for decision-making problems [6]. However, the persuasive acts employed by these chatbots might sometimes be considered morally and ethically unacceptable. Note that the chatbot itself cannot take responsibility for the methods and outcomes of the persuasive acts, because it is not a free moral agent.

Persuasion in argumentation has received a large amount of attention during the last years [4, 17, 16, 15, 30, 27]. Also, ethics in argumentation has been studied with the focus on the use of normative systems [25, 3, 20].

However, we can observe that the researchers and practitioners who develop argumentative persuasive chatbots are not always aware of the existing advances and the state of the art in the domain of persuasion as well as of the current legal framework and corresponding ethical considerations. This is why the first goal of our paper is to make a bridge between the existing knowledge in persuasion and ethics on one side and the practitioners who develop argumentative persuasive chatbots on the other side.

This is why the **first part of the paper** is devoted to a **survey** of the literature on persuasion that might be useful for argumentative persuasive chatbots. We cover the state of the art of persuasion for persuasive chatbots and the corresponding ethical guidelines (Section 2). Then, we survey the existing legal framework and its link with ethical principles and critically analyze the new proposal for a regulation on artificial intelligence of the European Commission (Section 3). We believe that this overview will be useful for researchers in argumentation who want to deploy an argumentative chatbot for persuasion since it allows them to quickly get knowledge about the most relevant approaches at one place.

The **second part of the paper** is devoted to the question: how can we increase transparency, trust and effectiveness of the argumentative persuasive chatbots? We propose a model that can enhance explainability and transparency of the persuasion systems (Section 4). The main idea is to show the graphical representation of the arguments used during the persuasion to the user at the end of the dialogue. This representation contains the relations between the arguments (attacks, supports), their origin (source), who uttered them (i.e. the machine or the human participant) and the persuasive methods employed. This approach has several advantages. Namely, it makes the system more transparent and enhances the human understanding of the system, which is a benefit per se. Furthermore, the fact that the system is transparent increases the trust of the user, which (apart from being one of the goals of AI in general) can increase the chance that the user will be persuaded by the system. Finally, the user can give a feedback on

the presented arguments (e.g. how much they believe the arguments are ethical), which constitutes valuable data, which can later be used to better understand the underpinnings of human reasoning and improve the persuasion system.

The paper is organised as follows. Section 2 presents related work in persuasion that is relevant for argumentative persuasive chatbots and corresponding ethical guidelines. Section 3 surveys the legal and ethical aspects. Section 4 explains the pillars of our idea to use the graphical argumentation-based representation in order to enhance transparency, trust and efficiency of persuasion systems. We then talk about possible future work and conclude.

## 2 State of the Art in Persuasion

This section provides background material for persuasion. Subsection 2.1 briefly covers the persuasive strategies that persuasive technologies can use during persuasion to increase the users’ compliance. Subsection 2.2 briefly explains personalized persuasion and shows the importance of personalization in persuasion. Subsection 2.3 briefly reviews four argumentative persuasive chatbots with the focus on the dialogue structure used in every chatbot, whether persuasive strategies were used, and finally whether the chatbot’s dialogue structure was compared to any other way of presenting the arguments to the user. Subsection 2.4 reviews the main elements of an argument-based dialogue system for persuasion. Subsection 2.5 covers the ethical guidelines proposed for the design of persuasive technologies, and orients these guidelines towards the design and implementation of persuasive chatbots specifically.

### 2.1 Persuasive Strategies

In this subsection, we review some of the persuasive strategies that can be used to enhance persuasion. Fogg was able to identify and propose forty principles that persuasive technologies can use [13]. We present briefly the ones related to the role of persuasive technologies as social actors. As Fogg explains, there exist five essential types of social cues that persuasive technologies can convey. First, physical cues can be transmitted through the physical characteristics. Fogg proposes the principle of Attractiveness: “A computing technology that is visually attractive to target users is likely to be more persuasive as well.” Second, persuasive technologies can use psychological cues to persuade. Fogg defines a person’s psychology as the group of emotions, preferences, motivations and personality. Humour and empathy can also be considered a psychological cue. The principle of Similarity states: “People are more readily persuaded by computing technology products that are similar to themselves in some way.” Third, we have the language. The principle of Praise states that: “By offering praise, via words, images, symbols, or sounds, computing technology can lead users to be more open to persuasion.” Fourth, social dynamics such as giving praise, cooperation and reciprocity can also be used. The principle of Reciprocity proposed by Fogg

states that: “People will feel the need to reciprocate when computing technology has done a favor for them.” Finally, adopting a social role can be considered as a very effective persuasive technique. Specifically, adopting an authority role seems to be very effective for persuasion. The principle of Authority identified by Fogg is the following: “Computing technology that assumes roles of authority will have enhanced powers of persuasion.”

Cialdini was able to identify six influence principles: Reciprocity, Commitment and Consistency, Social Proof, Liking, Authority, Scarcity [8]. Among these principles, we explain briefly the ones that were not explained before. The Commitment and Consistency principle states that humans tend to commit to their opinions, values and choices. The Social Proof principle states that people tend to imitate other people’s ideas and actions. The Liking principle is close to the Similarity principle proposed by Fogg, it states that people like others who are similar to them. The Scarcity principle states that people tend to value opportunities or things that become less available, hence scarce. Oinas-Kukkonen and Harjumaan proposed and developed a Persuasive Systems Design model [23] where twenty-eight persuasive strategies were listed for the design of persuasive technology. These principles were divided into four categories: primary task, dialogue, system credibility, and social support.

Wang et al. were able to identify ten persuasion strategies that are divided into two types, the persuasive appeal and the persuasive inquiry type. The persuasive appeal type consists of trying to appeal to the persuadee’s psychology. The persuasive inquiry type consists of asking the persuadee personal questions to facilitate the persuasion [32]. The persuasive appeal strategies identified in this work are the following: The Logical appeal strategy consists of using evidence and reasons to convince the persuadee of the persuasion goal. The Emotional appeal strategy consists of evoking the persuadee’s positive and/or negative emotions. The Credibility appeal strategy consists of citing information from objective sources in order to gain the persuadee’s trust. The Foot-in-the-door strategy consists of asking the persuadee small requests first, then asking larger ones. The Personal story strategy consists of telling the persuadee stories about other people who were persuaded by the persuasion goal, focusing on the positive results of such persuasion. The Donation Information strategy consists of giving the persuadee information about the action or idea the persuader wants to convince them with. The persuasive inquiry strategies are the following: The Source-related inquiry strategy consists of asking the persuadee whether they are aware or not of the action or idea the persuader wants to persuade them with. The task-related inquiry strategy consists of asking the persuadee their own opinions and expectation concerning the persuasion goal. Finally the personal-inquiry strategy consists of asking the persuadee about their own personal experiences related to this persuasion goal.

## 2.2 Personalization in Persuasion

In this subsection, we briefly define personalized persuasion and we briefly review two works done in this field. Personalization plays an important role in

enhancing persuasion. Personalized persuasion consists of using the user’s personal information and background to enhance the outcome of persuasion [19, 24, 9, 21]. Apart from using the user’s psychological cues to persuade them, personalization can appear in the form of trying to adapt the methods used during the process of persuasion based on the user’s psychological profile and/ or personal information. The goal of such adaptation is also the enhancement of the persuasion outcome. Kaptein et al. studied the effects of involving users in choosing a specific influence strategy for persuasion, disclosing the usage of such strategies and the use of multiple strategies simultaneously on user compliance to persuasive attempts [18]. The authors consider these results as guidelines for designing adaptive persuasion systems. Adaptive persuasion systems are persuasion systems that use different influence strategies based on the users’ profiles in order to increase their influence on users. The authors proved that letting the user decide which strategy to adopt in order to persuade them is more effective than predicting the preference for a specific strategy based on behaviour or personality measures. The reason behind this is that if the user chooses which influence strategy to adopt, they will commit to choice that they have made. The authors have also proved that using a single preferred strategy is more effective than using the preferred strategy simultaneously with a non preferred one. Also, using the two strategies simultaneously was more effective than using the single non preferred strategy alone. The two persuasive strategies used in this work are the authority and the consensus strategies. Wang et al. studied how the variations of the persuasion strategies upon the user’s psychological background, affect the persuasion outcome [32]. The results of the work done by Wang et al. [32] and Shi et al. [28] show that personalizing the persuasion strategies yields better persuasion outcomes.

### 2.3 Persuasive Chatbots

In this subsection, we briefly review four persuasive chatbots that were developed and designed. The first three chatbots do not use persuasive strategies during the process of persuasion, whereas the fourth chatbot does use different persuasive strategies during the dialogue.

Altay et al. studied whether they can change people’s opposite opinion regarding genetically modified food and genetically modified organisms by providing rebuttals to the counterarguments held against genetically modified organisms [1]. They have defined four conditions: the Control Condition consists of defining genetically modified organisms. The Consensus Condition informs about the important existence of the scientific consensus regarding the genetically modified organisms’ benefits. The Counterarguments Condition presents first counterarguments against genetically modified organisms then rebuttals to these counterarguments, then rebuttals to the previous ones and so on. The user scrolls to check all the arguments which were presented in a clear dialogue structure. Finally, the Chatbot Condition consists of presenting all the counterarguments againsts genetically modified organisms to the user, the user can click on any counterargument, the rebuttal of the counterargument selected appears

progressively. The user has the option to come back to the initial counterarguments and click on another one. The four conditions were compared against each other. The Counterarguments Condition was found more persuasive than the Chatbot condition in the sense that spending more time reading when all counterarguments are available leads to more positive attitude changes than selecting only the most relevant counterarguments.

Hadoux and Hunter showed how preferences over types of concern can be used to enhance the persuasion in persuasive dialogues [14]. The notion of concern is defined as an issue raised or addressed by an argument. Among the empirical studies conducted, a group of participants chatted with two types of chatbots called the baseline chatbot and the preference-based chatbot. The structure of the dialogue is the same for both chatbots, the first argument is the one proposed by the system and called the persuasion goal, then a menu of counterarguments is proposed by the system to the user. The user can select a set of counterarguments; this set is called a menu move. Then the system can counter the selected arguments by a set of arguments called the posit move. The dialogue continues in the same manner until there is no argument attacking any argument of the last move or if the user ends the dialogue by a null argument. A null argument means that the user does not choose any of the counterarguments presented by the system. For the baseline chatbot, for each counterargument selected by the user, the chatbot selects a rebuttal among the arguments that attack the counterargument randomly. For the preference-based system, a set of the user's preferences over concerns is available, for each counterargument selected by the user, the chatbot selects the rebuttal with which the most preferred type of concern is associated. The results show that using preferences over concerns enhances the persuasiveness of the dialogue.

Chalaguine and Hunter designed a persuasive chatbot to persuade users to take the Covid-19 vaccine [7]. The authors use the same notion of concern as in [14]. The chatbot first presents the persuasion goal, then the user provides a counterargument manually. The chatbot predicts the user's concern raised in the counterargument and replies with the first not yet used rebuttal that addresses the same concern. In case the chatbot could not identify the concern of the user i.e. the prediction is less than 40% in confidence, it replies with one among three default rebuttals. There exist only three default rebuttals. The dialogue ends when the chatbot cannot identify a concern and all of the three default rebuttals were already used. The authors have shown that this interactive chatbot is more persuasive than a static web page in which the users read the ten most common rebuttals used by the chatbot.

Shi et al. developed a persuasive chatbot that understands the user's input based on neural network models [28] and replies from the human responses that were collected from the previous work [32]. The authors conducted experiments to study the effect of disclosing the chatbot's identity (bot or human) and the effects of using different type of inquiries (personal and/or non personal inquiries) on the persuasiveness of the dialogue. The chatbot salutes the user first, then the chatbot asks the user some questions based on the type of persuasive inquiry

the user was assigned to. After finishing from the persuasive inquiry module, the chatbot moves on to the persuasive appeal module where the chatbot dialogues with the user. At each step, the chatbot uses a different persuasive strategy and asks the user if they want to donate. If the user accepts to donate, that means that the chatbot succeeded in persuading the user to donate. If the user does not accept to donate, the chatbot uses another not yet used persuasive strategy to try to persuade the user to donate. The dialogue ends if the user agrees to donate or if the ten persuasive strategies were all used. Results showed that whether the chatbot was really human or not, it is the perceived identity of the chatbot by the user that matters. The persuasiveness is better when people think they are talking to human.

## 2.4 Argumentation Theory in Persuasive Dialogues

In this subsection, we review the main elements of a persuasive dialogue system introduced by Prakken [26]. Argumentation-based dialogues can be classified into six types based on their goal [2]. We have persuasion, negotiation, information seeking, deliberation, inquiry and quarrel. When it comes to argumentation-based dialogues, there are multiple rules to take into account. The communication language consists of the utterances the participants can make, the protocol consists of the conditions under which the participants can make the utterances, it also determines when the dialogue ends. According to Prakken [26], the main elements of a persuasive dialogue systems are the following:

- A dialogue goal which, in persuasion dialogues, is the resolution of a conflict of point of views between the participants.
- A topic language
- A logic for the topic language used, which can be monotonic or non-monotonic, it can be used to manage the dialogical consistency of participants.
- A communication language: As defined before, communication language consists of the allowed utterances to make. The most important ones are : claim  $\phi$ , why  $\phi$ , concede  $\phi$ , retract  $\phi$ , question  $\phi$  and  $\phi$  since  $S$ .
- A protocol: The protocol specifies the allowed moves at each step of the dialogue. The protocol specifies the dialogue’s structure. We have unique-reply vs multi-reply, unique-move vs multi-move and immediate-reply vs non-immediate-reply, deterministic and fully deterministic vs non deterministic protocols.
- A set of participants with roles, internal beliefs and commitments. Usually the roles in a persuasion dialogue are proponent, opponent and neutral toward a well specified topic. Commitments are very important because they determine the end of the dialogue and its outcomes, and they can be used to oblige the participant to be dialogically consistent. Commitments are usually determined by claim  $\phi$ , concede  $\phi$  and retract  $\phi$ .
- Effect rules: The effect rules determine the effects of the speech acts on the participants’ commitments.
- Outcome rules: The outcome rules define the outcomes of a dialogue which are in a persuasive dialogue the winners and the losers of the dialogue.

## 2.5 Ethics of Persuasive Chatbots

In this subsection, we cover the ethical guidelines proposed in the literature for the design of persuasive technologies and we try to orient some of them towards the design of persuasive chatbots precisely. Berdichevsky and Neuenschwander explain that when it comes to persuasion, both persuader and persuadee take full moral responsibility for the outcome [5]. In order to evaluate the ethics of persuasion itself, one should evaluate the persuader’s motivations, the methods they employed and the outcome of persuasion.

Although persuasive technology and persuasive people have same motivations and use similar methods and strategies, persuasive technology has more persuasive potential because of the simulations they can embed leading to more realism. The difference between persuasion through technology and through person-to-person interactions relies in the methods used for persuasion and also probably the outcome. The ethics of persuasion seems to be insufficient to guide the design and implementation of persuasive technology. The authors wanted to reconsider the ethical guidelines for traditional persuasion methods when being applied by technology and not humans, and for the outcome i.e. the persuasion goal.

Therefore, Berdichevsky and Neuenschwander proposed a set of eight ethical principles and guidelines for the design and implementation of persuasive technology, with the consideration that the designers should be only responsible for intended and unintended reasonably predictable outcomes. The first two principles state that the intended outcome of any persuasive technology and the motivations behind it should never be considered unethical if the persuasion was done without the technology or if the outcome happened independently of the persuasion. The third principle states that the designers of such technologies should take responsibility for all reasonably predictable outcomes of their use. The “Dual Privacy” principles state that the creators of persuasive technology should respect users’ privacy when it comes to accessing their online personal information and sharing it with a third party. The “Disclosure” principle states that the designers must be transparent and clear about the motivations, methods and intended outcomes of such technology. The “Accuracy” principle states that the persuasive technology should always be honest and credible. Finally, the “Golden” principle states that the designers of persuasive technology should never use a persuasion goal that they themselves are not consent of being persuaded by it.

Verbeek [29] emphasised on the importance of integrating the ethical framework proposed by Berdichevsky and Neuenschwander [5] with the concept of “technological mediation” in order to better understand and predict unintended outcomes, and take these outcomes into consideration when designing persuasive technology. As mentioned before, technology tends to shape human perception and interpretation of reality by amplifying some perceptions while reducing others. It also shapes human actions in reality by encouraging specific forms of actions while discouraging others. Persuasive technology mediates these effects between users and their environments, so when technology is used the way their



designers intended, it is possible to have unintended and unexpected outcomes, Verbeek proposed to focus on all the mediation effects by doing a moral reflection along deontological and utilitarian lines. The deontological point of view means respecting the moral principles while the utilitarian point of view means balancing between the desirability for something and its costs for all the people involved. This moral reflection will take into consideration the intended persuasions, the methods of persuasion used with the emerging forms of mediation, and the outcomes of the mediation which are the consequences of the persuasive and mediating role of the technology. The ethical guidelines that the authors proposed are the following:

- The intended persuasions of the technology-in-design must cause no harm for the people using persuasive technologies and those affected by them being used, these intended persuasions must benefit these people and be fair (justice) to them.
- The methods of persuasion and forms of mediation must be disclosed (respect for autonomy), cause no harm in terms of privacy and be fair to all people.
- As for the outcomes of mediation, the designers must do a moral imagination of all the possible mediating roles of technology in human actions and experiences and then assess these mediations along the deontological and utilitarian lines.

Fogg proposed to apply a stakeholder analysis to identify all people affected by a persuasive technology, and what each stakeholder has to gain or lose [13].

- List all of the stakeholders.
- List what each stakeholder has to gain.
- List what each stakeholder has to lose.
- Evaluate which stakeholder has the most to gain.
- Evaluate which stakeholder has the most to lose.
- Determine ethics by examining gains and losses in terms of values.
- Acknowledge the values and assumptions you bring to your analysis.

Note that values differ from a culture to another. Hence, creators of persuasive technology be careful about the culture in which they are trying to embed this technology, because with every different culture, comes different ethical issues.

We list below a set of guidelines for the design of persuasive chatbots inspired by the guidelines proposed by Fogg [13] for the design of persuasive technology.

- Users of persuasive chatbots should not be distracted by the number of questions or the difficulty of arguments, because this can stand in the way of their focus on the content in the chatbot. The chat must not be complicated or very lengthy.
- Creators of persuasive chatbots should not consider that the user has experience in the domain of the goal with which we want to persuade the user.
- Creators of persuasive chatbots should not include in the chat any links to download an application or something else.

- The user must be able to stop at anytime they want, or ask for clarification. The creators should be also careful about the cases where the user must have the ability to ask for a human intervention.
- Not only the creators of persuasive chatbots take responsibility when it comes to errors and damage to the user, but also the company that bought this technology, distributed and promoted it. We may have different companies through time, they all can be responsible.
- Manipulation can happen when the chatbot expresses negative or positive emotions towards the user, presents arguments that appeal to the user’s positive/negative emotions, tells lies or false information, tells incomplete information, chats with children or mentally disabled people, presents threatening information or punishment. Negative emotions could be fear, angry, deception, impatience. Positive emotions could be celebration, rewarding, encouraging. Designers of persuasive chatbots should avoid manipulation at all costs. It is preferred that the chatbot does not express emotions at all or expresses the minimum and only for good cause.
- The chatbot should not be very sophisticated in a way that confuses the user whether the chatbot is a human or robot. The user must know that they are chatting with a robot.
- Designers of persuasive chatbots must test and supervise these chatbots when used to observe if there are any unintended outcomes that were not recognised before, or happen to a small number of people. This is how they should deal with unintended and unpredictable outcomes. They should also keep track of the conversations between the chatbot and the users, with the user’s knowledge.
- Persuasive chatbots should not provide offers, promotions, advertisements or branding. They should be designed exclusively for persuasion.

Creators of persuasive chatbots are also invited to consult the guidelines for developers of conversational AI proposed by Microsoft [10].

### 3 Persuasive Chatbots between Ethics and Law

In this section, we present and discuss the legal issues that impact the design and implementation of chatbots, specifically persuasive chatbots. On April 21, 2021 the European Commission has published a proposal for a regulation on artificial intelligence [12], called the AI Act, which is still under debate. The AI Act proposes a gradation of legal constraints according to the risks presented by the AI system. These risks are those relating to health, safety and fundamental rights. AI systems are therefore classified into the following categories:

- “Unacceptable Risk” (social scoring, behaviour manipulation and facial recognition), the use of which is prohibited, with some exceptions.
- “High Risk” (very broad category. E.g. recruitment using a system of AI), whose uses must follow strict obligations and requirements so that the AI system can be placed on the market in the European Union.

- “Low Risk” (Chatbots, deep fakes and emotion recognition systems), the use of which requires informing the user in order to respect an obligation of transparency.
- “Minimal Risk” (Video games and spam filters based on AI), for which the AI Act does not impose any specific obligation.

The AI Act is one of the first texts in the world that will impose legal obligations for chatbots, when the text currently under discussion is voted on. Article 52.1 states that: “Providers shall ensure that AI systems intended to interact with natural persons are designed and developed in such a way that natural persons are informed that they are interacting with an AI system, unless this is obvious from the circumstances and the context of use.” The proposal contains very few obligations regarding chatbots. Indeed, users who are required to interact with a chatbot only need to know that they are discussing with a machine in order to be able to choose whether to continue the discussion or not. However, article 52.1 relates to chatbots in general, but not specifically to persuasive chatbots. Therefore, this information obligation may not be sufficient to protect users in this context.

It seems important for total transparency that the designers of persuasive chatbots also reveal the persuasion strategy underlying their system. For example, it is relevant that the users of an authority-based persuasion chatbot are informed of the designers’ goals. The AI Act does not address this concern. However, an ethical approach can allow us to look beyond the law for the purpose of doing the right thing [22].

We therefore argue that simply informing the users that they are interacting with a chatbot is insufficient for a persuasive chatbot. It is therefore crucial to provide them with additional ethical information:

- Users must be informed about the nature of the persuasion system used.
- Users should be made aware of the potential effects of the persuasive system used, particularly if the persuasive effect could be enhanced.

Can the designers of a persuasive chatbot be likely to infringe the rights and freedoms of users? We believe that if the chatbot adapts its method of persuasion according to the gender, racial origins, or religious beliefs of users, it might risk to behave in a discriminatory way. However, if it adapts its method of persuasion to the user’s age or level of education, this could be a way for designers to be better understood by specific users. With regard to the law under construction in the European Union, these risks to rights and freedoms are neglected. Despite the seriousness of the situation, the chatbot does not move from the low risk category to the high risk category, which is considered more protective for the users. Indeed, as the AI Act expressly circumscribes the cases where AI systems are considered as “high risk” (article 6), it is not possible to change the category for a persuasive chatbot, unless Annex III of the AI Act (article 7), is updated, which is doubtful.

If the chatbot is gendered or humanised, it is still likely to infringe the rights and freedoms of users in two cases. In the first case, the gender or certain human

aspects can reinforce the persuasive effect. For example, the chatbot can appear in the form of a gentle face of a grandmother who softens the users. Designers must be aware of this and minimise these characteristics. In the second case, gender or certain human aspects can be potentially sexist or discriminatory depending on the uses that are made of them and the goals that designers pursue. One of the solutions could be to minimise the human characters to avoid the problems of sexist or discriminatory biases. However, it is possible for a non-gendered persuasive chatbot without human characteristics to be less persuasive for the purposes pursued by the designer. In this case, a compromise must be made between the values to be respected and the goals to be achieved by the chatbot.

Designers of a persuasive chatbot indeed infringe on people’s rights and freedoms if the chatbot is designed to manipulate users, for example by leading them in a certain direction without their knowledge or saying things that are false or truncated. In the European Union, the issue of manipulation is also **not** mentioned in the AI Act in article 52.1. Even if article 52.3 mentions “manipulation”, it is only about the manipulation of images, or audio or video content (“deep fake”), moreover, subject to the same rule of user information. The question is also very delicate from an ethical point of view, since the motivations of designers can vary considerably. However, we believe that the majority of the designers have good intentions and want to use the chatbot for users’ own good. As an example, take the chatbots that try to persuade users to practice a sporting activity or to limit the consumption of alcohol or sugar.

## 4 Ethical Design via Explainability

There is an increasing interest in Explainable AI over the last few years in order to tackle the ethical challenges that arise from the use of AI-based technologies. Vilone and Longo list the existing definitions in the literature of the notions related to the concept of explainability [31]. We believe that we can respect the ethical guidelines for persuasive chatbots [5] by using argumentation for the explainability of persuasive chatbots. In this work, we use mostly two notions of explainability: understandability and correctability. Understandability means the capacity of a method for explainability to make a model understandable while correctability means the capacity of a method for explainability to allow end-users make technical adjustments to an underlying model [31]. Our method consists of showing an argumentation graph to the user after the dialogue: that graph highlights the persuasive methods and the sources of information used by the chatbot, and the degrees to which the user finds the chatbot’s arguments ethically acceptable. Before explaining our method, we briefly present Dung’s abstract argumentation framework.

### 4.1 Dung’s Abstract Argumentation Framework

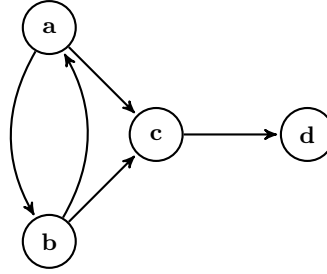
In abstract argumentation, arguments are considered defeasible entities where all information related to these arguments are abstracted away except for the re-

lations of attacks between them. Dung’s abstract argumentation framework [11] is one of the attempts used to formalise reasoning i.e. to represent systems of arguments and their relations, determine which arguments are acceptable. The argumentation framework is represented as a directed graph where arguments are represented by nodes and the attacks relations between them are represented by arrows.

**Definition 1.** *An abstract argumentation framework  $AF$  is a pair  $\langle Ar, att \rangle$  where:*

- *$Ar$  is a finite and non-empty set of arguments.*
- *$att \subseteq Ar \times Ar$  is an attack relation  $(\rightarrow)$ .*

Figure 1 shows an example of an abstract argumentation framework with arguments represented by nodes, and relations of attacks among them.



**Fig. 1.** Example of an abstract argumentation framework

#### 4.2 An Argumentation-Based Approach Towards Explainability

Our method consists of labelling each argument presented by the chatbot by a persuasion strategy (if it exists) and by the source of the information presented in the argument. If the chatbot uses natural language processing to generate the arguments presented to the user, this process is called post-labelling because the chatbot labels the arguments after they were presented to the user. In the other case where the chatbot has already a knowledge base i.e. well defined arguments in its system, then each argument must be pre-labelled. For both cases, the user chats with the persuasive chatbot.

When the dialogue ends, the chatbot shows the user an argumentation graph that consists of all the arguments that were presented during the dialogue by both sides, with the relations of attack between them. By showing this argumentation graph, the chatbot shows to the user the persuasion strategies that were used during the process of persuasion. Hence, the chatbot discloses all the methods that were employed in the dialogue. The chatbot also shows to the user the source of the information it provided in each argument. The user is then well

aware of the source of the information. The information can be extracted from scientific sources, crowd-sourcing, online forums, governmental websites, personal communication with experts, etc. Also, it can be generated by the chatbot i.e. invented.

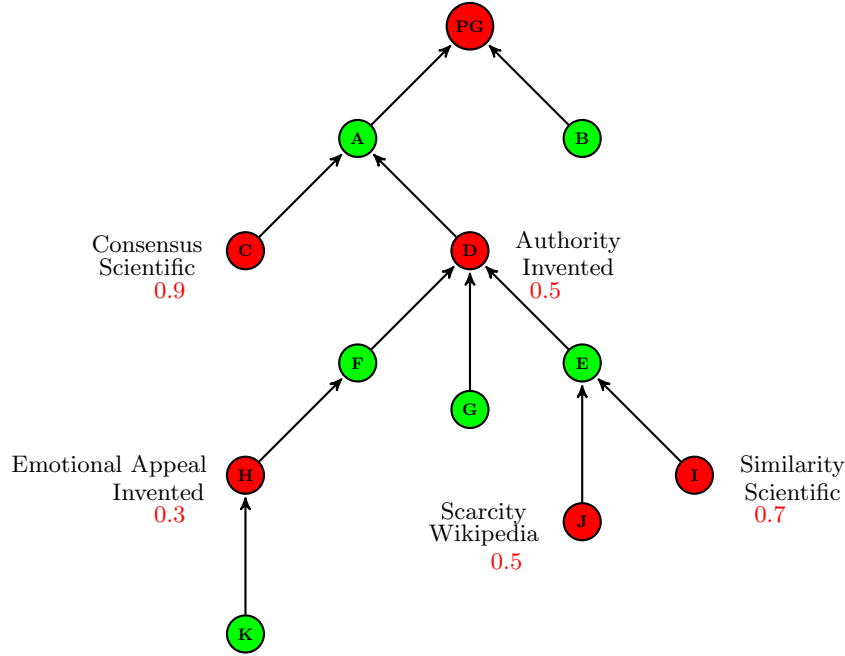
Adopting this method allows the user to assess the accuracy of the information that was given by the chatbot and to possibly detect if the chatbot lied or stated false information. By implementing this method, we answer to the question : How did the chatbot try to persuade the user?

We also allow the user to input for each argument presented by the chatbot, a degree that ranges between 0 and 1. Each degree associated with a specified argument must represent the user's belief in the argument being (somehow) ethical. We let this assignment be spontaneous and intuitive in order to be able to represent the user's actual beliefs and preferences over what is considered ethical and what is not. Assigning a degree to each argument presented by the chatbot will let us know the set of preferences of the user over the persuasive strategies and over the sources of information provided. Hence, we can build a recommendation system which predicts the set of preferences of a user based on their personal information and/or personality measures. This way, the chatbot can be considered ethically adaptive. Also, this can help the designers of the chatbot to eliminate from the chatbot's knowledge base the persuasive strategies or even the arguments that were assigned a very low degree of being ethical. Figure 2 shows an example of the abstract argumentation graph that should be presented to the user after the dialogue with the chatbot.

## 5 Future Work

In this section, we propose negotiation as an approach that can be adopted for the design of persuasive chatbots. A formal argumentation system for negotiation must be defined. We present in this section the motivations behind this proposal which will be tackled in the future work.

When it comes to designing a persuasive chatbot, it is important that the designers try to have an ethical trade off between respecting the ethics and the decreased compliance that comes with it. For example, Kaptein et al. showed that disclosure decreases the users' compliance [18]. Let us suppose that the designers of a persuasive chatbots can be represented by two agents; an ethical agent and another agent that has the goal of enhancing the persuasion. It would be interesting to use techniques from argumentation theory to formalise the negotiation that can happen between these two agents in order to reach an agreement among them towards the design and implementation of the persuasive chatbot. The two agents are invited to have a dialogue concerning how to design the chatbot, what is allowed to be used and what is not, etc. They should represent the dialogue in the form of an argumentation graph with relations of attack and support (if relations of support were present). Then they can use one of the formal argumentation semantics, preferably Dung's semantics [11], in order to



**Fig. 2.** Example of an abstract argumentation graph representing the dialogue between the user and the chatbot. “PG” stands for persuasion goal. The nodes in red represent the chatbot’s arguments while the nodes in green represent the user’s arguments. The nodes must show the text. Here in this figure, we show only letters for space constraints. The first row of labels represents the persuasive strategies used by the chatbot. The second row represents the source of the information presented by the chatbot. A reference or link must be assigned to each source of information.

select the set of accepted arguments. Based on the set(s) of accepted arguments, the designers should be inspired to design and implement the persuasive chatbot.

## 6 Conclusion

In this paper, we studied ethical argumentative persuasive chatbots. In the first part of the paper, we reviewed the state of the art of persuasion for argumentative persuasive chatbots and the ethical guidelines for the design of such systems. First, we provided background material for the persuasive strategies that can be used by persuasive chatbots to enhance the persuasion. Then we discussed how personalization used in persuasion can be helpful to improve the persuasive effect. We also reviewed four argumentative persuasive chatbots where we focused on the dialogue structure, and we briefly studied argumentation in persuasive dialogues. Finally, we presented the state of the art of ethics in persuasive technologies and we made a list of the ethical guidelines that designers of persuasive

chatbots are invited to respect. We also discussed the legal constraints related to design and implementation of persuasive chatbots and we showed how ethics could complement the legal framework in order to better respect the user's freedoms and rights.

In the second part of the paper, we proposed to use argumentation to display the persuasive strategies employed by the chatbot and the source of the information presented by the chatbot to the user. This way, the chatbot discloses the persuasive methods it used and provides to the user more transparency by providing for them the source of the information presented in the arguments. We also proposed to assess how much ethical each argument presented by the chatbot is, by letting the user input how much they believe each argument is considered ethical. This way, to eliminate the arguments that have very low degrees in the next dialogue, and we can ethically adapt the arguments presented by the chatbot to the user's preferences.

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