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The use of rhetorical strategies in Q&A discussion

To appear in *Journal of Documentation* 70, 2014

Introduction

Social Question and Answer (Q&A) sites have become a popular alternative to traditional library-based reference services. For example, Yahoo! Answers had in 2009 more than 200 million users and one billion question and answers (Shah and Kitzie, 2012, p. 2033). The growing popularity of Q&A sites is partly due to the fact that the users can find an answer from these forums by doing a Google search. This mode of accessing is becoming more prevalent as Q&A sites generate more content that is indexed and retrieved by search engines. Most Q&A services also integrate effectively with social media sites such as Facebook, allowing its users to easily connect and use the Q&A services (Shah and Kitzie, 2012, p. 2033).

The utilization of Q&A sites is based on the practice in which “askers” post their questions to a public Q&A site and then receive comments from “answerers”, i.e., anyone who is willing to share his or her knowledge about an issue at hand. Thus, Q&A forums allow everyone to benefit from the “wisdom of crowd” (Surowiecki, 2004). On the other hand, interaction on Q&A sites is constrained by the setup of the architecture, which has a strict question and answer format. Q&A threads must start with a question, and the participants mainly interact by answering the question, not by addressing one another. Furthermore, one cannot answer more than once within a thread nor can one answer oneself (Adamic *et al.*, 2008, p. 667).

The present investigation contributes to the empirical studies on Q&A by analysing how the answerers make use of rhetorical strategies while answering the questions presented by the askers. As Q&A forums often provide competing and sometimes conflicting answers, the use of rhetorical strategies may be a more effective way to persuade the askers to believe that one individual answer should be taken more seriously than others. Usually, such persuasion is based on the attempts to enhance the credibility of an answerer in the eyes of the online audience. The use of rhetorical strategies can be even more effective if an answerer is able to undermine the credibility of the fellow answerers providing competing answers.

Unfortunately, so far, Q&A studies have neglected the issues of rhetoric. However, this research perspective is important since it enables the analysis of the ways in which the Q&A contributors make use of persuasive communication particularly when the topics of discussion are contradictory and thus subject to conflicting interpretations. The present investigation fills gaps in this field; the empirical findings deepen our understanding about the ways in the knowledge claims are constructed as valid in online forums and how the participants present themselves as credible

contributors. The findings are also relevant from a broader perspective since so far the ideas of rhetorical analysis and argumentation theory have rarely been used in information studies (see, however, Feinberg, 2010; Savolainen, 2012).

The present study approaches the use of rhetorical strategies by drawing on the classic Aristotelian categories *ethos*, *pathos* and *logos* (Borchers, 2006, p. 45). These categories represent types of rhetorical appeals or modes of persuasion that can be used in communication. Persuasive communication making use of *ethos* appeals to the character of the communicator as a credible source of ideas and views. In this context, appeals to the ethics, morals, standards, values, and principles of communication are particularly important. Persuasive communication drawing on *pathos* appeals to emotions felt by the audience, for example, anger towards one's offender. Finally, persuasive communication can make use of *logos* by appealing to reason. Such appeals focus on the content of the message and emphasize the importance of facts and logical explanations, for example. Thus, through *logos*, the communicator aims at a person's intellect.

The above setting will be refined further by identifying diverse *rhetorical strategies* indicating the ways in which the modes of persuasion characteristic of *ethos*, *pathos* and *logos* are accomplished in practice. As discussed in greater detail below, such strategies include, for example, appeal to authority (*ethos*), argument *ad hominem* (*pathos*) and appeal to quantity (*logos*). An attempt will be made to find out how popular such rhetorical strategies are among Q&A answerers and how they use them. Since the use of rhetorical strategies can be supported by providing evidence obtained from information sources, the present study also explores how the answerers make use of such sources. In this context, the emphasis will be laid on the authoritativeness of information sources.

The nature of argumentation on Q&A sites have been addressed previously in two empirical studies focusing on the argument patterns on Yahoo! Answers discussion about global warming (Savolainen, 2012; 2013). The present study focuses on the same topic since global warming provides a fertile ground for rhetorical struggle. Yahoo! Answers was selected as a research setting because of its dominant status among Q&A sites. It is believed that due to that position Yahoo! Answers attracts a wide variety of questions and alternative answers making use of rhetorical strategies.

In general, global warming refers to the rising average temperature of Earth's atmosphere and oceans and its projected continuation. It is believed that global warming is mainly caused by increasing concentrations of greenhouse gases produced by human activities such as burning fossil fuels. The questions of global warming have been debated heavily since the 1990s (see, for example, Bradley, 2011; Hoggan and Littlemore, 2009; Singer, 1997). It became a particularly hot topic in 2006 along with *Inconvenient Truth*, a documentary film about former United States Vice President Al Gore's campaign to educate citizens about this issue (Johnson, 2009).

In the debate, opinions are divided with regard to the significance of global warming, ranging from the denial of its existence to the apocalyptic prophecies of environmental damage worldwide (Myerson and Rydin, 1996, p. 92). The arguments around global warming are characterized by conflicts of expertise and rationality, conflicts of appropriate political response and future policy direction (Myerson and

Rydin, 1996, p. 94; p. 97). This debate reflects the plurality of knowledge in contemporary society. There is conflicting evidence about global warming provided by researchers working in diverse fields such as climatology, and also everyday experience of all sorts. This raises the question of which voice or knowledge counts most, and who to believe. The problem is aggravated in that there seem to be all too many rival arguments for and against the assumptions of global warming (Myerson and Rydin, 1996, p. 216). In debates taking place in online forums such as Q&A sites, the use of rhetorical strategies may be particularly effective because the answerers providing rival comments can appeal both to cognition (reason) and emotion.

The present study is structured as follows. Literature review provides background for the empirical study by discussing the approaches to rhetorical analysis and the main findings of Q&A studies so far. Then, the research framework is specified, followed by the report of the empirical findings. The last sections discuss the significance of the research findings and present ideas for future research.

Literature review

Approaches to rhetorical analysis

The study of rhetoric has evolved significantly since its beginnings in ancient Greece (see, for example, Rhetoric tradition, 1990; Tindale, 2004). Traditionally, rhetorical analysis has concentrated on the oratorical texts, for example, the analysis of specific speeches. However, researchers are no longer confined to such texts but have embraced other forms of oral and written discourse, as well as visual elements (Zarefsky, 2008, p. 634). Contemporary study of rhetoric is associated with the analysis of persuasive communication in particular. More recently, rhetorical analysis has been extended to cover posts and comments written in online forums such as discussion groups and blogs (Anand *et al.*, 2011).

The study of persuasive communication is rendered difficult because no single, universally accepted definition of persuasion exists. As a consequence, there is no objectively best definition of persuasive communication (for an overview of these issues, see Stiff and Mongeau, 2003). It can be claimed that all communication is by its nature persuasive, intentionally or unintentionally. Usually, however, persuasive communication is referred to as behaviour that is intended to affect the responses of others. Persuasive communication of this kind can be characterized by three major processes: response shaping, response reinforcing and response changing (Miller, 1980). Thus, persuasive communication intends to shape positive or negative responses to an issue, reinforce such responses or change them from one, already established position, to another, different position (Stiff and Mongeau, 2003, p. 9). More briefly, persuasive communication "represents any message that is intended to shape, reinforce, or change the responses of another, or others" (Stiff and Mongeau, 2003, p. 10). Since communicative activities such as these are characteristic of Q&A discussion, the present study approaches persuasive communication from the viewpoint of the above definition.

To be effective, persuasive communication drawing on rhetorical appeals must use demonstrations or proofs. In his classic work *On Rhetoric* Aristotle (cited in Borchers, 2006, p. 45) identified three major forms of proofs. One of them is in character (*ethos*)

of the speaker, and some in disposing the listener in some way (*pathos*) and some in the argument (*logos*) itself, by showing or seeking to show something. Aristotle regarded ethos, the apparent credibility of a source, as “almost the most important means of persuasion” (cited in Zarefsky, 2008, p. 630). According to Aristotle, three qualities are necessary for ethos: practical wisdom (*phronesis*), virtue (*arete*) and good will (*eunoia*) (cited in Borchers, 2006, p. 45). By means of these qualities the speaker can present him- or herself as credible.

Aristotle also believed that the speaker should know about his or her audience as to use effectively *pathos*, or an appeal to emotions (Borchers, 2006, p. 46). *Pathos* is “putting the audience in the appropriate mood, by playing on its feelings” (Lanham, 1991, p. 166). *Ethos* works with *pathos* because *ethos* first secures the audience’s sympathy through the speaker’s credibility, verifying the speaker’s conviction (Rife 2010, p. 261). The third proof is *logos*, or reasoning. The Greek sense of *logos* is “reasoned account” (Rife 2010, p. 261). Word choices, logic choices, and readable sentence structures are attributable to the *logos* one constructs. *Logos* also blends with *ethos* because a well-developed and admirable sense of *logos* can help establish *ethos* (Rife, 2010, p. 261).

Researchers have identified a number of rhetorical strategies serving the ends of *ethos*, *pathos* and *logos*. The terminology varies among researchers; expressions such as *rhetorical device*, *rhetorical strategy*, *rhetorical tactic*, and *rhetorical technique* are often used interchangeably (see, for example, Clark and Clark, 2005; Fogelin, 1974; Walton, 2008). In the present study, the term *rhetorical strategy* is preferred over the above alternatives. This term allows a broader and more flexible approach to persuasive communication because *rhetorical strategy* neither confines itself to the use of specific linguistic expressions (*rhetorical devices*) such as hyperbole and oxymoron, nor limits itself to the instrumental, means-to-ends rationality of such expressions in the form of a specific “tactic” or “technique”. Henceforth, *rhetorical strategy* is understood more broadly as an intentional (or unintentional) way by which the communicator persuades the recipients of a particular message to accept his or her viewpoint as valid.

One of the most well-known rhetorical strategies is argument *ad hominem*, that is, attacking the arguer instead of the argument by pointing out a negative characteristic of the arguer (Fogelin, 1974, pp. 87-89). Closely related to this, the speaker may *appeal to ridicule*; an argument is made by presenting the opponent’s conclusion in a way that makes it appear foolish. Other types of rhetorical strategies include *poisoning the well* – a type of *ad hominem* where adverse information about a target is presented with the intention of discrediting everything that the target person says (Walton, 2008, p. 187). Further, *appeal to authority*, that is, the assumption that an assertion is deemed true because of the position or authority of the person asserting, is one of the rhetorical strategies (Clark and Clark, 2005; Walton, 1997). The communicator can also appeal to *consequences of action*. In this case, the conclusion is supported by a premise that asserts positive or negative consequences from some course of action (Walton, 2008, p. 27).

Perelman and Olbrechts-Tyteca (1969, pp. 85-86) have provided an important categorization by specifying *loci of quantity* and *loci of quality*. Rhetorical strategies drawing on *loci of quantity* suggest that one thing is better or more important than

another for quantitative reasons. Thus, for example, a greater number of things is presented as more impressive than a smaller. In contrast, rhetorical strategies drawing on loci of quality challenge the “strength of numbers” (Perelman and Olbrechts-Tyteca, 1969, pp. 89-90). The locus of quality leads to a high rating of the unique which, just like the normal, forms one of the axes of argumentation. The unique is linked to a concrete value: what we consider as a concrete value seems to be unique, but it is what appears unique that becomes precious to us.

Rhetorical studies of online communication

By drawing on the ideas of rhetorical analysis, Warnick (2007) examined Web-based persuasive discourse in the public sphere. More specifically, her research focused on reception of persuasive discourse and the field dependency of online credibility. Burke and her associates (2007) investigated rhetorical strategies that elicit response in Usenet newsgroups. It appeared, for example, that messages that included introductions were more likely to receive a reply than those without. Requests also increased the likelihood of reply, consistent with the assumption that requests invoke linguistic norms that elicit response.

Wikgren (2001; 2003) examined the persuasive citation behaviour patterns in Usenet newsgroups. Her findings are particularly relevant for the present investigation since they focus on a controversial topic similar to global warming: the beneficial or hazardous use of dietary chromium supplementation in diabetes self-management. Due to the controversial nature of this medical issue, the advice given appeared to be both conflicting and confusing. To enhance their credibility, the participants referred to medical sources in persuasive ways, and sought support for their ideas from the cognitive authority of medical science. Medline abstracts in particular were used as “hard currency” in the arguments for or against the use of chromium supplementation. Citations served the rhetorical ends of legitimating knowledge claims, with the purpose of “providing authoritative grounds to persuade readers of the validity and significance of the arguments in a paper” (Gilbert, 1977, p. 117). In this context, medical science served as “general ideological support, where science has a voice of authority, and appeals to scientific proof tend to win arguments and give power to those who can articulate them” (Wynne, 1991, p. 116).

More recently, Anand and associates (2011) made use of the rhetorical approach while examining the feasibility of classifying blog posts as persuasive or non-persuasive on the basis of lexical features in the text. The study concentrated on the act of persuasion: instances where an agent attempts to convince another party to adopt a novel belief, attitude, or commitment to act. For this purpose, the researchers developed a corpus of over 4600 blog posts annotated for the presence of persuasion. Fourteen types of persuasion tactics were identified. Of them, *Reason*, i.e. providing a justification for an argumentative point based upon additional argumentation schemes e.g., causal reasoning, and *Deontic appeal*, i.e. drawing on one’s duties or obligations were used most frequently. Other tactics of particular interest for the present study include *Redefinition*, i.e. reframing an issue by analogy or metaphor, and *Social generalization*, i.e. making generalizations about how some particular class of people tendentially behaves.

Argumentation patterns in Q&A discussion

Earlier studies on Q&A sites have mainly focused on their content and users. The majority of the findings originate from empirical investigations characterizing the content of questions and answers, as well as the ways in which Q&A sites are used (for an overview, see, Gazan, 2011; Oh, 2012, and Shah *et al.*, 2009).

Drawing on Toulmin's (2003) model, Savolainen (2012) examined the ways in which argument patterns are structured in Yahoo! Answers discussion threads focusing on the issues of global warming. *Failed opening* appeared to be the most frequent argument pattern (63% of all instances of unique argument patterns). In this pattern, an asker or answerer presents an initial claim in order to elicit debate about an issue. However, if no other participant comments on the initial claim, it remains as a failed opening to a potential discussion. The participants also made use of the *oppositional argument pattern* in that they presented counter-arguments towards the initial claims. The participants also employed the *non-oppositional argument pattern*; in this case, the initial claim was supported by additional claims. Finally, the *mixed argument pattern* was used; the participants presented both counter-arguments and supporting arguments while commenting on the initial claim. Given the high share of failed openings, the findings suggest that most Q&A discussions are broad but not particularly deep.

In another study Savolainen (2013) investigated the strategies that the answerers employed in justifying their counter-arguments in discussion about global warming on Yahoo! Answers. This investigation concentrated on the oppositional and mixed argument patterns characterized above. The study also explored how the answerers used information sources to support their counter-arguments. Of the strategies employed for justifying counter-arguments, *questioning the validity of answers*, and *questioning the background assumptions of answers* were employed most frequently. The answerers also drew on *emotional appeals* and *questioned the contributor's motives*. To support the counter-arguments, the participants mainly referred to internet-based sources of information. The controversial nature of the discussion topic was reflected in the struggle for the most authoritative information sources: persuasive material advocating a particular (ideological) viewpoint to global warming versus objective research reports. It appeared that persuasive material was slightly preferred over scientific sources while seeking support for the above strategies.

Research framework and research questions

The ideas discussed in the literature were used in the elaboration of the research framework and research questions. First, the rhetorical strategies were approached as factors that serve the ends of the major types of rhetorical appeals identified by Aristotle, i.e., ethos, pathos, and logos. Second, in the identification of rhetorical strategies, the findings of the previous studies were used, most notably Anand *et al.* (2011), Fogelin (1974), and Walton (1997; 2007). Later on, the repertoire of such strategies was broadened by adding new categories identified in the analysis of the empirical data. Third, Wikgren's (2001; 2003) findings about the persuasive use of information sources in online discourse were utilized. The research framework is presented in Figure 1.

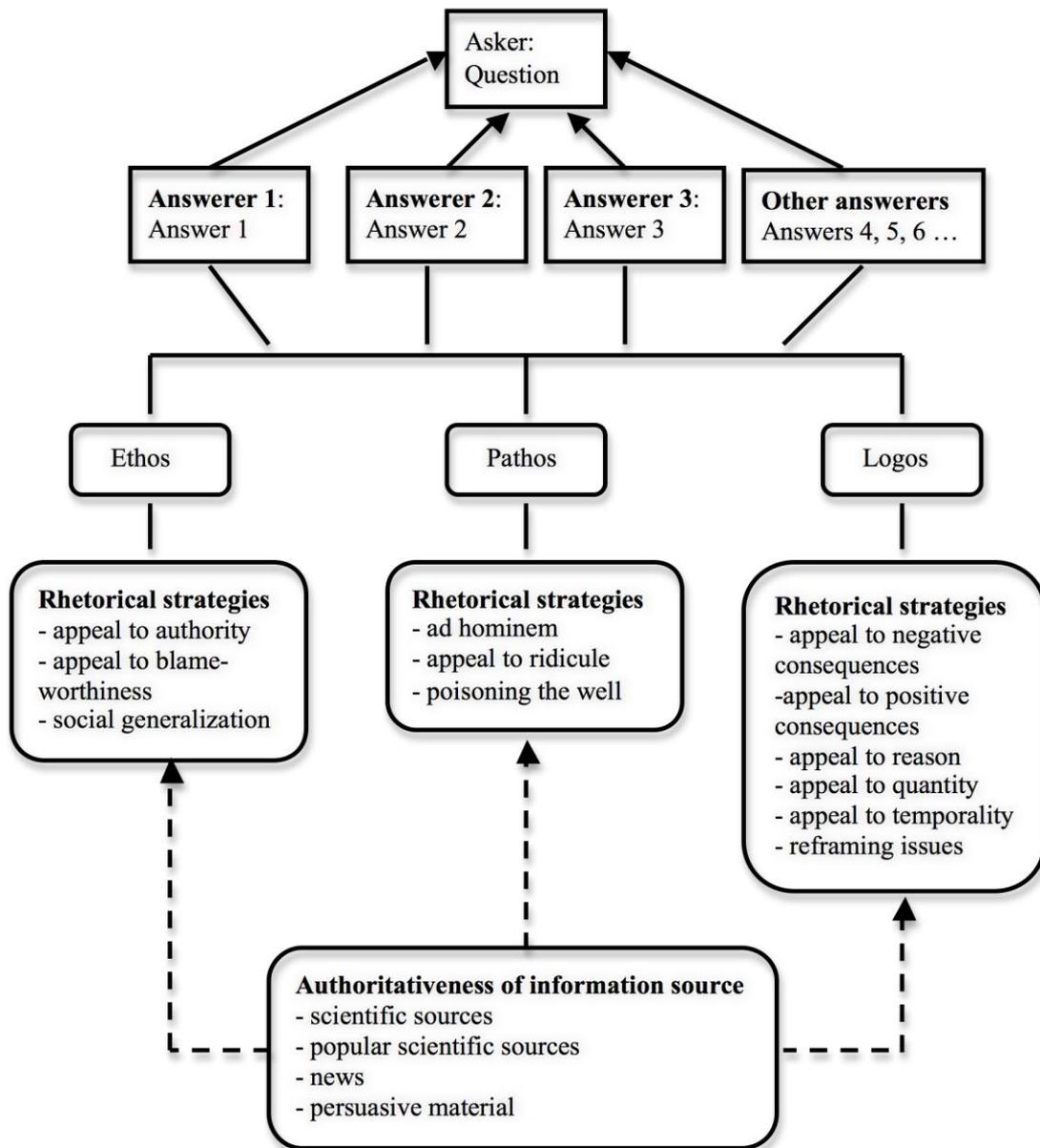


Figure 1. The framework of the study.

Figure 1 suggests that in Q&A discussion the answerers can employ diverse rhetorical strategies for the purposes of persuasion characteristic of ethos, pathos and logos. For example, appeal to authority can serve the ends of ethos since this strategy aims at enhancing the credibility of the communicator. Further, the answerer can use pathos-related strategies such as ad hominem in order to undermine the credibility of the fellow answerers. Finally, rhetorical strategies serving the ends of logos may include appeal to reason, for example, presenting compelling evidence derived from a scientific report. Figure 1 also suggests that the answerer can strengthen the rhetorical strategies by drawing on information sources of various kinds. It is assumed that the authoritativeness of such sources is particularly important because the type of information sources employed in the argumentation may affect the extent to which the answerer and his or her message is taken seriously. Four major types of information

sources are identified with regard to their authoritativeness: scientific sources, popular scientific sources, news, and persuasive material. The nature of the types of information sources is characterized in greater detail below.

Empirical research design and research questions

Drawing on the above framework, the present study addresses the following research questions.

- RQ1: What kind of rhetorical strategies do the participants employ while answering questions on a social Q&A site?
- RQ2: How frequently and in which ways are such strategies employed in the above context?
- RQ3: In which ways do the answerers make use of information sources to support the rhetorical strategies?

To strengthen the focus of the study, a few limitations to research questions appeared to be necessary. No attempts were made to investigate how the rhetorical strategies were employed within individual threads or how the use of such strategies differs across the threads. Moreover, no attention will be devoted to specific questions such as how is the use of the use of rhetorical strategies dependent on the order in which the answers are presented within threads? The present study approaches these strategies on a more general level by looking at a sample of Q&A threads as a whole. Finally, no attention will be paid to answers that did not employ a rhetorical strategy. It is evident that the comparison of the features of such answers to those employing a strategy would have required a separate study.

Empirical data and analysis

The empirical data were collected from Yahoo! Answers threads focusing on the issues on global warming. To this end, 100 consecutive threads containing discussions on this topic were downloaded. Because the present study places the main emphasis on qualitative analysis and thus does not aim at statistical generalizations, the above sample appeared to be sufficient for the purpose of the current investigation. The threads were available in the section *Yahoo! Answers/Environment/Global Warming/Resolved Questions*. This section was preferred because threads placed there are in the final form and they will not be continued by adding new messages, different from the sections of *Open Questions* and *In Voting*. The messages analyzed in the present study were posted to Yahoo! Answers within a period of eleven days from 4th to 14th March 2012. The timeframe is fairly narrow if we think that different arguments and argumentative strategies might be employed based on current events and that the topics of discussion change frequently. However, the findings of an earlier study analysing the argumentation patterns employed in Q&A discussion about global warming in December 2011 indicate that the argumentative strategies and discussion topics have not changed essentially (Savolainen, 2012). Thus, there appeared to be no specific need for the triangulation of temporal periods.

In the downloading, threads containing less than 5 messages were excluded because it appeared that short threads such as these rarely contain elements that are relevant for the needs for rhetorical analysis. The downloaded messages were first read carefully

several times in order to get an overview of the ways in which the participants made use of rhetorical argumentation. Then, the focus was directed to the answers presented by the answerers; the questions posed by the askers were excluded. The relevant parts of the answers, more specifically, a sentence or fewer related sentences were then coded in order to identify the use of rhetorical strategies. More specifically, an answer was classified as relevant for the analysis of rhetorical strategies if it contained persuasive elements such as appeals, justifications and judgments of the character of a person.

In the first phase of the coding, a list of preliminary categories of rhetorical strategies identified in research literature were used. These categories included nine strategies, for example, argument ad hominem (Fogelin, 1974), appeal to authority (Walton, 2008) and appeal to reason (Anand *et al.*, 2011). The main reason for selecting such rhetorical strategies is that they are commonly used in everyday discourse; it was expected that Q&A discussion would not be different in this regard. This assumption was confirmed by the preliminary reading of the discussion threads; additional support for validity of the above categories was obtained from the analysis of the research material. However, all research strategies were not selected in advance. The research material was also approached inductively by keeping open the possibility of identifying new categories from the material focusing on a specific and situationally sensitive issue, that is, global warming. As a result, three additional rhetorical strategies reflecting the specific features of global warming debate were identified: appeal to negative consequences, appeal to positive consequences, and temporality.

Thus, finally, altogether 12 rhetorical strategies were taken into the analysis (see Table 1 below). These categories show the range and diversity of rhetorical strategies employed in the sample of 100 threads, produced within a period of eleven days in March 2012. Since rhetoric is situational, it is possible that a broader sample taken across a longer time period might have resulted in additional categories identified from the data. However, the present study does not aim at the generalization of rhetorical strategies used in Q&A discussion across diverse contexts. The aim is more modest: to provide an indicative picture of the ways in which ethos-, pathos- and logos-related strategies are employed in online discussion.

| Rhetorical strategy serving the ends of rhetorical appeal | Definition |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ethos | Appeal to the character of the answerer in order to enhance his or her credibility in the eyes of audience |
| Appeal to authority | Deeming an assertion valid because of the position or authority of the person asserting it. In citing an authority, instead of giving reasons for what the answerer says, he or she indicates that someone (the authority cited) could give such reasons |
| Appeal to blameworthiness | Devoting attention to moral questionableness of behaviour exhibited by other people; such behaviour may manifest itself in intentional citation of misleading sources of information, for example |
| Social generalization | Making generalizations about how some particular class of people tendentially behaves and evaluating the implications of such behaviour |

| | |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Pathos | Appeal to the emotions of the recipients of a message in order to secure the audience's sympathy |
| Ad hominem | Attacking the character of a person rather than his or her opinions, arguments and conclusions |
| Appeal to ridicule | Presenting the opponent's argument in a way that makes it appear foolish |
| Poisoning the well | Presenting adverse information about a person with the intention of discrediting everything that the person says |
| Logos | Appeal to content of an argument by placing emphasis on its factual basis and the ways in which inferences are drawn from the evidence |
| Appeal to negative consequences | Emphasizing the negative outcomes of action or processes, for example, risks involved |
| Appeal to positive consequences | Emphasizing the positive outcomes of action or processes, for example, economic benefits (real or expected) |
| Appeal to quantity | Drawing on the assumption that which is more voluminous is more significant than which is less so |
| Appeal to reason | Providing a justification for an argumentative point based upon additional argumentation schemes e.g., causal reasoning |
| Appeal to temporality | Drawing on the assumption that what has existed for a long time is more significant than what has existed for less time |
| Reframing issues | Approaching an issue from a novel viewpoint by means of analogy or metaphor, for example |

Table 1. The categories of rhetorical strategies.

In Table 1, the rhetorical strategies are grouped under the categories of ethos, pathos and logos. A rhetorical strategy is defined an intentional (or unintentional) way by which the communicator persuades the recipients of a particular message to accept his or her viewpoint as valid. An individual strategy is assigned to one of these three categories on the basis of the main function it serves in the context of a rhetorical appeal. Therefore, the above classification is not totally exclusive since an individual strategy may have elements that are relevant to another category, too. For example, social generalization may not solely serve the ends of ethos; it can also contain "pathetic" elements in that labeling an individual as a member of a social group, e.g. "deniers" may elicit negative emotions towards that person. Similarly, the rhetorical strategies serving the ends of pathos, for example, ad hominem, can incorporate elements that are relevant for the consideration of ethos because a person who has been categorized as a pathological liar may not be taken as a competent answerer. Finally, logos-related strategies such as appeal to quantity may incorporate elements that are relevant from the perspective of ethos. The elaboration of a compelling argument drawing on climatology may suggest that the answerer is a credible source of information.

In the coding, an individual rhetorical strategy identified in an answer was assigned with a code. Multiple codes were assigned to the same answer if the answerer

employed more than one strategy, for example, appeal to authority and appeal to quantity. Further, an individual strategy, for example, appeal to authority was coded several times within the same message if the answerer referred to diverse authorities such as individual scientists and research reports in different sentences constituting the answer. However, typically, only one code per rhetorical strategy was used within a sentence.

Thereafter, the information sources referred to by the answerers were coded. For this purpose, the categorization of information sources according to their authoritativeness was employed, similar to an earlier study focusing on the justification of counter-arguments (Savolainen, 2013). Given the problem of multiple rationalities in the discussion about global warming, no attempts were made to place the information sources on a continuum of high versus low authoritativeness. A neutral approach was taken by characterizing the authoritativeness of a source on the basis of the nature of evidence provided by information sources of various types. To this end, the content of all information sources used to support rhetorical strategies were scrutinized by accessing the networked sources. The authority of information sources of other types was inferred on the basis of qualitative analysis of the message. Five major categories indicating the nature of the authoritativeness of information sources were inductively identified as follows (Savolainen, 2013):

- *Scientific sources* provide evidence by reporting the findings of basic and applied research funded by universities and research agencies such as The National Aeronautics and Space Administration (NASA).
- *Popular scientific* sources entail material that interprets the findings of scientific research for a general audience in diverse formats such as printed books, television documentaries and web pages. Examples of sources of this type include Wikipedia articles and the articles of National Geographic.
- *News* communicates selected information on current events which are reported through the printed media, broadcast, or the Internet to a mass audience.
- *Persuasive material* advocates a particular (ideological) viewpoint in order to influence public opinion. Examples of sources of this type include the website organized by Global Warming Hoax (<http://www.globalwarminghoax.com/news.php>)
- *Other sources* include a variety of miscellaneous sources such as a message available on a Q&A site or an opinion of a friend.

In order to strengthen the validity of the coding, the initial coding was checked iteratively by the present author. Because the study is exploratory and does not aim at statistically representative generalizations of Q&A sites, the requirement of the consensus on coding decisions based on inter-rater reliability can be compromised without endangering the reliability of the exploratory study. According to Miles and Huberman (1994, p. 65), check-coding the same data is useful for the lone researcher, provided that code-recode consistencies are at least 90%. Following this idea, check-coding was repeated several times, and the initial coding was carefully refined. Check-coding revealed a few boundary cases regarding the categories of Appeal to blameworthiness, Ad hominem, and Poisoning the well. These cases were resolved by scrutinizing the content of the message in the context of the answer provided by the participant. The refining of the coding was continued until there were no anomalies.

To answer the research questions, the data were scrutinized by means of descriptive statistics. To this end, the percentage distributions were calculated for the rhetorical strategies per ethos, pathos and logos, as well the types of information sources used to support the rhetorical strategies. Second, qualitative content analysis was conducted. The constant comparative method was used to capture the variety of articulations of the rhetorical strategies and the ways in which they were used in Q&A discussion (Lincoln & Guba, 1985, pp. 339-344). As the qualitative data appeared to be saturated enough, it was possible to draw sufficiently coherent and credible picture of the nature of rhetorical strategies used in the Q&A forum.

Since the contributors to Yahoo! Answers are expected to be well aware of the fact that their messages will become publicly available on a Q&A site, no attempts were made to contact the answerers to obtain permission for the use of their messages in the present study. Asking permission would have been difficult in practice because the majority of the contributors appeared to be occasional users; they may not be motivated in answering requests such as these. However, when using the illustrative extracts taken from messages, the anonymity of the answerers is carefully protected. Their nicknames are replaced by neutral identifiers such as Answerer 12, Thread 76. Given the high number of Q&A threads discussing global warming, it is unlikely that such extracts could be associated with individual answerers.

Empirical findings

The use of the rhetorical strategies are reviewed by following the order of ethos, pathos and logos specified in the research framework above.

Quantitative overview

In total, 92 individual askers and 353 answerers, altogether 445 participants contributed to the discussion reviewed in the present study. The answerers provided altogether 944 answers to 100 questions presented in the Q&A forum. Since there were 100 questions and 944 answers in the 100 threads examined in the present study, there were on average 10 messages per thread. Of the answerers, 85.3% wrote only one message. The share of active answerers (10+ messages) was low, that is, 5.9 % of all answerers. The highest number of answers provided by an individual participant was 42. The active answerers (10+ messages) wrote altogether 40.9% of all answers. Thus, similar online forums of other types, for example, discussion groups, a handful of active participants produce a disproportionate share of messages (Savolainen, 2011).

The number of answers indicating the use of one or fewer rhetorical strategies was 361, that is, 38.2 % of all answers (n = 944). This suggests that rhetorical strategies are employed relatively often in Q&A discussions. Within 361 answers, there were altogether 678 instances of the use rhetorical strategies. The distribution of the use these strategies is presented in Table 2.

| Rhetorical strategy | % | |
|---------------------------------|------------------------|------|
| Ethos | 35.3 | |
| Social generalization | | 12.8 |
| Appeal to blameworthiness | | 12.5 |
| Appeal to authority | | 10,0 |
| Pathos | 24.5 | |
| Ad hominem | | 10.5 |
| Appeal to ridicule | | 10.2 |
| Poisoning the well | | 3.8 |
| Logos | 40.1 | |
| Appeal to temporality | | 9.9 |
| Appeal to reason | | 9.4 |
| Appeal to negative consequences | | 9.3 |
| Reframing issues | | 6.8 |
| Appeal to quantity | | 4.0 |
| Total | 99.9 (due to rounding) | |

Table 2. Percentage distribution of the use of rhetorical strategies (n = 678).

As a whole, the answerers favoured most frequently strategies related to logos (40.1% of all instances of the use of the strategies) and ethos (35.3%), while the strategies serving the ends of pathos were employed less frequently (24.5%). The use of individual rhetorical strategies was distributed quite evenly. The answerers drew most frequently on social generalization (12.8% of all instances of the use of rhetorical strategies). Almost equally often, they appealed to blameworthiness of action. Quite frequently, the answerers also used arguments ad hominem and appealed to authority. It was also quite common to appeal to negative consequences of action. However, some strategies, for example, appeal to quantity, poisoning the well and appeal to positive consequences were employed quite seldom.

Interestingly, the answerers drew somewhat differently on information sources while seeking support for the use of rhetorical strategies. To this end, they made altogether 197 references to information sources of diverse kinds; however, a few individual sources, for example, a YouTube video criticizing “alarmist” views, were mentioned several times in diverse answers. The percentage distribution of the use of information sources is specified in Table 3.

| | Scientific sources | Popular scientific sources | News | Persuasive material | Other sources | % in total |
|-----------------------|--------------------|----------------------------|------------|---------------------|---------------|--------------|
| Ethos | | | | | | 37.5 |
| Authority | 10.7 | | 0.5 | 6.1 | 4.1 | 21.4 |
| Blameworthiness | 3.0 | | | 6.1 | 1.0 | 10.1 |
| Social generalization | 0.5 | | 2.5 | 1.0 | 2.0 | 6.0 |
| Pathos | | | | | | 11.5 |
| Ridicule | 1.5 | 1.5 | | 2.0 | 1.5 | 6.5 |
| Ad hominem | | | | 1.0 | 2.5 | 4.0 |
| Poisoning the well | 0.5 | | | | 0.5 | 1.0 |
| Logos | | | | | | 51.0 |
| Reason | 5.6 | 1.0 | 4.1 | 6.1 | 0.5 | 17.3 |
| Reframing | 2.0 | 2.5 | | 2.5 | 3.0 | 10.0 |
| Temporality | 5.6 | 1.5 | | 2.0 | 0.5 | 9.6 |
| Negative consequences | 2.0 | 1.0 | | 3.0 | 1.5 | 7.5 |
| Quantity | 3.6 | 1.0 | | 1.0 | 1.0 | 6.6 |
| Positive consequences | | | | | | 0.0 |
| In total | 35.0 | 8.5 | 7.1 | 30.8 | 18.6 | 100.0 |

Table 3. Percentage distribution of the use of information sources (n = 197) in support for the rhetorical strategies.

The answerers were most active to use information sources in support for logos-related strategies (51% of all mentions of information sources). This suggests such strategies are more “information-intensive” than those serving the ends of ethos and pathos. The ethos-related strategies were also supported quite actively by the use of information sources (37.5% of all information sources mentioned), while such sources were employed quite seldom in support for pathos-related strategies (11.5%). Of individual strategies, appeal to authority was most frequently supported by making references to information sources (21.4% of all instances of the use of information sources). The answerers also quite frequently drew on information sources while appealing to reason or directing attention to the blameworthiness of action.

The answerers favoured most strongly scientific sources (35% of all mentions of information sources). Almost equally, they preferred persuasive material (30.8%). The role of popular scientific sources (8.5%) and news (7.1%) remained fairly marginal. On the other hand, the share of sources of other types was fairly high (18.6%). This reflects the facts that the answers employed a wide variety of miscellaneous sources such as a message published in an online discussion forum, a printed book, and the comment of a former minister.

Interestingly, the above distribution is fairly equal with the findings of an earlier study focusing on the justification of counter-arguments on the issues of global warming

(Savolainen, 2013) In that study, the share of scientific sources was almost the same (34%). In the previous study, the share persuasive material was somewhat higher than in the present investigation (38%). Popular scientific sources were used equally often (7%) in both studies, but the share of news was somewhat higher in the present study (8.5 % versus 5%). Also in the previous study, a considerable part of the sources were classified into the category of other sources (16% of all mentions). The slight differences between these two studies may be explained by the fact that in the previous investigation (Savolainen, 2013), the messages taken into analysis were characterized more strongly by ideological struggles because the focus was placed on the counter-arguments. In this context, the answerers drew more strongly on persuasive material than research reports, for example.

As Table 3 demonstrates, the answerers were most active to seek further support from information sources while appealing to authority and appealing to reason. In both cases, the main struggle for source preferences took place between scientific sources and persuasive material. While appealing to authority, scientific sources were preferred over persuasive material, whereas in the context of appealing to reason, the answerers employed these source types almost equally often. The answerers also quite actively used scientific sources while appealing to temporality. The role of persuasive material was most visible while appealing to negative consequences of action. On the other hand, while appealing to positive consequences of action, no information sources were referred to; the arguments were solely based on the opinions of the answerers.

Qualitative features of the use of rhetorical strategies

The quantitative overview can be specified by examining the main qualitative features of the use of the rhetorical strategies. Ethos-related strategies will be discussed first, followed by strategies serving the ends of pathos and logos.

Ethos

It was a specific characteristic of the logos-related strategies that the answerers placed the main emphasis on the undermining of the credibility of fellow answerers. In contrast, the answerers seldom drew on their own strengths such as familiarity with the issues of global warming or academic background in environmental science.

I have published a number of articles and science documents documenting these conditions. (Thread 54, Answerer 1)

The preference for attacking the competitors is mainly due to the controversial nature of the issues of global warming. To enhance credibility, it may be more effective to put fellow answerers in a dubious light than praising one's own competency. In this way, the answerer can create an impression that he or she is free from weaknesses assigned to his or her competitors and thus more credible in the eyes of the audience.

The most popular strategy serving the ends of ethos was *social generalization*. To this end, the answerers classified their competitors into specific groups of people whose values and goals were put in a questionable light. By means of collective labeling, the competitors were classified by using negatively-coloured categories such as

“denialists” or “deniers” and “alarmists” or “warmists”. The former category includes people who intentionally ignore the alerting issues of global warming while people classified into the latter category are characterized as ideologically motivated believers ranting about doomsday scenarios. Almost without exception, the labels used in the social generalization were negative and they were used in order to undermine the credibility of those providing opposing answers. This strategy reflects the fact that the topics related to global warming easily give rise to ideological struggle.

While drawing on social generalization, the answerers quite seldom supported their views by drawing on information sources (6% of mentions of all sources of information). In most cases, the informants made a reference to online news articles.

Warmist like Al Gore refuse to engage in any formal debate on the issue. That is because on the few occasions Warmist have debated openly, they lose, and they lose big. http://blogs.news.com.au/heraldsun/andrewbolt/index.php/heraldsun/comments/no_wonder_the_warmists_hate_debate/. (Thread 9, Answerer 4)

The answerers also favoured comments presented on online forums such as Yahoo! Answers. These sources are used since they provide support for the collective labeling of ideological opponents; the answerer is not alone with his or her views.

It is not conservatives who oppose the idea of global warming, but some, and not all extreme right wing neo-fascists who want to imprison scientists. http://answers.yahoo.com/question/index;_ylt=AjGmerraw3Pg4nCOxmAESCvty6IX;_ylv=3?qid=20111109200719AAOGPIIn. (Thread 26, Answerer 4)

A frequent ethos-related strategy was *appeal to blameworthiness*. To this end, the answerers directed attention to the moral questionableness of behaviour exhibited by those with opposite ideas. In many cases, appeal to blameworthiness drew on the assumption that opponents act insincerely or deceitfully. Therefore, they should not be taken as credible contributors to Q&A discussion. In most radical statements, the ethical foundation of distributing information about global warming was questioned.

The Great Global Warming Swindle. (Thread 88, Answerer 1)

However, there were counter-attacks towards “denialists” such as the above answerer who was blamed for the frequent posting of a promotional YouTube video.

Whatever it says, the author is not a scientist and the article does not affect science any more than X’s silly and endlessly repeated lies (again here on this page) about "top climate scientists" appearing in his favorite anti-science video. (Thread 23, Answerer 4)

The blameworthiness was often associated with betrayal in science, for example, tampering climatological evidence. The promotion of denialist or warmist ideas can also become an ethically problematic affair if it aims at making money or advancing one’s political career. The ideological struggle was also reflected in the source preferences. Different from the strategy of social generalization, the answerers drew

more frequently on persuasive material and scientific sources while the role of other sources remained marginal. All in all, the answerers appealing to blameworthiness quite actively referred to information sources (about 10% of mentions of sources). Persuasive material was mainly used by “denialists” who attacked the blameworthiness of behaviour exhibited by “warmists” or “alarmists”.

Al Gore’s movie "An Inconvenient Truth" was full of bald faced lies. Like the Polar Bears were drowning, or the Ice Caps were melting, or the oceans were rising - all lies.
<http://scienceandpublicpolicy.org/monckton/goreerrors.html>. (Thread 9, Answerer 4)

The answerers also drew on scientific sources in order to bolster their arguments about the blameworthiness of action. An illustrative example of how scientific sources can be employed to support opposite views is taken below. The competing answerers debate whether Phil Jones, a well-known climatologist, had presented interpretations that are morally dubious.

Why did Phil Jones, head of the Climatic Research Unit, the Guru and High Priest of Global Warming himself admitted there has been no statistically significant warming? Why all the lying and cheating and data manipulation? (Thread 34, Answerer 8)

However, the above “denialist” interpretation was put into question by an answerer who took a “warmist” viewpoint.

No, Phil Jones admits nothing of the kind, you are a liar. In his statement he was talking about warming over a certain time period that was not significant at the 95% confidence level. He certainly did not say temperatures were going down, and in fact the first decade of the 21st century was the warmest decade in the instrumental record. To portray that as temperatures "going down" is a blatant lie. I really don't understand why you and your buddies cannot make arguments without lying. (Thread 79, Answerer 5)

To enhance credibility, the answerers often appealed to *authority*, particularly scientific expertise. This rhetorical strategy differs from social generalization and appeal to blameworthiness in that instead of the negative labeling of the opponents, the answerers made attempts to find supporting evidence for their views by quoting distinguished climatologists, for example. Often, such attempts were made to strengthen one’s credibility by drawing on the authority of scientific research and research institutions. Again, however, such evidence was used both for and against the assumptions about the existence of global warming.

Overall, the answerers were active to use supporting evidence taken from information sources (about 21% of mentions of information sources). There appeared to be a struggle between the authoritativeness of scientific sources and persuasive material. However, it was characteristic of the use of this strategy that the answerers favoured scientific sources over persuasive material. In addition, sources of other types were referred to quite often.

The use of scientific sources took place in two major ways. First, the answerers referred to individual sources such as the websites of established research organisations. Second, they quoted individual scientists by rephrasing their words, without giving exact bibliographic data or URL. Interestingly, the “warmists” preferred the use of websites of research organizations such as NASA.

According to NASA 2010 was the hottest year ever recorded and in the last decade we find nine of the ten hottest years on record. <http://data.giss.nasa.gov/gistemp/>. (Thread 19, Answerer 6)

In contrast, the “denialists” preferred quotes taken from the interviews of established climatologists in particular. One of the ways to increase the impact of the rhetorical argument was to demonstrate that a fervent proponent of the ideas of global warming had changed his mind and confessed that his prior argumentation was flawed.

An honest evaluation by an Alarmist (and that is unusual): John Barnes, climate scientist: “If you look at the last decade of global temperature, it is not increasing,” Barnes said. (Thread 59, Answerer 8)

The authority of scientists was also utilized by preferring them over politicians promulgating particular viewpoints for or against global warming.

I believe the conclusions of intelligent climate scientists, not a fat bigot on the radio. (Thread 9, Answerer 3)

The appeals to authority seeking support from persuasive material boiled down to the ideological disputes. In particular, the “denialists” were eager to make use of such sources, for example, YouTube videos promoting skeptical viewpoints of individual researchers. However, such sources appeared to be mainly promotional, not objective scientific documents even though they might be referred to as contributions provided by distinguished researchers.

Some of the world's top climate scientists appear in the videos below and explain the man-made Global Warming scam in detail. You should watch, you will learn many things. The Great Global Warming Swindle. <http://www.youtube.com/watch?v=YtevF4B4RtQ> (Thread 19, Answerer 5)

Pathos

As a mode of persuasion, pathos appeals to the emotions of the recipients of a message in order to secure the audience’s sympathy. Similar to the ethos-related strategies, the answerers laid the main emphasis on eliciting negative emotions or antipathy towards the competing answerers. Again, the preference for the strategy of “attacking is the best defence” is mainly due to the conflict-sensitive topics of global warming. Putting the opponents in a negative light serves the ends of discrediting their ideas and undermining the credibility of competing answers. The most popular pathos-related strategy was argument *ad hominem*. This strategy is based on attacking the person instead of his or her argument.

Wow! To say it mildly, you are one confused person. (Thread 10, Answerer 9)

You are just repeating junk you heard from some idiot because you are too stupid to know whether what they are saying is the truth or not. (Thread 44, Answerer 3)

The answerers making use of ad hominem attacks rarely made use of information sources (4% of the mentions of information sources). Instead, the answerers drew on their personal beliefs, impressions and opinions, as exemplified by the above extracts. In a few cases in which the answerers sought support from information sources, they drew on persuasive material or miscellaneous sources, for example, a message posted to Yahoo! Answers.

Poisoning the well is a rhetorical strategy that is closely related to argument ad hominem. Poisoning the well draws on the negative labeling of all what a person presents by claiming that his or her ideas have always been questionable and will be so also in the future.

Denier head-pieces such as X and Y publish crap (especially in non peer-reviewed mediums), chock full of errors. (Thread 65, Answerer 3)

Interestingly, the answerers very seldom referred to information sources in order to support this strategy (only 1% of mentions of information sources). For example, blogs written by “denialists” or videos recommended by them were classified as low quality sources that should be avoided.

Be very careful with unscientific video clips, especially anything that you may find on Youtube. Most of that nonsense has been carefully (or not so carefully) edited to support someone's agenda. (Thread 75, Answerer 4).

Appeal to ridicule is a rhetorical strategy that focuses less directly on a person. More emphasis is placed on his or her arguments that are presented in ways that makes them appear foolish. On the other hand, appeal to ridicule can be directed to a group of people, for example, the competing answerers. Their credibility is eroded by means of joking or mockery.

They are all here and have a collective IQ below room temperature. (Thread 36, Answerer 8)

The answerers seldom sought further support for this strategy by drawing on information sources (about 6% of mentions of information sources). Persuasive material was preferred most strongly.

Have not you heard? Global warming is a magical force that causes everything <http://www.numberwatch.co.uk/warmlist.htm>, (Thread 8, Answerer 4).

The above source, “Warmlist” ridicules the “alarmist” viewpoint by providing an alphabetical catalog of hundreds of “things caused by global warming”, ranging from AIDS to “World War 4”.

Logos

As a whole, the answerers drew most frequently on logos-related rhetorical strategies concentrating on the content of the argument. These strategies also were most “information-intensive” in that 51% of all mentions of information sources appeared in the context of logos-related argumentation.

The most frequent strategy was *appeal to negative consequences*. The emphasis placed on negative (worrisome) consequences is understandable because global warming may primarily be perceived as a threat rather than a promise for something better in the future. Unsurprisingly, the answerers promoting “warmist” ideas were most eager to remind about the negative consequences of global warming. The following message is typical in this regard.

This (= global warming) has many bad effects such as rising sea levels due to ice caps melting. Drought in the coming years due to climate changing. Crops failing to grow as a result of too much hotness. (Thread 86, Answerer 4)

The answerers were quite active to support this strategy by drawing on information sources (about 7% of mentions of information sources). Persuasive material provided by organizations such as World Wildlife Foundation was preferred slightly over scientific sources.

Even if humans stop adding greenhouse gases into the atmosphere the warming will continue for centuries.
<http://worldwildlife.org/species/polarbear>. (Thread 15, Answerer 1)

Scientific sources that were used to bolster this strategy had different origins, for example, course material used at the Department of Ecology and Evolutionary Biology, University of Arizona.

Other animals will lose their ecological niche and, as a result, will either have to adapt or perish. Many plants and animals will just move along with the increase in temperatures where it feels most comfortable to them.
[http://eebweb.arizona.edu/courses/Ecol2006/Walther et al Nature.2002.pdf](http://eebweb.arizona.edu/courses/Ecol2006/Walther%20et%20al%20Nature.2002.pdf).
(Thread 88, Answerer 10)

Since global warming is associated with risks and threats rather than positive developments, the answerers rarely appealed to *positive consequences*. Interestingly, no explicit references to information sources were made to support this strategy; the argumentation drew on the answerers’ personal beliefs and opinions.

Natural global warming is our friend and it is what saved us from the ice ages.
(Thread 71, Answerer 4)

One of the most frequently used logos-related strategies was *appeal to temporality*, that is, devoting attention to the temporal aspects of processes related to global warming. Temporal aspects are particularly intriguing because the processes of global warming have a long history covering several hundreds or thousands of years. On the other hand, such processes may be cyclical.

Nature takes care of global warming and cooling as she pleases. It has been that way since the Earth was formed and will continue to be that way long after we are all gone. (Thread 40, Answerer 5)

The answerers were quite active in seeking further support for this strategy from information sources (about 9% of mentions of information sources). Different from the logos-related strategies discussed above, the answerers strongly preferred scientific sources over persuasive material or popular scientific sources, for example. Often, the scientific sources were used to support the scenario of continuous global warming by drawing on the statistics published by NASA.

The ten warmest years in the instrumental record are 2010, 2005, 2009, 2007, 2002, 1998, 2006, 2003, 2004 and 2011. <http://data.giss.nasa.gov/gistemp/>. (Thread 96, Answerer 2)

Similar to other strategies discussed above, the use of persuasive material was associated with the ideological dispute about the relevant time-scale of global warming. Interestingly, the skeptical viewpoints were dominant in this regard.

That is because there has been no additional warming for about 15 years and it looks like it is starting to get cooler.
<http://www.youtube.com/watch?v=YaTJJCPYh...> (Thread 33, Answerer 5)

Appeal to temporality was also supported by references to popular scientific sources such as Wikipedia.

For anyone who wants to talk about the warming at the end of the last ice age, that warming ended 6 000 years ago and will not resume until the end of the next ice age in 95 000 years.
http://en.wikipedia.org/wiki/File:Holocene_Temperature_Variations.png
(Thread 73, Answerer 2).

Closely related to the above strategy, the answerers appealed to the aspects of *quantity*. These arguments were mostly dealing with facts about the volume of processes contributing to global warming. The following example is quite typical.

Human actions are currently releasing 33.5 billion tons of CO₂ into the atmosphere annually while that atmosphere is increasing at a current average rate of 15.6 billion tons annually. (Thread 82, Answerer 1)

In order to support the appeal to quantity, the answerers preferred most strongly scientific sources. This is understandable because the most reliable facts or estimates may be obtained from scientific research reports published by NASA, for example.

The vast majority says it is human activity. A few that disagree claim low sensitivity to CO₂ (1 deg instead of 3 deg for doubling of CO₂) or feedback processes like clouds. A few will even claim that volcanoes produce more CO₂ than humans - check it out. Source: <http://climate.nasa.gov/evidence/>. (Thread 53, Answerer 3)

Appeal to reason is a logos-related strategy that operates on a higher level of abstraction than appeal to quantity, for example. While appealing to reason, the answerers tried to demonstrate that the object of discussion, that is, global warming can be approached differently based on the nature of reasoning used in the argumentation. First, the answerers presented logical reasons for the existence (or non-existence) of global warming. Second, the answerers identified flawed or illogical reasoning with regard to these issues.

While appealing on reason, the answerers were active to draw on information sources in order to support their views (about 17% of mentions of information sources). Persuasive material and scientific sources were almost equally popular. Often, YouTube videos promoting critical views on global warming were used to convince the audience that there cannot be anthropogenic global warming because climate change is caused by factors that are beyond humans' control.

It is the Sun that controls climate and people don't control the Sun.
<http://www.youtube.com/watch?v=YtevF4B4RtQ>. (Thread 49, Answerer 4)

The answerers also supported their appeals to reason by drawing on scientific sources. Again, established research organizations and authoritative journals such as *Science* were preferred.

Nice going - a trifecta of (1) incorrect answer; (2) scientific ignorance >>AGW is all about politics<<; and (3) inability to follow a logical sequence >>Pretending that a scientific consensus that our emission are affecting the climate equals a scientific consensus that our emissions are going to catastrophic is ridiculous."<< This statement also contradicts #2 because you cannot have a scientific consensus about something that is "all politics".
<http://www.sciencemag.org/content/335/6072/1058.abstract#aff-1>. (Thread 80, Answerer 10)

Finally, the answerers employed the strategy of *reframing* an issue. For this purpose the answerers used analogies and metaphors or approached the issues of global warming from a new viewpoint, for example, contrafactual assumptions.

If it were no for global warming, Chicago would still be under a mile of ice.
(Thread 89, Answerer 7)

The answerers reframing issues were fairly active to draw on information sources to support their rhetorical arguments (10% of mentions of information sources). The answerers equally preferred scientific sources and persuasive material. They also referred quite often to popular scientific sources and used information sources of other types. In the following extract, the answerer draws on an image issued by the National Oceanic and Atmospheric Administration (NOAA) in order to strengthen the power of the rhetorical argument. It introduces a thought-provoking view on New York that is inundated by floods caused by global warming.

Of course, denialists love to claim that every snowflake disproves global warming. People will still believe that global warming is a hoax when New

York is under water. <http://www.noaanews.noaa.gov/stories2010/images/warmingindicators.jpg>. (Thread 36, Answerer 10)

Discussion

The findings of the present study suggest that rhetorical strategies play an important role in persuasive communication on Q&A sites. About 38% of answers indicated that the answerers had drawn on such strategies. Altogether 12 diverse strategies serving the ends of rhetorical appeals characteristic of ethos, pathos and logos were identified. As a whole, the answerers drew most frequently on strategies related to logos and ethos while the strategies serving the ends of pathos were used less frequently. The answerers employed rhetorical strategies in order to present themselves as credible persons in the eyes of the askers and fellow answerers (ethos). The answerers also made attempts to elicit favourable emotions towards themselves among the audience (pathos). Finally, the answerers devoted remarkable attention to the substance of the argument by placing emphasis on its factual basis and the ways in which inferences are drawn from the evidence (logos).

Of individual strategies, Social generalization, Appeal to blameworthiness, Ad hominem, Appeal to ridicule and Appeal to authority were used most frequently. Interestingly, the rhetorical strategies serving the ends of ethos and pathos drew more strongly on the negative labeling of competing answerers than emphasizing the strengths of the answerer herself. This preference is mainly due to the controversial and conflict-intensive issues of global warming. Given the existence of multiple rationalities and high number of rival answers motivated by ideological interests of diverse kinds (Myerson & Rydin, 1996, p. 216), the reaching of consensus between the answerers is unlikely. Therefore, to enhance one's credibility in may be better to adopt the strategy of "attacking is the best defence" and suggest - by means of negative labeling - that the competitors should not be taken seriously since their views are biased. On the other hand, the logos-related strategies were more neutral in that the main attention was directed on the content of the argument. Since the substance of global warming is mainly associated with negative developments, the rhetorical strategies were mainly employed to demonstrate the nature of risks involved in the rising of Earth's average temperature.

The empirical findings support and specify the results of an earlier study that examined the strategies employed in justifying counter-arguments in Q&A discussion (Savolainen, 2013). This study made use of the argumentation patterns identified by Toulmin (2003). The investigation demonstrated that questioning the validity of answers was used most frequently among the answerers. This strategy comes closest to the rhetorical strategies serving the ends of logos, most notably appeal to reason and appeal to quantity. Both strategies boil down to the question about the extent to which answers provided by the participants are logically and factually credible.

The above study (Savolainen, 2013) also showed that while presenting counter-arguments, the answerers often questioned the background assumptions of the answers provided by other participants. This strategy, in turn, is parallel to the ethos-related rhetorical strategies, that is, social generalization, appeal to blameworthiness and appeal to authority. We may conclude that the strategy of questioning the background assumptions and ethos-related strategies ultimately deal with the

credibility of the answerer as a moral subject responsible for his or her action. Savolainen (2013) also showed that while justifying counter-arguments, the participants drew on emotional appeals and questioned the contributor's motives. These strategies come closest to the pathos-related appeals, that is, ad hominem, appeal to ridicule, and poisoning the well. All these five strategies boil down to the ways in which answerers appeal to the emotions of the audience in order to get support for their views. Importantly, these results suggest a more general conclusion. Argumentation in the context of Q&A discussion is built on three major factors: (i) the credibility of the communicator, (ii) emotional appeal to audience, and (iii) the nature of factual and logical evidence provided by the contributors. It is evident that these factors are constitutive of discourse occurring in online forums of other types, too.

The present study also specified the ways in which the answerers employed information sources to gain further support for the use of rhetorical strategies. As a whole, information sources were used most frequently in support for logos-related strategies. They comprised 40% of all instances of the use of rhetorical strategies, but 51% of all sources mentioned by the answerers. In contrast, pathos-related strategies were least "information intensive", since they comprised about 24% of all instances of strategies, but only 11% of all information sources mentioned. As a whole, the answerers preferred almost equally scientific sources and persuasive material. To a lesser extent they used popular scientific sources such as Wikipedia, news articles and miscellaneous information sources. As to the use of scientific information sources and persuasive material, the findings support the results of an earlier study (Savolainen, 2013). Both studies indicated that the major struggle for authoritative evidence takes place between the evidence obtained from scientific sources, and persuasive material propagating a particular viewpoint. The findings of the present study also support the findings of Wikgren (2003) demonstrating that the scientific sources are used rhetorically in order to strengthen the knowledge claims presented in online discussion.

Conclusion

The findings of the present investigation suggest that the ideas of rhetorical analysis open a promising perspective on the study of user-generated information in online forums. This perspective is important since online forums tend to be sites of discursive struggle for dominant interpretations. Rhetorical analysis can be employed to study how the participants persuade the audience (askers, readers) in diverse forums such as blogs, discussion groups, Facebook and Q&A sites. This research topic becomes even more important, along with the growing popularity of social media in everyday information seeking and sharing. The findings of rhetorical studies are also significant from the perspective of information literacy. It would be easier for the users to evaluate the relevance and credibility of information if they become aware of the specific ways in which bloggers, askers and answerers on Q&A sites, as well as online contributors of other kinds make use of persuasive communication.

The findings of the present study are limited because it focuses on an individual Q&A site discussing a controversial topic. Therefore, the findings cannot be generalized to all Q&A sites or online forums more broadly. In future studies, the research setting can be refined by comparing the range of rhetorical strategies identified in the present

investigation to those found in other Q&A topics, in other Q&A sites in similar questions, and other environments such as blogs and online discussion groups that invite commentary on the same topic. In this way, the research questions could be expanded to include issues such as how the various elements that combine in a single Q&A discussion area work to create a specific rhetorical environment. The focus of the study would shift from the analysis of rhetorical situations, for example, a debate about an individual issue taking place on a Q&A site, to the investigation of “rhetorical ecologies” (Edbauer, 2005). In this broader context, rhetorical strategies can be studied trans-situationally in diverse forums, for example, newspaper articles, documentary films, blogs and Q&A sites.

The present investigation draws on a partial rhetorical analysis inspired by the ideas of Aristotelian rhetoric; other approaches to rhetorical analysis (e.g., Perelman and Olbrechts-Tyteca, 1969) may place different emphasis on the critical role of the audience, for example. The study is also limited because it defers judgments about rhetorical success. Thus, no attempt was made to answer the question of “was the use of this rhetorical strategy successful in accomplishing the aims of the answerer?” However, this is an important point that should be investigated in future studies in order to find which rhetorical strategies are most effective and what the rhetoric accomplishes. Future studies could also investigate how question type might insinuate type of answer rhetoric, for example, building on the work of Harper and his associates (2010). Another interesting avenue for future study would be to incorporate an evaluation element, in examining which answer is ranked as “Best Answer” and/or up-voted. These issues are also significant in that they allow a shift in focus from the answerer’s objectives to the effects and functions of the rhetoric itself.

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