

Anecdotal, Statistical, and Causal Evidence: Their Perceived and Actual Persuasiveness

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ABSTRACT: Claims about the occurrence of future events play an important role in pragmatic argumentation. Such claims can be supported by inductive arguments employing anecdotal, statistical, or causal evidence. In an experiment, the actual and perceived persuasiveness of these three types of evidence were assessed. A total of 324 participants read a newspaper article in which it was claimed that the building of a cultural centre would be profitable. This claim was supported by either anecdotal, statistical or causal evidence. The statistical evidence proved to be more convincing than the anecdotal and causal evidence. Although the latter two evidence types were equally unconvincing, the anecdotal evidence was perceived as less persuasive than the causal evidence. Therefore, the actual and perceived persuasiveness of the evidence did not correspond. These results partly replicate the results obtained in previous experiments. They also underscore the need to distinguish between the perceived and the actual persuasiveness of an argument.

KEY WORDS: Evidence, experiment, persuasion

1. INTRODUCTION¹

Policy decisions can give rise to lively public debates. Should we build a new airport, expand the old one, or try to lower the number of flights? Should we build more motorways or make the public transport cheaper in order to solve the traffic congestion problem? When a debate arises, each option has its own proponents. They try to persuade others that their option is indeed in everyone's best interests. To achieve that goal, they put forward pragmatic argumentation. That is, they claim that their option will probably or certainly result in desirable consequences. The strength of their argument depends on two aspects: The consequence's desirability and the consequence's probability. A strong argument in favor of the option would be that the option will certainly result in desirable consequences.

Areni and Lutz (1988) have shown that people find it more difficult to evaluate arguments supporting a probability claim than to evaluate arguments supporting a desirability claim. In other words: The argument quality of a desirability argument is more transparent than that of a probability



argument. O'Keefe (1995) suggested that argumentation theory provides a framework to study the concept of argument quality. He also warned that what should be convincing from the point of view of an argumentation theorist, is not always convincing from a layperson's point of view.

In this paper, I will first discuss the different types of evidence that can be used to support a probability claim. Next, I will review empirical research in which the actual persuasiveness of these types of argument is studied. However, in none of the studies, the persuasiveness of the different evidence types has been compared directly. Section 4 contains the description of an experiment in which the same claim is supported by different types of argument. The actual persuasiveness of these argument types is measured, as well as the extent to which the participants think that they are convincing.

2. TYPES OF ARGUMENTS AND EVIDENCE

In policy debates, probability claims typically refer to future events, for instance: building a new airport will boost the economy. To support such claims, one can use inductive reasoning. Usually, three types of argument are distinguished in inductive reasoning (see, e.g., Govier, 1992). Following the terminology employed by Rieke and Sillars (1984), these three types are the argument by analogy, the argument by generalization, and the argument by cause. Each type is discussed along with the type of evidence typically employed for such an argument.

Rieke and Sillars (1984, pp. 76–77) define an argument by analogy as follows: '(. . .) you compare two situations which you believe to have the same essential characteristics, and reason that a specific characteristic which exists in one situation can be reasoned to exist in the analogous situation'. For instance, to support a claim about the beneficial economic effect of building a second airport, proponents may give the example of another country in which the building of a second airport had a strong beneficial effect on that country's economy. The second airport in this other country serves as an example for the beneficial economic effects a second airport can have. As such, it is an instance of anecdotal evidence. Essential for the quality of this argument, is the extent to which the two countries are similar. The more similar the countries, the more valid the argument by analogy.

The argument by generalization proposes that 'you look at a series of instances and from them claim a general principle' (Rieke and Sillars, 1984, p. 72). For instance, instead of giving just one example of a country profiting from building a second airport, one provides a number of such examples. The evidence used in an argument by generalization can be of two types. First, it can consist of a number of examples. For instance, the (beneficial) consequences of building a second airport in four or five or

more different countries are discussed. Second, as the number of examples increases, the argument by generalization may be based on statistical evidence. Instead of discussing several examples, one presents a percentage or some other descriptive statistic representing the proportion of countries profiting from building a second airport.

The quality of this type of argument depends on the number of observations as well as on the representativeness of the observations. For instance, an argument by generalization based on one hundred examples is normatively better than an argument based on two examples. However, when (most of) the hundred instances are very dissimilar from the issue at hand, the argument should not be convincing. For instance, the effects of building a second airport in developing countries may not be comparable to building a second airport in The Netherlands.

The argument by cause provides an explanation why a certain effect may arise (Rieke and Sillars, 1984, p. 74). In the case of a second airport, one might argue that building it will improve a country's economic position because (1) building and running such an airport will provide employment for thousands of people, and (2) it will improve the country's position as a major distribution country in the world's economy which might attract foreign companies to settle there. For this type of argument, causal evidence is usually employed. The quality of this argument depends on the presence or absence of other factors that might cause the second airport to become a failure or a success.

From a normative point of view, statistical evidence that comprises a sufficiently large sample of representative instances, should be more convincing than anecdotal evidence, especially if the latter uses an example that differs strongly from the issue at hand. Whether causal evidence should be more convincing than statistical evidence depends on the extent to which the argument by cause identifies the most important possible causes. The question that will be addressed in the next section is the extent to which what should be convincing, is convincing in actuality.

3. EMPIRICAL STUDIES ON THE PERSUASIVENESS OF DIFFERENT EVIDENCE TYPES

A number of experiments have been conducted to assess whether some types of evidence are more convincing than others. Especially the distinction between anecdotal and statistical evidence has received much attention by researchers. In several reviews, it is concluded that anecdotal evidence is more persuasive than statistical evidence (see, e.g., O'Keefe, 1990, pp. 168–169; Taylor and Thompson, 1982, pp. 163–164). Baesler and Burgoon (1994) found 19 experiments in which the persuasiveness of anecdotal and statistical evidence were directly compared. In 13 experiments, anecdotal evidence proved to be more convincing than statistical

evidence; in only 2 experiments, the opposite effect was obtained. (No differences between types of evidence were found in the remaining 4 experiments.)

Based upon such reviews, O'Keefe (1995, p. 15) noted that there is a distinction between what constitutes a strong argument from normative point of view (i.e., the argument by generalization), and from a descriptive point of view (i.e., the argument by analogy). However, Baesler and Burgoon (1994) claim that the manipulation of the two types of evidence is (often) confounded with a second factor: the vividness of the evidence. That is, anecdotal evidence usually presents an anecdote to support the claim; statistical evidence consists mainly of statistics. In general, an anecdote is easier to imagine than statistics. A vivid argument would be more convincing than a more pallid one. Nisbett and Ross (1980) dub this the vividness effect. Following this line of reasoning, anecdotal evidence would be more convincing than statistical evidence, not because it is based on a single instance, but because of its higher imagineability.

To test this explanation, Baesler and Burgoon (1994) manipulated not only the type of evidence (anecdotal or statistical), but the vividness of these arguments as well. That is, they provided vivid statistical and anecdotal evidence as well as pallid statistical and anecdotal evidence. Controlling the evidence's vividness led to a pattern of results different from the usually reported one: The statistical evidence proved to be more convincing than the anecdotal evidence. Hoeken and Van Wijk (1997) obtained a similar pattern of results using a different message on a different topic. The often reported finding that the normatively weaker, but more vivid anecdotal evidence is more convincing than the normatively stronger, but less vivid statistical evidence may therefore attributed to the difference in vividness.

Compared to anecdotal and statistical evidence, the causal evidence has received far less attention by researchers. Slusher and Anderson (1996) compared the convincingness of causal evidence to that of statistical evidence. They used a message stating that AIDS is not transmitted by casual contact (including nonsexual contact or contact through mosquitos). Evidence substantiating this claim was either causal or statistical. The argument by cause, for instance, ran that 'The Aids virus is not concentrated in saliva, is not present in sweat, and has to be present in high concentration to infect another person.' The argument by generalizability stated that in 'a study of more than 100 people in families where there was a person with AIDS without the knowledge of the family and in which normal family interactions (. . .) took place revealed not a single case of AIDS transmission.'

The results showed that the causal evidence was more successful at changing faulty beliefs about the ways in which AIDS can be transmitted than the statistical evidence. Because it is much more difficult to change an existing belief than to form a new belief, these results suggest that the

causal evidence is powerful. The stronger persuasive effect of the causal evidence may have two reasons. Slusher and Anderson (1996) state that such evidence results in the availability of explanations why AIDS cannot be transmitted by casual contact. As the availability of explanations increases, people are more inclined to accept the claim. In contrast, the statistical evidence does not lead to an increase of available explanations. A second explanation for the superior effect of the causal evidence may be that it enables people to build a model of why and how an effect may or may not occur. The statistical evidence does not enable one to construe such a model. Having such a model, regardless of how tentative it may be, strengthens the belief that a certain effect will occur (Tversky and Kahneman, 1982).

The empirical studies on the convincingness of different types of evidence lead to the following, tentative conclusions. Although most studies show that anecdotal evidence is more convincing than statistical evidence, this effect may be the result of an artefact. The anecdotal evidence is usually more vivid compared to the statistical evidence. When the vividness of evidence is controlled, however, statistical evidence is more convincing than anecdotal evidence. In the only experiment in which the convincingness of causal evidence was directly compared to that of statistical evidence, the former proved to be more persuasive than the latter. A tentative ordering of the different types of evidence would be that the causal evidence is more convincing than statistical evidence, which in turn is more convincing than anecdotal evidence.

4. THE EXPERIMENT

An experiment was conducted to address two topics. First, I tried to replicate earlier findings that when vividness is controlled for, anecdotal evidence is less persuasive than statistical evidence, which in turn is less persuasive than causal evidence. Replicating such effects employing arguments on different topics is an important precondition before general conclusions about message and argumentation effects can be drawn (cf. O'Keefe, 1990, pp. 121–129). Apart from replication, the experiment extends previous empirical studies. For the first time, the three different types of evidence were compared directly. That is, the same claim was supported either by anecdotal, statistical, or causal evidence.

The second topic concerns the relation between the perception of the argument's quality and its actual persuasiveness. In the experiments discussed above, the extent to which participants accepted the claim was measured. They did not indicate whether they regarded the argument as strong. In this experiment, participants not only rated the extent to which they accepted the claim, they rated the argument's quality as well.

One would expect the perception of the argument's quality and the actual

extent to which one yields to the argument to be correlated. That is, the type of argument being rated as strongest, should be the most convincing one as well. However, several studies have shown that what people believe to be convincing, is not necessarily convincing in actuality. For instance, although people thought that including a benefit appeal would improve the completion rate for questionnaires more than including a mandatory appeal, the actual completion rates showed the opposite pattern (Dillman, Singer, Clark and Treat, 1996). People also tend to overestimate the impact of vivid messages on their attitudes (Collins, Taylor, Wood and Thompson, 1988) and on their actual behavior (Rook, 1986; Thornton, Kirchner and Jacobs, 1991). Wilson, Houston and Meyers (1998) show that it can also be the other way around. That is, people sometimes underestimate the extent to which they have changed their opinion in response to a persuasive message. Based on these studies, I measured the perceived strength of the evidence as well as the actual strength (as indicated by the extent to which people accepted the claim).

The discussion above leads to the following two research questions:

1. Do different types of evidence lead to differences in actual persuasiveness?
2. Do differences in persuasiveness correspond to differences in perceived argument quality?

To answer these questions, an experiment was conducted in which a claim about the future financial success of a cultural centre was backed up by either anecdotal evidence, statistical evidence, or causal evidence. The anecdotal evidence was deliberately weakened through choosing an example that differed on essential characteristics from the issue under consideration.

4.1. *Method*

4.1.1. *Material*

The material consisted of three versions of a (fictitious) newspaper article on a council meeting in the Dutch town of Doetinchem. The meeting was about the mayor's proposal to build a multi-functional cultural centre. It was reported that some of the council members doubted that such a centre would be profitable. They feared that the citizens would have to pay for the losses. The mayor argued that the centre would attract sufficient visitors and make a profit within four years. The evidence to support this claim could be either anecdotal, statistical or causal. All arguments consisted of 6 sentences and 75 words.

For the anecdotal evidence, it was stated that a similar centre in the city of Groningen had been very successful. It had made a profit within four years. Groningen differed from Doetinchem on several important dimensions. Unlike Doetinchem, Groningen has a university and is much larger than Doetinchem. Furthermore, it is situated in a different part of The Netherlands. In a previous experiment, size of population, type of city,

and location in the country, were identified as the most defining characteristics of a town (Hoeken and Van Wijk, 1997).

For the statistical evidence, reference was made to a study by the Dutch Organization of Municipalities. In the study, the profitability of 27 cultural centres in different towns of varying size, dispersed over The Netherlands had been assessed. On average, the centres had made a profit within four years. Finally, the causal evidence consisted of three reasons why the cultural centre would be profitable. First, many citizens from nearby towns went to a faraway cultural centre to see movies and plays. Second, a popular movie theatre in a nearby town had burnt down. It was believed that the visitors would find their way to the cultural centre in Doetinchem. Finally, Doetinchem's demographics showed that the number of well-educated people who are well-off increased. Such people like to visit cultural centres.

4.1.2. *Participants*

A total of 324 participants took part in the experiment. There were slightly more men (51.2%) than women (48.8%). Their age ranged from 17 to 72 with an average of 29 years. Education ranged from primary education to a master's degree. The majority (67.7%) had completed at least grammar school.

4.1.3. *Questionnaire*

The questionnaire contained questions on a number of variables such as the participants' cognitive responses, their evaluation of the article, their own behavior with respect to cultural activities, and some general questions about their level of education, sexe, and age. In addition, to test whether the anecdotal evidence was perceived as more vivid than the other types of evidence, the text's vividness was measured. The most relevant variables with respect to the research questions were those operationalizing the argument's vividness, and its actual and perceived persuasiveness. The argument's actual persuasiveness was operationalized as the extent to which participants accepted the claim that the centre would make a profit within four years. The argument's perceived persuasiveness was operationalized by having participants rate the argument's strength and its relevance.

4.1.4. *The vividness of the argument*

The vividness of the argument was measured by two seven-point semantic differentials. One of the semantic differentials had the positive antonym at the left pole of the scale (colourful), the other had the positive antonym at the right pole (vivid). The reliability of the scale was adequate (Cronbach's $\alpha = 0.70$).

4.1.5. *The acceptance of the claim*

The acceptance of the claim that the centre is capable of generating money was measured by the clause 'The probability that the cultural centre will

make a profit within four years, seems to me' followed by four seven-point semantic differentials. Two of the four semantic differentials had the positive antonym at the left pole of the scale (large, present), the other two had the positive antonym at the right pole (probable, realistic). The reliability of the scale was good (Cronbach's $\alpha = 0.89$).

4.1.6. *Perception of argument quality*

The perceived argument quality was measured using four seven-point semantic differentials and one seven-point Likert scale. The semantic differentials were preceded by the clause 'I regard the argumentation supporting the claim that the centre will attract sufficient visitors as'. Two of the four semantic differentials had the positive antonym at the left pole of the scale (sound, relevant), the other two had the positive antonym at the right pole (strong, convincing). For the Likert-item, the argument was repeated. For instance, in the case of the anecdotal evidence: The mayor referred during the council meeting to the profit made by a cultural centre in Groningen. How relevant do you rate this example with respect to the decision to build a cultural centre in Doetinchem? The participants indicated their response on a seven-point Likert scale ranging from 'very irrelevant' to 'very relevant'. The five items formed a reliable scale (Cronbach's $\alpha = 0.83$).

4.1.7. *Design*

A factorial design was used, that is, each subject read only one of the text versions. This resulted in three experimental groups. After reading the text, they responded to the various items of the questionnaire.

4.1.8. *Procedure*

Each participant was run individually. Participants were told that the Linguistics department of Tilburg University was interested in the way in which people made up their mind in case of a referendum. After this introduction, the participant received the experimental booklet. After completing the experimental booklet, participants were informed about the true purpose of the experiment and thanked for their cooperation. An experimental session lasted about 14 minutes.

4.2. *Results*

Table 1 contains the mean vividness ratings of the different types of evidence, the extent to which the claim that the cultural centre will make a profit within four years was accepted, and the mean ratings of the perceived argument quality. First, it was tested whether the different types of evidence were rated as equally vivid. In previous experiments, the anecdotal evidence was often considered to be more vivid than the statistical evidence thereby influencing the argument's persuasiveness. An analysis

Table 1. The mean vividness ratings, acceptance of the claim and perceived argument quality as a function of type of evidence (1 = very negative, 7 = very positive)

	Type of evidence		
	Anecdotal	Statistical	Causal
Vividness			
Means	3.60	3.57	3.70
SD	1.15	1.17	1.22
<i>n</i>	106	109	107
Acceptance of claim			
Means	3.67	4.17	3.62
SD	1.34	1.40	1.38
<i>n</i>	108	109	107
Perceived argument quality			
Means	3.00	3.95	3.91
SD	1.30	1.27	1.23
<i>n</i>	107	109	107

of variance revealed no differences between the three types of argument with respect to perceived vividness ($F < 1$).

An analysis of variance revealed a main effect of Type of evidence on the acceptance of the claim that the centre would be profitable ($F(2, 321) = 5.31, p < 0.01; (\eta^2 = 0.03)$). Post hoc comparisons using the Tukey's HSD test showed that the statistical evidence led to higher scores than the anecdotal and the causal evidence. The latter two did not differ from each other. Analysis of variance revealed a main effect of Type of evidence for the perceived argument quality as well ($F(2, 320) = 19.61, p < 0.001; \eta^2 = 0.11$). Post hoc comparisons using the Tukey's HSD test showed that the anecdotal evidence was perceived as weaker than the statistical evidence and the causal evidence. The latter two did not differ from each other on perceived strength.

There appears to be a discrepancy between the perceived strength of the causal evidence compared to its actual persuasiveness: Whereas the causal evidence is perceived to be stronger than the anecdotal evidence, it led to similar scores with respect to the acceptance of the claim. This discrepancy is corroborated by the correlations between the perceived argument quality and the acceptance of the claim. The correlations and the percentage of explained variance are displayed in Table 2.

Whereas the correlations between perceived quality and claim acceptance are high for the anecdotal evidence and the statistical evidence, they are much lower for the causal evidence. The correlation between perception and acceptance is significantly lower for the causal evidence compared to the anecdotal evidence ($z = 2.83, p < 0.01$), whereas it tends to be lower when compared to the statistical evidence ($z = 1.90, p = 0.07$).

Table 2. The correlations and percentage explained variance between the acceptance of the claim and the perceived argument quality as a function of evidence type

	Type of evidence		
	Anecdotal	Statistical	Causal
Correlation	0.66	0.58	0.38
<i>n</i>	107	109	107
Explained variance	44%	34%	14%

The difference between the anecdotal and statistical evidence is not significant ($z = 0.95$, $p = 0.25$).

4.3. Conclusion

The first research question was: Do different types of evidence lead to differences in actual persuasiveness? The answer is affirmative: The types of evidence had a different effect on the acceptance of the claim. However, the differences do only partly replicate the pattern of results obtained in other studies. In this study, the statistical evidence proved to be stronger than the anecdotal evidence. As such, it replicates the results of Baesler and Burgoon (1994) and Hoeken and Van Wijk (1997). Contrary to expectations, the causal evidence proved not to be the most convincing evidence. In fact, it was as persuasive as the anecdotal evidence, and less persuasive than the statistical evidence.

The second question was: Do differences in persuasiveness correspond to differences in perceived argument quality? Again, the answer is partly affirmative. In correspondence with the actual persuasiveness, the statistical evidence is rated as stronger than the anecdotal evidence. Ratings of the argument's strength are in both cases strongly related to the actual persuasiveness. In contrast, the causal evidence received higher ratings compared to its actual persuasiveness. It was rated as stronger than the anecdotal evidence despite the fact that both types of evidence yielded similar claim acceptance ratings. The correlation between the perceived argument strength and its actual persuasiveness is lower for the causal evidence compared to the correlations for the other two types of evidence. In the next section, an interpretation for these results will be put forward and the implications discussed.

5. GENERAL DISCUSSION

In reviews of empirical research, it is often concluded that anecdotal evidence is more persuasive than statistical evidence. However, as shown by Baesler and Burgoon (1994), this pattern may be the result of con-

founding the type of evidence with its vividness. When the anecdotal evidence is equally vivid as the statistical evidence, the latter is more convincing than the former. In the experiment reported above, there was no difference in perceived vividness, and the statistical evidence was more persuasive than the anecdotal evidence. Therefore, the results replicate the finding that the statistical evidence is more convincing than the anecdotal evidence if the vividness of the evidence is held constant.

The results on the acceptance of the claim did not replicate previous results obtained for causal evidence. Instead of being more convincing, the causal evidence proved to be less convincing than the statistical evidence. A possible explanation may lie in a source effect. The statistical evidence was attributed to an independent organization, the Dutch Organization of Municipalities, whereas the causal evidence was put forward by the mayor who was in favor of the proposal. Therefore, people may question his impartiality in this matter. However, if the participants question the mayor's credibility, they would also have rated the causal evidence as less strong than the statistical evidence.

This brings us to the second issue: the relation between the actual and perceived persuasiveness of the evidence. For the anecdotal and the statistical evidence, this relation was straightforward. The higher the perceived argument quality, the more convinced people were, and vice versa. For the causal evidence, the relation proved to be more problematic. Although the argument was perceived as strong, it was not very convincing. The correlation between the perceived argument quality and the actual persuasiveness was markedly lower than the correlations for the other two types of argument.

In the experiment, the participants first indicated to what extent they agreed to the claim that the centre would make a profit. After that, they rated the argument's quality. The results suggest that only when asked to reflect upon the argument's quality, the participants who had read the causal evidence realized that the argument was pretty sound. Apparently, the causal evidence needed closer inspection in order to be convincing. This should not lead to the conclusion that only when asked to reflect upon the arguments, people distinguish between strong and weak arguments. For if that were the case, the difference in actual persuasiveness between anecdotal and statistical evidence would not have been obtained. That effect was obtained before participants were asked to reflect upon the argument's quality. Therefore, even when not instructed to reflect upon argument quality, people are sensitive to differences in type of evidence.

The discrepancy between the perception of argument quality and the actual persuasiveness only arises for the causal evidence. It is possible that people believe that casual evidence is convincing whereas in actuality they are not persuaded by it. Collins et al. (1988) report a similar pattern of results on the effect of colourful language. They showed that a message containing colourful language was rated as more persuasive without

yielding any significant attitude change. Collins et al. conclude that there is a widespread belief that colourful language facilitates persuasion, thereby influencing people's ratings of a message's persuasiveness whereas in actuality, they stay unaffected by this message variable (see also O'Keefe, 1993). Something similar may be the case for causal evidence. Our understanding of the world is formulated by laws of cause and effect. An argument based on such a relation may therefore give the impression of being very convincing without actually having this effect.

Of course, the results of this experiment should be interpreted cautiously. Only one topic was used, along with only one instantiation of each type of evidence. As several authors have claimed forcefully, it is dangerous to draw general conclusions from a study using a single message (Jackson and Jacobs, 1983; O'Keefe, 1990, pp. 121–122). In order to get a better view of the way in which different types of evidence influence the actual and perceived persuasiveness, replicating this study using different topics and different instantiations of types of evidence is needed.

Still, the results reported in this paper are valuable in several respects. First, they replicate the effect that when the vividness of the evidence is controlled for, statistical evidence is more convincing than anecdotal evidence. Second, they replicate the finding that the perceived persuasiveness of an argument may differ from its actual persuasiveness. Third, they clarify the need of further study on the conditions under which anecdotal, statistical, and especially causal evidence are persuasive.

NOTE

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