

Zeitschrift: Studies in Communication Sciences : journal of the Swiss Association of Communication and Media Research

Herausgeber: Swiss Association of Communication and Media Research; Università della Svizzera italiana, Faculty of Communication Sciences

Band: 7 (2007)

Heft: 2

Artikel: Is anecdotal evidence more persuasive than statistical evidence? : A comment on classic cognitive psychological studies

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DOI: <https://doi.org/10.5169/seals-791083>

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General Section
Research on Argumentation and Communication Management

Studies in Communication Sciences 7/2 (2007) 151–164

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IS ANECDOTAL EVIDENCE MORE PERSUASIVE
THAN STATISTICAL EVIDENCE?
A COMMENT ON CLASSIC COGNITIVE
PSYCHOLOGICAL STUDIES

Recent reviews of communication studies on the persuasiveness of evidence types have concluded that statistical evidence is more persuasive than anecdotal evidence. Cognitive psychological studies on the representativeness heuristic, however, have shown a large impact of anecdotal evidence (individuating information), and a small impact of statistical evidence (base rate information) on judgements. The difference between these conclusions can be explained by the research design of the psychological studies, which was in favour of anecdotal evidence. This article discusses more recent studies in cognitive psychology, and demonstrates that statistical evidence has more impact than the classic cognitive psychological studies suggested. This discussion brings back some consistency in results on the persuasiveness of anecdotal and statistical evidence, and also presents areas for future research.

Keywords: evidence, exemplars, cognitive psychology, persuasion, representativeness heuristic, sample size.

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1. Introduction

Imagine a short case story in a newspaper about a man who has experienced health problems because of regular alcohol consumption, and a contradictory finding in the same newspaper that only 14 % of men who regularly drink have had such health problems. Which of these two pieces of information has the largest impact on people's judgement about how probable it is that alcohol consumption leads to health problems? The anecdotal evidence (exemplar) that is based on one single case, or the statistical evidence (base rate information) that relies on a large number of cases? In one formulation or in another, this question has been addressed over 60 years in different fields of research, such as advertising, argumentation, public policy, health communication, cognitive psychology, and mass communication.

The majority of studies tackling this question have been conducted in communication studies on the persuasiveness of evidence, which is considered as "data (facts or opinions) presented as proof for an assertion" (Reynolds & Reynolds 2002: 429). Broadly speaking, such studies investigated the perceived probability of claims that were supported by different types of evidence. Hoeken (2001a), for instance, gave his participants the claim that a new cultural centre would be successful, and evidence supporting this claim. Half of the participants read the anecdotal evidence, which stated that a similar centre in another city had been very successful. The other half read a report stating the success of 27 such cultural centres (statistical evidence). Participants who had received the statistical evidence were more convinced about the likelihood of the centre's success than participants who had read the anecdotal evidence. Hence, statistical evidence was found to be more persuasive than anecdotal evidence. Although other types of evidence have also been investigated (e.g., expert evidence), most research attention has been paid to statistical and anecdotal evidence. Recent reviews of studies on the persuasiveness of these evidence types demonstrated that, generally speaking, statistical evidence is more persuasive than anecdotal evidence (Allen & Preiss 1997; Hornikx 2005).

This conclusion contrasts with findings of less recent reviews on evidence, in which the opposite pattern was found. Both Baesler & Burgoon

(1994), and Reinard (1988), namely, concluded that anecdotal evidence was more persuasive than statistical evidence. One explanation of this difference in conclusion may lie in the *inclusion* of relatively new experimental studies. If Allen & Preiss (1997), and Hornikx (2005) have included new studies in which statistical evidence was found to be more persuasive, this may account for the different conclusion. The most recent overview of empirical studies, however, does not provide much ground for this explanation (Hornikx 2005): studies published after 1994 do not typically show statistical evidence to be more persuasive than anecdotal evidence. A second explanation may be the *exclusion* of studies from the selections. If Allen & Preiss (1997), and Hornikx (2005) have excluded studies in which anecdotal was more persuasive, this may be a possible explanation for the different conclusion. Indeed, both Allen & Preiss (1997), and Hornikx (2005) excluded a number of cognitive psychological studies that were included in Baesler & Burgoon (1994), and Reinard (1988). In these psychological studies, anecdotal evidence was typically found to be more effective than statistical evidence. In Hornikx (2005), an account is provided for the exclusion of these studies, namely the studies' research design: participants received anecdotal and statistical evidence at the same time, which favoured the impact of anecdotal evidence.

This exclusion, however, does not mean these studies are not important. On the contrary, the representativeness heuristic by which the results of these studies were explained (e.g., Kahneman & Tversky 1973), has been adopted as the best explanation for why anecdotal evidence is more persuasive than statistical evidence (Baesler & Burgoon 1994; Brosius 2000). This is the reason why it is important to take more recent studies in cognitive psychology into account that studied the effects of statistical and anecdotal evidence. As will be shown in the remainder of this paper, these more recent studies used other research designs, and found a larger impact of statistical evidence. The discussion of these more recent studies will bring back some consistency in results on evidence effects reported in cognitive psychology, and persuasive effects research.

This paper is structured as follows. First, it will be discussed that – in the ideal situation – statistical evidence should be more persuasive than anecdotal evidence because of the larger sample size, and the higher representativeness (Section 2). Next, empirical findings in cognitive psychology

will be reviewed that showed that sample size and representativeness do not matter too much, and that anecdotal evidence has more impact than statistical evidence (Section 3). Subsequently, a series of more recent cognitive psychological studies will be presented that demonstrate that statistical evidence has more impact under circumstances that differ from those in the original research designs (Section 4). Finally, on the basis of the discussion of this paper, areas for future research will be highlighted in Section 5.

2. Normative Superiority of Statistical Evidence

Statistical and anecdotal evidence are different types of information that can be used to support claims. Statistical evidence is related to the argument by generalization. In an argument by generalization “you look at a series of instances and from them claim a general principle” (Rieke & Sillars 1984: 72). In order to assess the quality of this argument type, and therefore also that of statistical evidence, argumentation theorists use normative criteria. For statistical evidence at least two criteria are important (cf. Garssen 1997; Schellens 1985): (1) the number of cases in the evidence should be sufficiently large in order to allow valid generalizations about the class of cases in the claim, and (2) the cases in the evidence should be representative of the class of cases in the claim. These criteria of large sample size and high representativeness also apply to anecdotal evidence when it is employed to generalize to a claim. The representativeness criterion can be met: a single case is representative of a group of cases, if the cases are highly similar. However, as anecdotal evidence relies on only one case, it does not meet the criterion of large sample size. In light of these two criteria, all else being equal (such as the vividness of the presentation), statistical evidence should be more persuasive than anecdotal evidence.

A few studies have tested whether meeting the normative criteria makes a difference. Most of the studies were psychological studies that examined whether people’s judgements were affected by information that did or did not meet the normative criteria relevant to the types of evidence. Concerning sample size, a number of studies have demonstrated that people’s judgements differ according to variations in sample sizes (e.g., Darke, et al. 1998; Doosje, Spears, & Komen 1995; Nisbett et al. 1983). In Nisbett

et al. (1983: Study 1), for instance, participants had to make a judgement about a population on the basis of samples of 1 person, 3 persons, and 20 persons. Their estimations were consistent with the normative law of large numbers: “they were more willing to assume that the population resembles the sample when N is larger” (ibid.: 349). Hornikx & Hoeken (2007) more specifically investigated variations in sample size mentioned in statistical evidence. They showed that statistical evidence with larger sample sizes (e.g., 314 persons) was found to be more persuasive than statistical evidence with smaller sample sizes (e.g., 46 persons) for Dutch participants, but not for French participants.

Other studies have tested whether meeting the representativeness criterion makes a difference. High representativeness has to do with homogeneity of the characteristics of cases, and with random selection of a sample. A few studies have investigated the way people generalize as a function of the homogeneity of samples and populations. Nisbett et al. (1983), for instance, demonstrated that people generalized more when the population was homogeneous with respect to relevant characteristics than when it was more heterogeneous. The degree of representativeness can also be assessed through information that the sample has been randomly selected or not (Kassin 1979). Random selection implies that the sample should be representative. People have indeed been shown to understand the relevance of random selection (see Wells & Harvey 1977: Study 1).

In sum, there is at least some research evidence that people react differently when the sample size is larger, and when the representativeness of the sample or case is higher. This warrants the suggestion that – in accordance with normative considerations – statistical evidence is more persuasive than anecdotal evidence. However, a number of empirical studies have shown anecdotal evidence to have more impact on people’s judgements than statistical evidence. These studies will be discussed in the next section.

3. The Impact of Anecdotal Evidence

Following the two criteria for strong evidence to generalize to claims, this section first presents studies in which large sample size was neglected, and subsequently, studies in which high representativeness was neglected.

3.1. *Neglect of Large Sample Size*

A number of studies in cognitive psychology have shown that people are insensitive to sample size. In their classic study, Kahneman & Tversky (1973) confronted their participants with statistical information that psychologists have interviewed 30 engineers and 70 lawyers. Subsequently, the participants were given five descriptions of persons (anecdotal evidence), which were said to be taken from the 100 interviews. The participants were asked to judge for each person whether he/she was an engineer or a lawyer. From a normative point of view, the chance that a specific person is an engineer should be based on the base rate information. If the person is taken from a population of 30 engineers and 70 lawyers, there is a 30 % chance of the person being an engineer. Participants, however, ignored these statistics, and based their judgements on the attributes in the descriptions. When the person shared some attributes which are typical for an engineer (e.g., has no interests in politics, likes mathematical puzzles), that person was judged an engineer, regardless of the percentage of engineers in the 100 people. Thus, participants were more heavily influenced by the degree to which a person was perceived to be representative of the class of people (engineers or lawyers) than by the actual distribution of engineers and lawyers in the sample. This was referred to as the representativeness heuristic, which holds that “people predict by representativeness, that is, they select or order outcomes by the degree to which the outcomes represent the essential features of the evidence” (Kahneman & Tversky 1973: 237–238).

Studies in mass communication have underlined people’s use of this representativeness heuristic in judgements and decision making (for an overview, see Zillmann & Brosius 2000). One line of research has addressed the question as to whether people follow the distribution of reports of pro’s and con’s (exemplars) or base rate information when they judge new issues. Brosius & Bathelt (1994), for instance, investigated the effect of congruency of exemplars and base rate information on judgements. In the *incongruent* condition, the distribution of exemplars (e.g., four exemplars are in favour of obligatory computer courses and one exemplar is against these courses) was different from the information given in the base rate (e.g., 20 % of people were said to be in favour of obligatory

computer courses). Results showed that participants ignored the base rate information and followed the ratio of the exemplar distribution to make their judgement.

In sum, studies have demonstrated that people neglect statistical information and its sample size information, but that they base their judgement on the characteristics of individual cases.

3.2. Neglect of High Representativeness

A number of cases (statistical evidence) are likely to be more representative of a population than one single case (anecdotal evidence). A few studies in cognitive psychology have investigated the effect of cases' degree of representativeness on people's generalization of these cases to the population. These studies showed that, beyond the finding that people generalize from a single case (as was just discussed), people also ignore whether the case is representative or not representative of the population (e.g., Gibson & Zillmann 1994; Hamill, Wilson, & Nisbett 1980; Nisbett & Borgida 1975). Representativeness was operationalized by indicating that cases were typical or atypical of the population. In Hamill et al. (1980), for example, participants watched a video about a prison guard. The guard was said to be either a typical or an atypical example of all prison guards, or no information was provided concerning his representativeness. Results showed that participants' attitude toward prison guards in general was not affected by the guard's typicality. Studies such as this one provide evidence for people's tendency to neglect the representativeness of individual cases in relation to a class of cases to which they belong.

3.3. Conclusion

Studies in cognitive psychology (e.g., Kahneman & Tversky 1973; Nisbett & Borgida 1975) and mass communication (e.g., Brosius & Bathelt 1994) have repeatedly shown that – when anecdotal and statistical evidence are presented together – only anecdotal evidence influences people's judgements and choices. People did not appear to respect the two normative criteria according to which statistical evidence should be more persuasive than anecdotal evidence. In fact, people generalize from one

single case (against the large sample size criterion), and do this regardless of whether the case is typical of the population or not (against the high representativeness criterion).

4. Circumstances under Which Statistical Evidence Has More Impact

Numerous studies have commented on the unfair comparison of anecdotal and statistical evidence in experiments similar to that of Kahneman & Tversky (1973). The very design of such experiments in which both types of evidence were presented in competition rendered anecdotal evidence more relevant than statistical evidence. The general claim that has been put forward seems to be that base rate neglect is an artefact of the research design, and that statistical evidence can be persuasive under certain conditions (e.g., Ajzen 1977; Bar-Hillel 1980; Gilovich & Griffin 2002; Zukier & Pepitone 1984). When base rates are made more *relevant*, they are indeed used by participants to come to a judgement. As relevance has been manipulated in different ways, three lines of research will be discussed, namely on causal relevance, vividness, and the order effect.

4.1. Causal Relevance

When asked to make predictions, people offer explanations, for instance for why a specific person would be an engineer or a lawyer. Statistical information is generally given when causal information is unavailable, hence, statistical evidence does not have causal significance (Ajzen 1977). In contrast, case information was causally relevant to the judgemental task in the experiments discussed above (Ajzen 1977; Tversky & Kahneman 1980). When it comes to the lawyer – engineer problem, “the five descriptions provided causally significant information in the form of personality traits, interest, motivation, and ability, which favoured either the engineer, the lawyer, or neither profession” (Ajzen 1977: 304). Thus, a first explanation that researchers have given for the impact of case information is that – in contrast to base rate information – case information was causally relevant to the task in the studies.

4.2. *Vividness and Salience*

Some studies have demonstrated that, when base rates are made more vivid and salient relative to individual case information, they are more frequently used by participants to come to a judgement (e.g., Beckett & Park 1995; Ginossar & Trope 1980; Manis et al. 1980). In Ginossar & Trope (1980), for instance, the individual case was made less useful for the task, less consistent or less related to the outcome categories than in the original Kahneman & Tversky (1973) study. Under these conditions, base rate information had judgemental impact. In three experiments, Zukier & Pepitone (1984) showed that the context of the decision in the experiment, and the role of the participants both affected the importance of base rate information on judgements. Participants who were instructed to solve the judgemental problems as scientists, for instance, assigned greater weight to base rates than participants who were instructed to solve the problems as clinical psychologists. In sum, when base rates are made relatively more vivid and more relevant than in the original studies, they can be found to influence people's judgements.

4.3. *Order Effect*

The order or recency effect explanation holds that, as anecdotal evidence was always the second piece of information in the original studies, it was more relevant, and therefore more influential than statistical evidence, which was given first. This claim was advanced and supported in a series of seven experiments by Krosnick, Li & Lehman (1990). When statistical evidence was given *after* anecdotal evidence, it had greater influence on the participants' assessment than when it was given before anecdotal evidence. This order effect can be explained with reference to conversational conventions. People expect that, when a person gives supplementary information, this information must be more relevant than the first piece of evidence (see, for a discussion about conversational conventions and the Tversky & Kahneman studies, Hilton & Slugoski 2001). As a result, anecdotal evidence, the information given in the second place, was typically found to have more impact than statistical evidence.

5. Discussion

Recent reviews on the persuasiveness of anecdotal and statistical evidence (Allen & Preiss 1997; Hornikx 2005) demonstrated that statistical evidence is generally more persuasive than anecdotal evidence. Studies in cognitive psychology, and mass communication, however, have often shown the opposite pattern: base rate information (statistical evidence) was neglected in favour of individuating information (anecdotal evidence), no matter its size or bias. This pattern was explained by the representativeness heuristic. However, findings of the classic studies that examined this heuristic have been affected by the research designs. More recent studies have demonstrated that, when statistical information is made relatively more relevant (e.g., more vivid, more related to the judgemental task), it has greater influence on people's judgements. The discussion of the more recent studies in Section 4 provides more consistency in findings on the persuasiveness of anecdotal and statistical evidence in studies in cognitive psychology and in persuasive effects research.

What classic studies on the representativeness heuristics have shown, nevertheless, is that – under certain circumstances – statistical evidence is relatively weak, and anecdotal evidence is surprisingly powerful. Although the designs favoured the impact of anecdotal evidence, some results still stand after this methodological critique. For example, people also generalize on the basis of one single case in circumstances in which anecdotal evidence does not compete with statistical evidence (such as in certain conditions in Hamill et al. 1980; Nisbett & Borgida 1975). This insensitivity to sample size is normatively incorrect (see Section 2), but has been demonstrated in various studies with different contexts, paradigms, and research designs (Gilovich & Griffin 2002).

Anecdotal evidence can indeed be persuasive, as has also been underlined by some studies in persuasive effects research (e.g., Hoeken 2001b; Koballa 1986). One explanation for this persuasiveness is the kind of claim that is used. Evidence studies mostly used evidence as support for claims about the generality of effects. With such claims, statistical evidence is normatively stronger than anecdotal evidence: it is more correct to generalize to a claim on the basis of a large, representative sample than on the basis of a single case (see Section 2). The cognitive psychologi-

cal studies that were discussed earlier, as well as a few evidence studies, however, used *specific* claims. Such claims deal with particular instances that occur at specific points in time and/or place, such as in example (1). Example (2) is about the same causal relationship between exams and starting salaries, but in this case, the claim is general.

- (1) The implementation of a comprehensive exam at the University of Rotterdam will lead to higher starting salaries.
- (2) Students who have passed a comprehensive exam will have a high average starting salary.

For specific claims, another normative criterion is important: similarity. That is, the cases in the evidence (e.g., University of Amsterdam) should be highly similar to the case presented in the claim (e.g., University of Rotterdam). Because of this criterion, anecdotal evidence can more easily be normatively strong with a specific claim than with a general claim. Similarly, in domains such as voting behaviour and choice preferences where the judgement is specific (e.g., candidate X) rather than general (e.g., all candidates), anecdotal evidence is naturally an appealing source of information. Also, case information can be successful as counterevidence for a general claim. If, for example, a political party claims to be environmentalist in all its activities, one single counterexample is sufficient to disconfirm this claim.

The type of claim – general of specific – is one of a few moderators that can be addressed when studying the relative impact of anecdotal and statistical evidence. Another potentially important moderator finds its origin in the cognitive psychological studies discussed in this article: the presence of absence of a second type of evidence. Studies in cognitive psychology and mass communication on the representativeness heuristic have used a clever research design to determine the persuasive power of base rate information (statistical evidence) and exemplars (anecdotal evidence): incongruency. Persuasive effects research on evidence could benefit from this research design by giving participants anecdotal and statistical evidence, of which one type supports the claim and the other does not support the claim (cf. Boster et al. 2000). By carefully controlling for the order of appearance, and for the vividness of the evidence,

the persuasiveness of these two types of evidence as support for general claims could be investigated. This would provide a powerful test of the persuasiveness of both types of evidence. Cognitive psychological studies on anecdotal and statistical evidence may have encountered some methodological critique as summarized in this article, they are still valuable for future research on human reasoning, and on the ways in which this reasoning can be influenced.

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