Tactful, or Doubtful? Expectations of Politeness explain the Severity Bias in the Interpretation of Probability Phrases

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When a medical condition is qualified by a probability phrase such as "possible," hearers assign higher numerical probabilities to more severe conditions. This severity bias can have serious consequences for the well-being of patients. It is argued that the bias is due to a misconception of the pragmatic function served by the probability phrase. The more severe the condition, the greater the chance that the phrase is construed as a politeness marker rather than as an uncertainty marker by the person who hears it. When this misconception does not occur, neither should the severity bias. An analysis of hearer's interpretations of probability phrases using a membership function approach validates this account. We discuss the consequences of this bias for the communication of risk within and outside the medical domain.

Natural language is a poor tool when it comes to communicating the likelihoods of states of affairs. Probabilities, of course, are a much better medium for communication of uncertainty, which is why most of us prefer to be given numerical rather than verbal estimates of likelihoods (Wallsten, Budescu, Zwick, & Kemp, 1993). Unfortunately, numerical estimates are often unavailable, forcing us to base our decisions on phrases as ambiguous as "*X* is rather likely" or "*Y* is highly possible".

Not surprisingly, people are prone to a number of biases in their interpretation of probability phrases. Prominent among these is the *severity bias*, which is usually demonstrated with health-related material (Fischer & Jungerman, 1996; Franic & Pathak, 2000; Weber & Hilton, 1990). When a probability phrase (probable, possible, likely, etc.) qualifies a medical condition a patient might develop or a potential side effect of some treatment, it receives a numerical interpretation that is all the higher for more severe conditions. The severity bias can have serious consequences for the well-being of patients, especially as they become more directly involved in medical decisions. Overestimating the likelihood of a side effect can encourage the choice of the wrong treatment. Misunderstanding the likelihood of developing a given condition can make communication between doctor and patient frustrating and counter-productive. This potential for damage is further increased by large-scale policies such as the European recommendation to give verbal estimations of side effect likelihood (European Commission, 1998) – some experts have asked for the suspension of such policies until research has yielded further insight into the interpretation of probability phrases (Berry, Raynor, & Knapp, 2003). However, only meager understanding has been achieved so far.

Insight into the mechanics of the severity bias has gone no further than Weber and Hilton's initial explanation that "more severe events may draw attention to potentially higher probability levels, something that might be labeled a 'worry effect'" (1990, p. 788). We propose that the severity bias derives from what Goffman (1967) and Brown and Levinson (1978/1987) have identified as a fundamental mechanism of human social life, *face-work*. All humans project a sense of positive identity and public self-esteem called "face", and all of us are motivated to support our own and other's face in social interactions. Many actions, called face-threatening acts, can induce a loss of face (e.g., disagreeing, criticizing, giving orders, embarrassing others). When such an action is performed, the actor is likely to resort to one of many linguistic strategies that mitigate the face threat. Among these strategies is the use of probability phrases, not to communicate degrees of uncertainty, but rather to reduce the impact of the face-threatening acts.

Our explanation of the severity bias involves two assumptions. First, as an alternative to their standard function of likelihood communication, probability phrases can be used as face-management devices when they qualify face-threatening acts (e.g., "you might be misinformed," "it is possible you will have to pay for my lunch"). There is ample evidence for this claim, both qualitative (Brown & Levinson, 1978/1987) and quantitative. For example, Youmans (2001) re-

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ports a rate of 787 probability phrases per 20,000 words (from American English speakers), of which 39% were used for face-management rather than likelihood-communication purposes. Second, probability phrases imply high probabilities when they are used for face-management. The phrase "possibly" in "it is possibly going to snow tomorrow" performs its likelihood-communication function, and accordingly denotes a moderate probability of snowfall. Used in "your bad breath is possibly the reason people shun you," it has nothing to do with uncertainty, and all to do with face-management. In this context, it denotes a high likelihood. Preliminary evidence for this claim is presented in Bonnefon and Villejoubert (2005) who found that the terms "possibly" and "probably" denoted higher likelihoods when they qualified criticisms or impositions than when they qualified non-face-threatening contents.

All other things being equal (e.g., for similar base rates), probability phrases denote the same probability whatever the condition they qualify, as long as they are perceived to perform their likelihood-communication function. But, when a physician tells a patient she is going to develop a medical condition, her social "face" is threatened and the threat is greatest when the condition is most severe. Therefore, the more severe the patient's condition, the more likely a probability phrase will be interpreted as a face-management device, rather than as a likelihood-communication device. Increasingly severe conditions increase the number of speakers and hearers who switch to a face-management interpretation of the phrase. This, in turn, increases the average probability attached to the phrase, hence the severity bias.

Method

Participants

Participants were recruited by third-year psychology students at the University of Toulouse, as a course credit requirement. Each student made a list of several men and women, older than 18 and not studying psychology. Then each student randomly drew one man and one woman from his or her list, and asked them to take part in the study. Of the 810 participants in the final sample (401 men, 409 women, mean age = 31.2, *SD* = 12.8), 21% had completed graduate school, 47% had an undergraduate education, 19% graduated from high school only, and the educational level of the remaining 13% was lower than high school. The sample included a large proportion of students (39%), but 61% came from a great variety of non-student professions (including 8% unemployed).

Material and Procedure

Data collection focused on the phrase "possibly". The numerical interpretation of this phrase was assessed by eliciting its *fuzzy membership function* (Zadeh, 1965). This membership function assigns a number to each value on the probability line $[0,1]$ that represents its degree of membership in the concept defined by the phrase. Degree of membership is usually expressed as a real number from 0 to 1, such that memberships of 0 denote probabilities that are absolutely not in the concept, and memberships of 1 denote elements that are perfect exemplars of the concept. Other values represent intermediate degrees of membership. The membership function approach (originally suggested by Wallsten, Budescu, Rapoport, Zwick, & Forsyth, 1986, and Rapoport, Wallsten, & Cox, 1987) provides a subtle and rich representation of the meaning of probability phrases, and has been carefully validated in many studies (see for reviews Budescu & Wallsten, 1995 or Karelitz & Budescu, 2004).

Membership functions were elicited using the Multiple Stimuli Method introduced in Budescu, Karelitz, and Wallsten (2003). Participants were asked to imagine that their family doctor had announced they would "possibly" develop some condition during the year to come. One condition was deafness, the other insomnia (order of presentation was counterbalanced). Insomnia and deafness are of similar prevalence in the French population, from which participants were sampled (i.e., with incidence rates of about 4% in year 2000).

After having read, "The doctor tells you, you will possibly suffer from insomnia soon," participants were asked: "Does the doctor think the probability that you will suffer from insomnia soon is…" followed by the 10 values 10%, 20%, up to 100%. They provided a judgment for each of the 10 percentages, on a 10-point scale anchored at "absolutely not" and "absolutely". The task was then repeated with judgments of the second medical condition (deafness or insomnia). In addition to the membership function judgments, participants were asked to say which of deafness or insomnia was worse news.[1] Finally, they were asked whether the doctor was qualifying deafness as "possible" because (a) she was not sure it would happen, or rather because (b) she wished to announce it tactfully. The same question was asked with respect to insomnia, to assess in each case which speech function participants believed the probability phrase was intended to perform.

Results

"Possible deafness" is more probable than "possible insomnia." Membership functions were computed by averaging membership judgments across participants. Figure 1 (left panel) depicts the function values of "possible" for insomnia and deafness, regardless of which speech function participants assigned to the phrase. Membership functions show the expected severity bias,

[1] Individuals who failed to answer ($n = 16$) or who judged insomnia to be worse news than deafness ($n = 131$) were filtered out, yielding the final sample of 810 participants. This choice substantially improved the clarity of the analyzes.

Table 1
Mean Peaks of the Membership Functions attached to "Possible" Insomnia and Deafness, as a function of whether the Phrase is understood as Performing Likelihood Communication or Face Management

	M (SD)	*n*
Insomnia		
Likelihood Comm.	.57 (.33)	669
Face Management	.71 (.30)	141
Overall	.59 (.33)	810
Deafness		
Likelihood Comm.	.55 (.34)	324
Face Management	.74 (.28)	486
Overall	.67 (.32)	810

as the function for deafness peaks at a higher probability than the function for insomnia. The bias is confirmed by the computation of the two functions' peaks (see Table 1). The peak is computed by averaging for each participant the probability values which received the highest membership ratings, then averaging across participants the values so obtained.[2] The peak of the function for deafness is higher than for insomnia, $t(815) = 7.90$, $p_{\text{rep}} > .999$ (Killeen, 2005), $d = .23$ (the 95%-confidence interval for this difference is .06 – .09).

One is uncertain about "possible insomnia," but tactful about "possible deafness." As shown in the last column of Table 1, the proportion of participants judging that the doctor used the term "possible" for face-management purposes is much greater with respect to deafness (60%) than insomnia (17.4%, $z = 17.1$, $p_{\text{rep}} > .999$, Cohen's $h = .9$). One noteworthy result is that no more than 29 participants judged the doctor was tactful about insomnia but uncertain about deafness. Thus, less than 4% of the participants directly contradict our hypothesis that more severe conditions increase the likelihood that the probability phrase will be perceived as tactful.

The numerical interpretation of "possible" is a function of its being tactful or uncertain. The top-right panel of Figure 1 depicts the membership functions of "possible" for insomnia and for deafness only for participants who judged that the phrase communicated likelihood. In contrast, the bottom-right panel depicts the same functions, but for participants who judged the phrase to be tactful, serving face-management motives. The functions within each panel are similar, especially in the top-right (likelihood-communication) panel, but the difference between the two panels is dramatic with the functions in the bottom panel peaking at higher probabilities.With respect to insomnia, the peak of the face-management membership function is greater than the peak of the likelihood-communication function(see Table 1 for descriptive statistics), $t(808) = 4.9$, $p_{\text{rep}} > .999$, $d = .46$ (the 95%-confidence interval for this difference is .09 – .21). Similarly, with respect to deafness, the peak of the face-management membership function is greater than that of the likelihood-communication function, $t(808) = 8.5$, $p_{\text{rep}} > .999$, $d = .61$ (with a 95%-confidence interval of .14 – .23).

We finally consider the sub-sample of participants ($n = 295$) who judged that the doctor was expressing uncertainty about both insomnia and deafness. If politeness expectations do underly the severity bias, these participants should not manifest any bias in their numerical interpretations. Indeed, the peaks of the membership functions for insomnia ($M = .57$, $SD = .35$) and deafness ($M = .56$, $SD = .34$) are practically the same for these participants ($t(294) = .8$, $p_{\text{rep}} = .55$, $d = .05$, with a 95%-confidence interval for the difference between peaks of -.01 – +.03. The two peaks are correlated, $r = .87$.

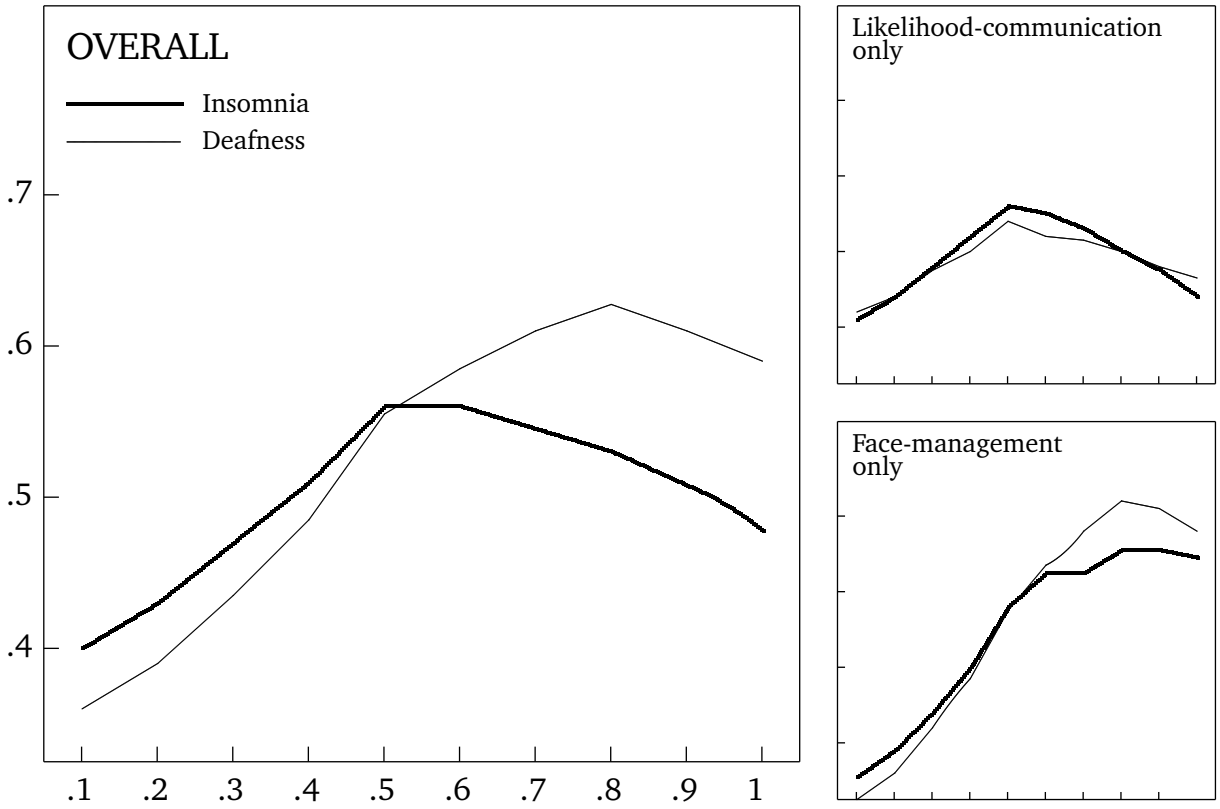
Discussion

Previous research has established that probability phrases not only communicate degrees of uncertainty but also serve other pragmatic functions, such as expressing perspective and drawing attention to the occurrence or the non-occurrence of the event to which they refer (Sanford & Moxey, 2003; Teigen & Brun, 2003) or social face-management. We conjectured that the so-called severity bias in interpretations of verbal probability phrases results from the use of verbal phrases as face-management devices whose function is to safeguard the hearer's feelings while receiving face-threatening news.

We tested this conjecture in a medical context where a doctor tells a patient that she might develop a mild or severe medical condition. We expected the face-management interpretation would be more likely when the condition was more severe, and that a face-management interpretation would lead to an overestimation of the probability of this condition. Results replicated the severity bias effect. The same probability word ("possibly") was judged to communicate higher numerical probabilities when it qualified a more severe condition (deafness) than when it qualified a less severe but equally prevalent condition (insomnia). Furthermore, when the verbal probability phrase qualified the more severe condition, most participants thought it served a face-management purpose. Those who believed the probability phrase was used as a face-management device also thought that the condition it qualified was substantially more likely to occur, compared to those who thought the phrase was communicating a vague likelihood. But, those who believed the probability phrase was intended to communicate the likelihoods of occurrence for both diseases did not exhibit the severity bias.

[2] Some small discrepancy is common between the numerical computation of the peak and its graphical representation: Accordingly, the values in Table 1 do not exactly match the peaks of the functions in Figure 1.

Figure 1. Membership functions of "possible" deafness and insomnia, for the whole sample (left panel, $n = 810$), for those participants who understood "possible" as serving likelihood-communication purposes (top-right panel, $n = 669$ for insomnia and $n = 324$ for deafness), and for those participants who understood "possible" as serving face-management purposes (bottom-right panel, $n = 141$ for insomnia and $n = 486$ for deafness)



Thus, people recognize that the more severe a condition is, the more threatening the news telling someone they have this condition will be. They also understand that it is polite and tactful to mitigate face-threatening news by using linguistic moderators, such as probability phrases. Finally, they recognize that a probability phrase used as a face-management device does not refer to the probability of the event it qualifies.

While our experimental test of this account was limited to the phrase "possible," it should apply to other phrases as well. However, some phrases may be less appropriate than others to express politeness. For example, we suspect that "probable" is a less plausible politeness term than "possible." If so, fewer respondents would make a tactful interpretation of information communicated with "probable" as a qualifier. But, this would not undermine for our main findings. Although a phrase with the term "probable" in it is less likely to be interpreted as tactful face-management, when it is interpreted as "tactful," it would still be judged to be a higher numerical probability, than when interpreted as communicating likelihood information directly (Bonnefon & Villejoubert, 2005). Moreover, an uncertain "probable" should receive the same numerical interpretation whatever the severity of the condition to which it refers.

A misunderstanding about which function a probability phrase is intended to serve could lead to a discrepancy between the level of probability a doctor intends to communicate and the level of probability understood by her patient. This miscommunication can give rise to an overestimation of the probability communicated when the patient interprets a particular phrase as a face-management device whereas the doctor used it to communicate a vague likelihood. Thus, this research suggests that measures should be taken to ensure speakers and hearers assign a likelihood communication function to a given probability phrase to improve risk communication.

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