

Probabilité des jugements et des témoignages*

Jules Bienaymé

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Mr. Bienaymé obtains the floor in order to expose some considerations on the theory of judgments and of witnesses.

One knows, says he, that in 1835, when from the discussion which took place in the Chambers on the law of the jury, some orators endorsed a formula of Laplace, inserted into a supplement in the *Théorie analytique des Probabilités*, whence it appeared to be evident that the condemnations at 7 against 5 entailed necessarily in some way some mistakes in very considerable number.

This formula appears to contain two sorts of errors, the one, that the author of the *Théorie des Probabilités* had not perceived at all, and that has not been revealed since to him; the other, that he was not at all ignorant, and that he has signaled by remarking how his formula was a simple indication of good sense in the absence of all data.

The first of these errors consists in attributing one same value to the probability that a witness says the truth when he affirms a fact, and the probability that he says the truth when he denies a fact of the same nature: or else to the probability that a judge not be deceived when one submits to him a *condemnable* accused, and when it is *** an *acquitable* accused who he is called to pronounce.

With a little attention, one recognized without difficulty that if the possibility of the truth is v for example when a given number is exited from the urn, and the possibility of the lie or of the mistake $1 - v$, there is place to conclude that the possibility of the truth is equally v , and the contrary possibility $1 - v$, when it is the number in question which is not exited at all. It is able effectively to be encountered any cause which prevents being deceived when the number arrive, and which produces the opposed effect when it not arrive.

Likewise, for the jury which goes to pronounce a condemnation, there exists a entirely special precaution before being decided to put the fatal *yes* on its bulletin, while this precaution has no place when the concern is to write *no*. There is little risk to acquit. There results from it that the probability that a jury is deceived when one presents to it a *condemnation*, is totally different from its probability of being deceived when one presents to it an *acquital*.

*Translated by Richard J. Pulskamp, Department of Mathematics & Computer Science, Xavier University, Cincinnati, OH. June 21, 2010

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This consideration alone shows that there is at the very least an element or a variable which is lacking in the formula of Laplace, and in all those which one has constructed for this kind of questions.

But moreover one sees without difficulty that if the chance of the true is different when the concern is of a simple *yes* or *no* to pronounce, for stronger reason, it varies when a great number of witnesses or of judgments are reported with some very varied facts. So that when also even the *judiciary statistic* would offer some details much more multiplied than those of which are filled the volumes published by the ministry of justice, it would be very nearly impracticable to establish the necessary equations in order to determine the multitude of unknowns or of variables which contain the questions.

It remains well understood here that all these variables are only some arithmetic means of the opinions of all the jurors, because one is able to demonstrate easily that, as Jacques Bernoulli has said, a multitude of causes produce the same effect that a single cause responding to the arithmetic mean possibility among the possibilities resulting from all these causes.

The second error remarked in the formula of Laplace holds to this that this formula, which expresses a simple probability *a posteriori*, for the case where the possibility of the true and of the false remain the same, is applied however only on a single proof, the proof of a condemnation.

Now, when the accused would be such that the condemnable would have the same chance to be condemned, and the acquitable to be acquitted, it would not be less necessary, conforming to the theorem of Bernoulli or to the reciprocal of Bayes, a great number of experiences or trials in order to discover the value of the possibility of the truth, which would be under this hypothesis the possibility that the jurors are not deceived at all.

Laplace gave therefore the numeric result to deduce from his formula that as one presents, in all the books on the calculus of probabilities, the formula which assigns the probable value of the ratio of the white balls and the black balls contained in a sack from which there has been extracted only one ball alone.

These observations on the formula of Laplace suffice to show that there was no place to draw from this formula the conclusions which had been drawn from it in 1835.

They establish at the same time that this formula expresses the true result to deduce from experience, when the observed facts are such that the possibility of exact affirmation is the same, whatever be the fact.

But they prove also that it is not possible, in the actual state of the judicial statistic, to deduce the value of the opinion of the jury, thus as one appears to have believed it. The theory furnished a too great number of unknowns in order that there existed some equations rather numerous and capable of giving the values of it, even approximately.

Also, added Mr. Bienaymé, one has been led to conclude from the application of the preceding formulas known to the facts published by the ministry of justice, that the possibility of the error of a juror was greater for the crimes against persons, than it is for the crimes against property. So that the mistakes of the jury for the first crimes entailed the condemnation of a much greater number of acquitables than they would be able to make for the second.

In ending, Mr. Bienaymé observed that his remarks rise to the epoch of the discussion of the law on the jury; but that different motives had not permitted him to publish them until here, although he had communicated to different persons, among others to Mr. Liouville, who has mentioned them some months ago in one of the sessions of the Society.