Quantifying Burdens of Proof

A View from the Bench, the Jury, and the Classroom

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This paper is the third in a series of articles describing the results of efforts to investigate ways in which the burdens of proof applicable in criminal and civil trials could be defined more precisely and more objectively. The burden of proof for determining guilt in criminal trials in American courts is the presentation of evidence which would lead "a reasonable man" to believe "beyond a reasonable doubt" that the defendant did indeed commit the act for which he was charged. This standard is applicable to all criminal acts irrespective of their heinousness or the circumstances under which they were committed.[1] In civil actions the burden of proof necessary for determining negligence on the part of the defendant is "by preponderance of the evidence."[2]

EARLIER RESEARCH

In the first article (Simon, 1970), we reported the verdicts of four groups of students who had assumed the role of jurors and listened to a criminal trial in

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which the defendant had been charged with first degree homicide. The trial was recorded and lasted about forty minutes. When it was over, half of the subjects in each group were asked for their verdicts in the traditional guilty/not guilty form. The others were asked:

> What is the probability or likelihood that the defendant committed the act for which he is charged? On the bar drawn below, mark the spot that describes the probability you have in mind that the defendant committed the act.[3]

On these latter ballots no mention was made of guilt or innocence; the subjects were asked simply to indicate the likelihood or probability that the defendant committed the act for which he was charged.

The second paper reported the results of a mail survey to a sample of trial court state and federal judges throughout the country (Simon, forthcoming). In essence, the purpose of the survey was to have judges translate the burdens of proof in criminal and civil trials into statements of probability.[4] The problem as it was presented to the judges in the survey appeared as follows:

> In every jurisdiction in the United States, the *burden of proof* necessary to convict a defendant in a criminal trial is that the defendant's guilt must be established *beyond a reasonable doubt.* We would like you to do the following: Translate the phrase "beyond a reasonable doubt" into a statement of probability.

The judges were also asked to guess how juries would translate the burdens of proof into probability statements. In the conclusions to that paper, we noted that the judges believe that jurors understand what the burdens of proof are intended to convey and that jurors apply the instructions as they (the judges) would have them do.

METHODOLOGY

A major purpose of the present article is to report how in fact jurors do interpret and translate some of the problems that had been posed for the judges in the earlier paper. With the cooperation of the Chief Judge of the Champaign County Court we were able to use persons serving on their regular period of jury duty as subjects for our research. Instead of reporting for a real trial, these jurors were asked to listen to a recorded and edited version of a trial involving a charge of homicide.[5] After listening to the trial the jurors were divided into groups of six and told to deliberate for about thirty minutes to see if they could reach a decision about the case. Immediately preceding and following their deliberations the jurors were asked to indicate on a questionnaire their individual decisions.

Included on the postdeliberation questionnaire were many of the same items that had been used in the judges' survey.

The overall design looked as it does in Figure 1. The first group of jurors who had indicated their individual verdicts in the traditional guilty/not guilty form were then asked to translate their verdicts into a probability estimate. Their instructions are presented in Figure 2.

The same format was used on the group and individual postdeliberation verdicts. First, half of the jurors made a qualitative and the other half a quantitative decision; then both groups were asked to make the "other" type of decision. All jurors were given the postdeliberation questionnaire that contained the items used on the judges' survey.

In addition to jurors we also used students in several sociology classes as subjects for these experiments. The design of the student experiments followed the pattern applied to the jurors.[6] The only difference was the location of the research. The trial was played, and the students deliberated in a classroom, not in a courtroom. In total, 69 jurors and 88 students participated. There were 10 "juror" juries and 14 "student" juries.
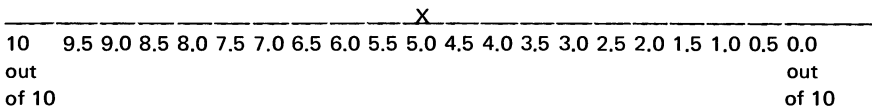

Before the deliberations half of the jurors were told:

Before you being your group discussion, think of youself as a one man jury deciding the verdict in the case you just heard. In your opinion, is the defendant
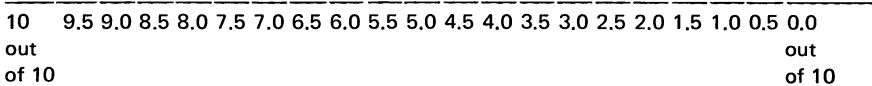
_____Guilty?

_____Not Guilty?

The other half were told

Before you being your group discussion, think of youself as a one man jury deciding the verdict in the case you just heard. In your opinion, what is the likelihood or probability that the defendant committed the criminal act for which he is charged?

For example: If you think that there is a five out of ten chance or probability that the defendant committed the act you will place a mark on the scale drawn below as follows:

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—————————————————————————————————X——————————————————————————————————
10     9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
out                                                                              out
of 10                                                                            of 10
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ON THE SCALE DRAWN BELOW MARK THE SPOT THAT
BEST DESCRIBES THE PROBABILITY YOU HAVE IN MIND:

I believe that there is a ____ out of ten chance that the defendant committed the criminal act for which he is charged.

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——————————————————————————————————————————————————————————————————————
10     9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
out                                                                              out
of 10                                                                            of 10
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Figure 1

FINDINGS

We report first the individual and group verdicts for jurors and students in Table 1.

Two interesting findings emerge from Table 1. Sociology students are more likely to find the defendant not guilty than jurors.[7] But both students and jurors have the same reaction to having been asked for a probability estimate first. And, that is, it introduces a pro-defendant bias. The student respondents who were asked if the defendant was guilty or not guilty were divided 20% guilty and 80% not guilty; and the jurors 51% guilty and 49% not guilty. But the respondents who were first asked what is the likelihood that the defendant committed the act, and then asked to find guilty or not guilty, divided their responses 9% guilty and 91% not guilty, and 38% guilty and 62% not guilty. This same pattern is repeated on the postdeliberation verdicts. Having to translate one's feelings or beliefs about a situation into a probability estimate about what actually happened apparently introduces a certain degree of caution that, in this context, is translated into a pro-defendant bias.

Table 2 describes the group verdicts. Eleven out of the fourteen student juries found for the defendant and the other three hung, while among the regular juries five out of ten found not guilty, four hung, and one found guilty. The students' pro-defendant bias persists.

In Table 3 we note that the individual deliberation verdicts reported after the group arrived at a decision reflect the same pattern reported in Table 1. While the students continue to have a greater propensity to acquit the defendant, the group discussions have the effect on both students and jurors of moving more of

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The first group of jurors was asked:

How does your verdict translate into a probability statement? Does it mean that there is a one in ten chance that the defendant committed the criminal act for which he is charged, or a six in ten chance, or a nine in ten chance, or a 9.5 in ten chance?

ONE THE SCALE DRAWN BELOW MARK THE SPOT THAT
BEST DESCRIBES THE PROBABILITY YOU HAVE IN MIND:

I believe that there is a ____ out of ten chance that the defendant committed the criminal act for which he is charged.

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10   9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
out   out
of 10   of 10
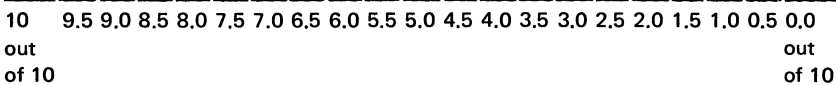
The other half of the jurors, who had made the probability estimate first, were then told:
Suppose you were asked on the basis of your probability statement to convict or acquit the defendant; would you find the defendant guilty or not guilty?

Figure 2

TABLE 1

QUALITATIVE AND QUANTITATIVE PREDELIBERATION VERDICTS BY JURORS AND STUDENTS

	Students		Jurors	
Verdict	Qualitative	Quantitative	Qualitative	Quantitative
	"Qualitative form first"			
Guilty	20%	8.3	51%	7.8
Not Guilty	80%	3.8	49%	3.3
		(n = 44)		(n = 37)
	"Probability estimate first"			
Guilty	9%	7.5	38%	6.8
Not Guilty	91%	4.6	62%	3.0
		(n = 44)		(n = 32)

TABLE 2

GROUP DECISIONS IN QUALITATIVE AND QUANTITATIVE TERMS

	Students		Jurors	
Verdicts	Qualitative	Quantitative	Qualitative	Quantitative
	"Qualitative form first"			
Guilty	—	—	1	6.5
Not Guilty	5	4.0	1	5.0
Hung	2	7.0	3	4.8
	"Probability estimate first"			
Guilty	—	—	—	—
Not Guilty	6	4.1	4	3.8
Hung	1	—	1	—

TABLE 3

QUALITATIVE AND QUANTITATIVE POSTDELIBERATION VERDICTS BY JURORS AND STUDENTS

	Students		Jurors	
Verdict	Qualitative	Quantitative	Qualitative	Quantitative
	"Qualitative form first"			
Guilty	16%	8.3	32%	8.3
Not Guilty	83%	4.8	68%	4.8
	"Probability estimate first"			
Guilty	5%	8.0	19%	8.3
Not Guilty	95%	4.6	81%	4.2

The first series of items asked:

1. What would the likelihood or probability have to be that a defendant committed the act for *you* to decide that he is guilty?
   I would have to believe that it was a _____ out of ten chance that the defendant committed the act.

2. When a *jury* finds a defendant guilty after having been instructed that the burden of proof must be beyond a reasonable doubt, *what was the probability in the jury's mind* that the defendant committed the act?
   On the scale drawn [see sample of scale in Figure 2] mark the spot that best describes the probability you think the jury had in mind.

3. In a *bench trial* when a judge finds a defendant guilty beyond a reasonable doubt, *what is the probability in the judge's mind that the defendant committed the act?*
   On the scale drawn [see sample of scale in Figure 2] mark the spot that best describes the probability you think the judge had in mind.

Figure 3

TABLE 4

PROBABILITY OF GUILT NECESSARY FOR DECIDING THAT DEFENDANT IS GUILTY—REPORTED FOR SELF

Judges			Jurors			Students		
Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency
0.0-5.0	—	—	0.0-5.0	05	—	0.0-5.0	03	—
5.0	01	—	5.0	06	16%	5.0	02	4%
5.5	02	1%	5.5	02	19%	5.5	01	—
6.0	08	3%	6.0	04	25%	6.0	01	7%
6.5	02	4%	6.5	01	26%	6.5	—	—
7.0	14	8%	7.0	02	29%	7.0	01	9%
7.5	23	14%	7.5	02	32%	7.5	01	14%
8.0	58	31%	8.0	08	43%	8.0	09	30%
8.5	21	37%	8.5	02	46%	8.5	02	35%
9.0	68	57%	9.0	09	59%	9.0	21	59%
9.5	44	69%	9.5	03	64%	9.5	17	81%
10.0	106	100%	10.0	25	100%	10.0	30	100%
N.A.	04		N.A.	—		N.A.	—	
Mode	10.0		Mode	10.0		Mode	10.0	
Median	8.8		Median	8.6		Median	9.1	
Mean	8.9		Mean	7.9		Mean	8.9	

the subjects who initially thought the defendant guilty toward a not guilty verdict than they have on moving the jurors who thought initially that the defendant was not guilty toward a guilty verdict. The findings also indicate, as we noted earlier, that the task of deciding how likely it is that the defendant committed the act decreases the probability that the subjects will find the defendant guilty.

COMPARISONS AMONG JUDGES, JURORS, AND STUDENTS

So much for the verdicts under the two types of instruction forms. We turn now to the second set of comparisons: those among responses of judges, jurors, and students to the questionnaire items. The questionnaires were distributed to the students and the jurors after they had deliberated and reported a group decision. The questionnaire is duplicated in Figure 3. Tables 4, 5, and 6 report the distribution of responses for each item.

The data show that there are little differences among the three groups of respondents. The summary statistics following each distribution indicate that half or more of the jurors, students, and judges translate "beyond a reasonable doubt" to mean an 8.6 or higher probability. The students' responses are a little closer to those of the judges, and both apply a slightly more stringent interpretation than the jurors do. The jurors' distributions are also slightly more skewed in favor of the lower probabilities and the means, therefore, are smaller than they are for the judges and students.

A different impression emerges when jurors' and students' translations of the "by a preponderance of the evidence" standard applied in civil actions are compared against those of the judges. The figures shown in Tables 7, 8, and 9 indicate that both jurors and students understand that phrase differently than do the judges. For the judges, "by a preponderance of the evidence" means a little more than half or a 5.5 probability. Neither students nor jurors interpret the phrase that way. Their means and medians hover around 7.5. Thus, for these lay groups, the difference between the criminal (beyond a reasonable doubt) and civil (by a preponderance of the evidence) standards are much less than they are for the judges. The judges make a much sharper distinction between the criminal and civil standards.

The jurors and students were given a list of offenses with a scale following each offense and then asked to indicate the probabilities they would apply in determining whether the defendant had committed the offense for which he was charged. If the subjects were to respond in a manner consistent with formal legal interpretation, their probability estimates would not vary by the nature of the crime. In Table 10, the means and medians for the three groups of respondents are shown.

TABLE 5
PUTATIVE PROBABILITY OF A DEFENDANT'S GUILT
"IN A JURY'S MIND"

Judges			Jurors			Students		
Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency
0.0-5.0	02	—	0.0-5.0	04	—	0.0-5.0	02	—
5.0	06	2%	5.0	09	19%	5.0	08	11%
5.5	03	3%	5.5	01	21%	5.5	—	—
6.0	13	7%	6.0	03	25%	6.0	01	12%
6.5	01	8%	6.5	02	28%	6.5	—	—
7.0	18	13%	7.0	02	31%	7.0	12	26%
7.5	30	22%	7.5	06	40%	7.5	06	33%
8.0	57	40%	8.0	09	54%	8.0	14	49%
8.5	18	45%	8.5	03	58%	8.5	10	60%
9.0	63	64%	9.0	11	75%	9.0	19	82%
9.5	30	74%	9.5	03	79%	9.5	07	90%
10.0	86	100%	10.0	14	100%	10.0	09	100%
N.A.	24		N.A.	02		N.A.	—	
Mode	10.0		Mode	10.0		Mode	9.0	
Median	8.6		Median	7.8		Median	8.1	
Mean	8.7		Mean	7.7		Mean	8.0	

TABLE 6
PUTATIVE PROBABILITY OF A DEFENDANT'S GUILT
"IN A JUDGE'S MIND"

Judges			Jurors			Students		
Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency
0.0-5.0	01	—	0.0-5.0	05	—	0.0-5.0	01	—
5.0	02	1%	5.0	04	14%	5.0	02	4%
5.5	02	—1%	5.5	—	—	5.5	—	—
6.0	06	3%	6.0	04	20%	6.0	02	7%
6.5	03	4%	6.5	—	—	6.5	—	—
7.0	09	7%	7.0	02	23%	7.0	02	9%
7.5	20	12%	7.5	01	24%	7.5	04	14%
8.0	55	28%	8.0	05	32%	8.0	14	30%
8.5	23	35%	8.5	03	36%	8.5	05	35%
9.0	66	54%	9.0	12	54%	9.0	21	59%
9.5	43	67%	9.5	04	61%	9.5	19	81%
10.0	114	100%	10.0	26	100%	10.0	17	100%
N.A.	07		N.A.	03		N.A.	—	
Mode	10.0		Mode	10.0		Mode	9.0	
Median	8.9		Median	8.9		Median	8.8	
Mean	8.9		Mean	8.3		Mean	8.7	

TABLE 7
PROBABILITY OF CONVICTION BY PREPONDERANCE OF EVIDENCE STANDARD, REPORTED FOR SELF

	Judges			Jurors			Students	
Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency
0.0-5.0	02	—	0.0-5.0	02	—	0.0-5.0	01	—
5.0	03	1%	5.0	03	7%	5.0	04	6%
5.5	184	56%	5.5	05	14%	5.5	01	7%
6.0	69	77%	6.0	03	19%	6.0	09	17%
6.5	14	81%	6.5	02	22%	6.5	03	21%
7.0	15	86%	7.0	04	28%	7.0	17	40%
7.5	17	91%	7.5	15	49%	7.5	11	53%
8.0	06	93%	8.0	12	67%	8.0	13	68%
8.5	04	94%	8.5	01	68%	8.5	04	72%
9.0	06	96%	9.0	12	86%	9.0	14	88%
9.5	04	97%	9.5	02	88%	9.5	05	94%
10.0	10	100%	10.0	08	100%	10.0	05	100%
N.A.	17		N.A.	—		N.A.	01	
Mode	5.5		Mode	7.5		Mode	7.0	
Median	5.4		Median	7.5		Median	7.4	
Mean	6.1		Mean	7.7		Mean	7.6	

TABLE 8
PROBABILITY OF CONVICTION BY PREPONDERANCE OF EVIDENCE STANDARD, ASCRIBED TO "A JURY"

	Judges			Jurors			Students	
Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency
0.0-5.0	05	—	0.0-5.0	02	—	0.0-5.0	02	—
5.0	07	4%	5.0	05	10%	5.0	07	10%
5.5	145	50%	5.5	09	24%	5.5	02	12%
6.0	54	68%	6.0	02	27%	6.0	09	23%
6.5	17	73%	6.5	05	34%	6.5	06	30%
7.0	19	79%	7.0	09	48%	7.0	15	46%
7.5	31	89%	7.5	06	57%	7.5	09	57%
8.0	08	92%	8.0	11	73%	8.0	18	77%
8.5	09	94%	8.5	01	75%	8.5	06	84%
9.0	06	96%	9.0	10	90%	9.0	10	95%
9.5	02	97%	9.5	01	91%	9.5	01	96%
10.0	09	100%	10.0	06	100%	10.0	03	100%
N.A.	39		N.A.	02		N.A.	—	
Mode	5.5		Mode	8.0		Mode	8.0	
Median	5.5		Median	7.1		Median	7.2	
Mean	6.2		Mean	7.3		Mean	7.3	

TABLE 9

PROBABILITY OF CONVICTION BY PREPONDERANCE OF EVIDENCE STANDARD, ASCRIBED TO "A JUDGE"

Judges			Jurors			Students		
Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency	Prob-ability	Fre-quency	Cumula-tive Fre-quency
0.0-5.0	03	—	0.0-5.0	05	—	0.0-5.0	01	—
5.0	—	—	5.0	—	—	5.0	06	8%
5.5	168	52%	5.5	04	14%	5.5	01	9%
6.0	70	73%	6.0	02	17%	6.0	06	16%
6.5	13	77%	6.5	01	18%	6.5	02	18%
7.0	13	81%	7.0	02	21%	7.0	13	33%
7.5	22	87%	7.5	10	36%	7.5	10	45%
8.0	11	91%	8.0	10	52%	8.0	22	70%
8.5	03	92%	8.5	05	59%	8.5	05	76%
9.0	08	94%	9.0	09	73%	9.0	12	90%
9.5	08	96%	9.5	06	82%	9.5	05	95%
10.0	12	100%	10.0	12	100%	10.0	04	100%
N.A.	20		N.A.	03		N.A.	01	
Mode	5.5		Mode	10.0		Mode	8.0	
Median	5.5		Median	7.9		Median	7.6	
Mean	6.3		Mean	7.9		Mean	7.3	

TABLE 10

PROBABILITY ESTIMATES BY CRIME FOR JUDGES, JURORS, AND STUDENTS

Crime	Judge		Jury		Student	
	Mean	Median	Mean	Median	Mean	Median
Murder	9.2	9.2	8.6	9.5	9.3	9.3
Burglary	8.9	8.8	7.9	8.2	8.6	8.5
Embezzlement	8.9	8.9	7.6	7.9	8.6	8.7
Assault	8.8	8.8	7.5	7.7	8.5	8.6
Grand larceny	8.8	8.8	7.8	7.8	8.5	8.6
Bribery	8.9	8.9	7.8	7.9	8.4	8.6
Forcible rape	9.1	9.1	7.5	8.4	8.9	9.0
Auto theft	8.8	8.8	7.8	7.9	8.5	8.5
Fraud	8.8	8.8	7.6	7.9	8.5	8.6
Manslaughter	8.9	8.9	9.2	8.7	8.9	9.1
Petty larceny	8.7	8.7	7.4	7.5	8.2	7.9
Statutory rape	9.0	9.0	7.7	8.4	8.8	8.8
Forgery	8.8	8.8	7.8	8.0	8.4	8.5
Aggravated assault	8.9	8.8	7.8	7.9	8.8	8.8

The students' and jurors' responses have a greater dispersion than do those of the judges. Among the judges, the greatest difference is only .5 (the difference in estimates for murder and petty larceny). For jurors it is 2 and for students 1.4. In both instances, murder has the highest probability and petty larceny the lowest. For each offense, the students' estimates are more like those of the judges than they are of the jurors.

CONCLUDING REMARKS

Asking jurors to decide the likelihood that a defendant committed an offense has the effect of reducing the probability that the jurors will find the defendant guilty. This finding persisted for both the students and the "regular" jurors on both the pre- and postdeliberation verdicts. It is a finding we had neither anticipated nor had any hypotheses about. But it is sufficiently interesting and possibly important for the day-to-day operations of the court that further work along the lines suggested in this paper be conducted. For example, does the behavior occur for different types of crimes? In civil actions, if jurors were asked what is the likelihood that John Doe was negligent, would it reduce the probability that the jury would find him negligent or would it decrease the amount of damages it would award to the plaintiff? Further research with different types of cases, under different conditions, and with different groups of subjects seems warranted.

It is not likely, however, that the judiciary will be enthusiastic about having questions such as these posed by behavioral scientists. In the paper referred to earlier describing judges' responses, we asked whether the court should adopt a system whereby the jurors' decisions would be made by first estimating the likelihood that the defendant committed the act—and then have the court use the probability estimates as the bases for determining guilt or negligence. Over ninety percent favored retaining the present system because in their words:

> Percentages or probabilities simply cannot encompass all the factors, tangible and intangible, in determining guilt—evidence cannot be evaluated in such terms. Jurors understand what the burdens of proof are intended to convey and they apply the instructions as we would have them do.[8]

It now appears, however, that perhaps jurors do not apply the instructions as the judges would have them or believe they do. Further evidence in support of the discrepancy between judges' expectations about jurors' behavior and jurors' actual behavior appeared when the jurors' translations of "by a preponderance of the evidence" were compared against those of the judges. For the judges a preponderance means a little more than half; for the jurors it means a probability almost indistinguishable from the standard applied in criminal trials.

Further work needs to be done on this problem as well. Should the discrepancy in interpretation between judges and jurors persist, then serious consideration might be given to recommendations for changes in procedure.

NOTES

1. In instructing the jury, the judge explains his use of the phrase "beyond a reasonable doubt" by relying primarily upon paraphrases and by using what he believes are synonymous terms. Thus, a typical instruction reads like this:

> Reasonable doubt is one a reasonable person has after carefully weighing all the testimony and is one a reasonable person would act or decline to act upon. It is not a capricious doubt or a fanciful doubt or a doubt arising in anyone's mind because of any sympathy for the defendant. It is in essence what the words obviously mean—a reasonable doubt. A reasonable doubt may arise not only from the evidence produced but also from a lack of evidence.

2. The judge usually explains his use of that phrase to the jury in the following terms:

> To "establish by a preponderance of the evidence" means to prove that something is more likely so than not so. In other words, a preponderance of the evidence in the case means such evidence as, when considered and compared with that opposed to it, has more convincing force, and produces in your minds belief that what is sought to be proved is more likely true than not true.

3. Each ballot had an example on it, which indicated how the marking should be done, and a brief explanation of what the mark indicated.

4. The judges did not listen to a trial; they participated only in the mail survey.

5. We used the same trial played before the students reported in the first article.

6. For some of the student groups, we varied the format of the scales such that the students could mark any position from 0 to 100. We found, however, that the distributions as well as the means and medians did not differ noticeably between the 0 to 10 and the 0 to 100 scales. We, therefore, decided to merge the two sets of data.

7. The student verdicts are identical to those reported for the first group of students that had been exposed to this trial. Among them, twenty percent found guilty, eighty percent not guilty.

8. Jurors and students were asked the same questions. They too were reluctant to advocate change. Sixty-two percent of the jurors and 69% of the students said they favored retaining the present system.

REFERENCES

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