

# Rejoinder

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First, I wish to thank all the commentators for their thoughtful discussion. The variety of potential applications of the screening paradigm they describe also demonstrates a wide variation in social and economic costs of the two types of error. Hence, a simple resolution of all the issues involved is unlikely to be achieved.

Although Professor Kaye is correct in noting that the polygraph is generally inadmissible unless both parties stipulate to it, recent cases suggest that the current reluctance of courts to admit the result of a polygraph test is due to the concern that juries may give it too much weight. Judge Lacey (1984) provides an example where a jury was not unduly swayed. Egesdahl (1986) cites *McMorris v. Israel*, 643 F.2d 458 (7th Cir. 1981) and *State v. Stanislawski*, 62 Wis. 2d 703, 216 N.W. 2d 8 (1974) for the view that polygraph tests have reached a sufficient degree of scientific standing that automatic rejection of expert testimony based on them is no longer warranted. A similar position was taken in *U.S. v. Oliver*, 525 F.2d 731 (8th Cir. 1975) a case that approved the admission of a polygraph exam that both sides had agreed to before its administration. In addition to discussing the conflict between the *Frye* criteria and the relevancy approach, Egesdahl (1986) provides many references to empirical studies of the effect of scientific evidence on juries as well as cases that considered the admissibility of such evidence. The newer studies show that mock juries are not overly influenced by scientific techniques especially when ranges for their accuracy, e.g. 70–90% for the polygraph, are presented to them.

I believe that presenting juries with the standard errors and confidence intervals for all pertinent parameters ( $\theta$ ,  $\eta$ ,  $C$  and  $F$ ) should aid their understanding of the degree of possible error inherent in any scientific device. The results in Tables 2 and 3 show that the reliability of any technique needs to be determined from a reasonably large study. Indeed, Dr. Goldberg's comments on the screening application reinforce the desirability of carefully determining the error rates *prior* to initiating a mass screening program. Professor Kaye's remarks on the relationship between the PVP and probative value supplement my view that the PVP as well as the sensitivity and specificity should aid in the assessment of the weight that should be given to scientific evidence.

As Professor Kaye notes the PVP is not the same as the legal concept of probative value nor did I equate them. Apparently others have stated that the PVP

must exceed  $\frac{1}{2}$  for test results to be useful. The legal concept of probative value is broader than the usual mathematical models allow and it is unwise to fix a threshold value for admissibility in terms of the PVP or any one statistical measure. More research on how jurors utilize the other evidence to form their prior probability of guilt and how the scientific evidence subsequently changes this probability is needed. Fairly complex models may be required as jurors see and hear the same evidence and discuss the case so procedures for combining dependent data should play a role. Furthermore, the strength and amount of other relevant evidence may affect the admissibility of lesser-quality scientific information.

Although I have some sympathy with Professor Kaye's Bayesian view, he may have overemphasized the difference between  $P(D|S \cap X)$  and  $P(D|S)$  as it may be possible either to obtain accuracy rates for persons possessing  $X$  or to demonstrate that belonging to the group specified by  $X$  (the other evidence) does not affect the accuracy of the test or device. Thus, the relevant issue is whether the accuracy rates  $\eta$  and  $\theta$  are known (sufficiently precisely) for the appropriate population. Indeed, Section 5 and the comments by Kircher and Raskin and Goldberg underscore the importance of verifying the accuracy rates of a screening test on the population for which it will be used.

Although I discussed the PVP, the PVN should also be considered in weighing the admissibility of scientific evidence. The most controversial cases involving the admissibility of polygraph, drug tests and other scientific evidence occur when other evidence is relatively sparse. In this situation courts must focus on the accuracy of the procedure. For example, the accuracy of the EMIT drug test arose in *Pella v. Adams*, 638 F. Supp 94 (D. Nev. 1986) when a prison inmate was disciplined for drug use after a positive test. As Dr. Wittes raised the issue of drug tests we quote from page 97 of the opinion:

[5] "Because the evidence against Pella is scarce without the positive EMIT test, the Court finds that inquiry into its reliability and accuracy is appropriate. Several courts have examined the results of the EMIT test, with varying conclusions. See e.g., *Higgs v. Wilson*, 616 F.Supp. 226 (W.D.Ky.1985) (granted a preliminary injunction against the prison from disciplining an inmate on the sole basis of an unconfirmed positive EMIT test); *Wykoff v. Resig*, 613 F.Supp. 1504