Polygraph

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# ELEVENTH CIRCUIT ADMITS POLYGRAPH EVIDENCE

On September 28, 1989, the United States Court of Appeals for the Eleventh Circuit issued their opinion in United States v. Piccinonna. The decision is the most important to the polygraph profession since United States v. Gipson admitted polygraph evidence into military courts. The decision sets forth situations in which polygraph evidence may be admitted before courts in their Circuit, and reviews the status of admissibility in the other federal circuits. That it disposes of Frye as outmoded, as did Gipson, is no surprise; but the surprise is the reversal of their long-standing position, and the refreshing appearance of at least a few scientific literature citations in their footnotes, instead of the tiresome repetition of old decisions and blind adherence to stare decisis. [Ed.]

## Text of the Decision

**In this case, we revisit the issue of the admissibility at trial of polygraph expert testimony and examination evidence. Julio Piccinonna appeals his conviction on two counts of knowingly making false material statements to a Grand Jury in violation of Title IV of the Organized Crime Control Act of 1970. 18 U.S.C. 1623 (1982). Piccinonna argues that the trial judge erred in refusing to admit the testimony of his polygraph expert and the examination results. Because of the significant progress made in the field of polygraph testing over the past forty years and its increasingly widespread use, we reexamine our per se rule of exclusion and fashion new principles to govern the admissibility of polygraph evidence. Accordingly, we remand the case to the trial court to reconsider the admissibility of Piccinonna's polygraph test results in light of the principles we espouse today.**

### I. Background

Julio Piccinonna has been in the waste disposal business in South Florida for over twenty-five years. In 1983, a Grand Jury conducted hearings to investigate antitrust violations in the garbage business. The government believed that South Florida firms in the waste disposal business had agreed not to compete for each other's accounts, and to compensate one another when one firm did not adhere to the agreement and took an account from another firm.

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* As we go to press, the West citation is not yet available, but it is probably going to be 884 F.2d ____ (11th Cir. 1989). The Circuit No. is 86-5335 and D.C. Docket No. 85-6132. United States v. Gipson is 24 M.J. 343 (C.M.A. 1987). Frye v. United States is 293 F.1013 (D.C. Cir. 1923).

Piccinonna was compelled to testify before the Grand Jury pursuant to a grant of immunity. The immunity, however, did not protect Piccinonna from prosecution for perjury committed during his testimony. Piccinonna testified that he had not heard of the agreement between garbage companies to refrain from soliciting each other's accounts and to compensate each other for taking accounts. The Grand Jury, however, also heard testimony from several witnesses involved in the disposal industry who implicated Piccinonna in the garbage industry agreement. On August 1, 1985, Piccinonna was indicted on four counts of perjury.

Prior to trial, Piccinonna requested that the Government stipulate to the admission into evidence of the results of a polygraph test which would be administered subsequently. The Government refused to stipulate to the admission of any testimony regarding the polygraph test or its results. Despite the Government's refusal, George P. Slattery, a licensed polygraph examiner, tested Piccinonna on November 25, 1985. Piccinonna asserted that the expert's report left no doubt that he did not lie when he testified before the Grand Jury. (R1-38-2). On November 27, 1985, Piccinonna filed a motion with the district court requesting a hearing on the admission of the polygraph testimony.[1] On January 6, 1986, the district court held a hearing on the defendant's motions. Due to the per se rule, which holds polygraph evidence inadmissible in this circuit, the trial judge refused to admit the evidence. The judge noted, however, that the Eleventh Circuit may wish to reconsider the issue of the admissibility of polygraph evidence since these tests have become much more widely used, particularly by the Government. Hence, the judge stated that if Piccinonna was convicted, the court would conduct a post-trial hearing to perfect the record for appeal.

Piccinonna was convicted on two counts of making false material declarations concerning a matter the Grand Jury was investigating. The court then conducted a hearing to perfect the record for appeal. At the hearing, the judge ordered the report of the polygraph examination and the complete transcript of the evidentiary hearing conducted in United States v. Irwin Freedman, No. 81-434-CR-ARONOVOTZ to become part of the record. On appeal, Piccinonna urges us to modify our per se rule excluding polygraph evidence to permit its admission in certain circumstances.

II. The Per Se Rule

In federal courts, the admissibility of expert testimony concerning scientific tests or findings is governed by Rule 702 of the Federal Rules of Evidence. Rule 702 provides:

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education, may testify thereto in the form of an opinion or otherwise.

Fed. R. Evid. 702. Under this rule, to admit expert testimony the trial judge must determine that the expert testimony will be relevant[2] and will be helpful to the trier of fact.[3] In addition, courts require the proponent of

the testimony to show that the principle or technique is generally accepted in the scientific community. McCormick, McCormick on Evidence Sec. 203 (3rd. ed. 1984).

The general acceptance requirement originated in the 1923 case of Frye v. United States, 293 F. 1013 (D.C. Cir. 1923). Frye involved a murder prosecution in which the trial court refused to admit results from a systolic blood pressure test, the precursor of the polygraph. The defendant appealed, arguing that the admissibility of the scientific test results should turn only on the traditional rules of relevancy and helpfulness to the trier of fact. The court of appeals disagreed and imposed the requirement that the area of specialty in which the court receives evidence must have achieved general acceptance in the scientific community. Id. at 1014. The court stated that "while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs." Id. The court concluded that the systolic blood pressure test lacked the requisite "standing and scientific recognition among physiological and psychological authorities." Id.

Courts have applied the Frye standard to various types of scientific tests, including the polygraph.[4] However, the Frye standard has historically been invoked only selectively to other types of expert testimony, and has been applied consistently only in cases where the admissibility of polygraph evidence was at issue. See McCormick, Scientific Evidence: Defining a New Approach to Admissibility 67 Iowa L. Rev. 879, 884 (1982).[5] Most courts had little difficulty with the desirability of excluding polygraph evidence and thus, applied the Frye standard with little comment. Id. at 885. This circuit also has consistently reaffirmed, with little discussion, the inadmissibility of polygraph evidence. United States v. Hilton, 772 F.2d 783, 785 (11th Cir. 1985); United States v. Rodriguez, 765 F.2d 1546, 1558 (11th Cir. 1985); c.f., United States v. Beck, 729 F.2d 1329, 1332 (11th Cir.) (court implied that polygraph evidence may be admissible when the parties stipulate to its admissibility), cert. denied, 469 U.S. 981 (1984). Our position was derived from former Fifth Circuit precedent excluding polygraph evidence, which we adopted as law in this circuit. Bonner v. City of Prichard, 661 F.2d 1206, 1207 (11th Cir. 1981).[6]

Recently, the application of the Frye standard to exclude polygraph evidence has been subject to growing criticism.[7] Since the Frye decision, tremendous advances have been made in polygraph instrumentation and technique.[8] Better equipment is being used by more adequately trained polygraph administrators. Further, polygraph tests are used extensively by government agencies. Field investigative agencies such as the FBI, the Secret Service, military intelligence and law enforcement agencies use the polygraph. Thus, even under a strict adherence to the traditional Frye standard, we believe it is no longer accurate to state categorically that polygraph testing lacks general acceptance for use in all circumstances. For this reason, we find it appropriate to reexamine the per se exclusionary rule and institute a rule more in keeping with the progress made in the polygraph field.

## III. Differing Approaches to Polygraph Admissibility

Courts excluding polygraph evidence typically rely on three grounds: 1) the unreliability of the polygraph test,[9] 2) the lack of standardization of polygraph procedure,[10] and 3) undue impact on the jury.[11] Proponents of admitting polygraph evidence have attempted to rebut these concerns. With regard to unreliability, proponents stress the significant advances made in the field of polygraphy.[12] Professor McCormick argues that the fears of unreliability "are not sufficient to warrant a rigid exclusionary rule. A great deal of lay testimony routinely admitted is at least as unreliable and inaccurate, and other forms of scientific evidence involve risks of instrumental or judgmental error." McCormick, supra, Sec. 206 at 629. Further, proponents argue that the lack of standardization is being addressed and will progressively be resolved as the polygraph establishes itself as a valid scientific test. Sevilla, Polygraph 1984: Behind the Closed Door of Admissibility, 16 U. West L.A. L. Rev. 5, 19 (1984).[13] Finally, proponents argue that there is no evidence that jurors are unduly influenced by polygraph evidence. Id. at 17. In fact, several studies refute the proposition that jurors are likely to give disproportionate weight to polygraph evidence.[14]

In the wake of new empirical evidence and scholarly opinion which have undercut many of the traditional arguments against admission of polygraph evidence, a substantial number of courts have revisited the admissibility question. Three roughly identifiable approaches to the problem have emerged. First, the traditional approach holds polygraph evidence inadmissible when offered by either party, either as substantive evidence or as relating to the credibility of a witness. McCormick, supra, sec. 206 at 628.[15] Second, a significant number of jurisdictions permit the trial court, in its discretion, to receive polygraph evidence if the parties stipulate to the evidence's admissibility before the administration of the test and if certain other conditions are met.[16] Finally, some courts permit the trial judge to admit polygraph evidence even in the absence of a stipulation, but only when special circumstances exist.[17] In these jurisdictions, the issue is within the sound discretion of the trial judge.

Relying on the typical grounds to exclude polygraph evidence, the Fourth, Fifth and District of Columbia Circuits historically have adhered to the traditional approach of per se inadmissibility. United States v. Brevard, 739 F.2d 180 (4th Cir. 1984); United States v. Clark, 598 F.2d 994, 995 (5th Cir. 1979), vacated en banc 622 F.2d 917 (1980), cert. denied, 449 U.S. 1128 (1981); United States v. Skeens, 494 F.2d 1050, 1053 (D.C. Cir. 1974). While these circuits have sometimes hinted at the possibility of adopting a more liberal approach, they have consistently returned to per se inadmissibility. See, e.g., United States v. Webster, 639 F.2d 174, 186 (4th Cir.) (admissibility of polygraph evidence can be within discretionary powers of trial judge), cert. denied, Christian v. United States (1981), Modified in other respects 669 F.2d 185 (4th Cir.), cert. denied, 456 U.S. 935 (1982); United States v. Brevard, 739 F.2d 180 (4th Cir. 1984)(per se inadmissible); United States v. Clark, 622 F.2d 917, 917 (5th Cir. 1980)(twelve concurring judges agreed that the per se rule should be reconsidered), cert. denied, 449 U.S. 1128 (1981); Tyler v. United States, 193

F.2d 24 (D.C. Cir. 1951), cert. denied, 343 U.S. 908 (1952)(not error for trial court to admit polygrapher's testimony for purpose of deciding whether the defendant's confession was voluntary); United States v. Skeens, 494 F.2d at 1053 (D.C. Cir. 1974)(polygraph evidence per se inadmissible).

The Eighth Circuit has developed a more liberal approach which allows admission of polygraph evidence only when the parties stipulate. Anderson v. United States, 788 F.2d 517, 519 (8th Cir. 1986); United States v. Alexander, 526 F.2d 161, 166 (8th Cir. 1975). However, another line of Eighth Circuit cases appears to be more permissive in allowing the introduction of polygraph evidence. United States v. Yeo, 739 F.2d 385, 388 (8th Cir. 1984); United States v. Oliver, 525 F.2d 731, 736 (8th Cir. 1975)(a discretionary rather than a per se exclusionary rule is appropriate). Hence, while the Eighth Circuit falls within the second category, it appears to be leaning toward greater admissibility of polygraph evidence.

Finally, the Third, Sixth, Seventh, Ninth and Tenth Circuits, and the Court of Military Appeals permit admission of polygraph evidence even in the absence of a stipulation when special circumstances exist. The Third and Seventh Circuits permit polygraph evidence to be introduced for the purpose of rebutting a claim by the defendant that his confession was the result of coercion. United States v. Johnson, 816 F.2d 918, 923 (3rd Cir. 1987); United States v. Kampiles, 609 F.2d 1233, 1245 (7th Cir. 1979), cert. denied, 446 U.S. 954 (1980). The Tenth Circuit has permitted the government to introduce the fact that the defendant failed a polygraph test to explain why the police detective had not conducted a more thorough investigation. United States v. Hall, 805 F.2d 1410 (10th Cir. 1986). In its attempt to mitigate the potential problems with polygraph evidence, the Sixth Circuit has promulgated a two-step approach to admission. Wolfel v. Holbrook, 823 F.2d 970 (6th Cir. 1987), cert. denied, __U.S.__, 108 S.Ct. 1035 (1988). "First, the trial court must determine if the proffered evidence is relevant. Second, if the court concludes that the proffered evidence is relevant, it must balance the probative value of the evidence against the hazard of unfair prejudice and/or confusion which could mislead the jury." Id. at 972. The Ninth Circuit holds polygraph evidence admissible only in instances narrowly tailored to limit the prejudicial impact of the evidence. United States v. Miller, 874 F.2d 1255, 1262 (9th Cir. 1989). The Miller court, in considering prior Ninth Circuit cases on this issue, noted that polygraph evidence might be admissible "if it is introduced for a limited purpose that is unrelated to the substantive correctness of the results of the polygraph examination." Id. at 1261. In United States v. Bowen, 857 F.2d 1337, 1341 (9th Cir. 1988), the court held that if "the polygraph evidence is being introduced because it is relevant that a polygraph examination was given, regardless of the result, then it may be admissible ..." Id. at 1341.

The common thread running through the various approaches taken by courts which have modified the per se rule is a recognition that while wholesale exclusion under rule 702 is unwarranted, there must be carefully constructed limitations placed upon the use of polygraph evidence in court. Absent a stipulation by the parties, we are unable to locate any case in which a court has allowed polygraph expert testimony offered as substantive proof of the truth or falsity of the statements made during the polygraph

examination. The myriad of "special circumstances" and conditions that have been held to constitute appropriate scenarios for use of polygraph evidence are necessarily rough estimates by the courts of when and where the danger of unfair prejudice due to the admission of the evidence is least significant.

## IV. Principles for Admissibility

There is no question that in recent years polygraph testing has gained increasingly widespread acceptance as a useful and reliable scientific tool. Because of the advances that have been achieved in the field which have led to the greater use of polygraph examination, coupled with a lack of evidence that juries are unduly swayed by polygraph evidence, we agree with those courts which have found that a per se rule disallowing polygraph evidence is no longer warranted. Of course, polygraphy is a developing and inexact science, and we continue to believe it inappropriate to allow the admission of polygraph evidence in all situations in which more proven types of expert testimony are allowed. However, as Justice Potter Stewart wrote, "any rule that impedes the discovery of truth in a court of law impedes as well the doing of justice." Hawkins v. United States, 358 U.S. 74, 81 (1958)(concurring). Thus, we believe the best approach in this area is one which balances the need to admit all relevant and reliable evidence against the danger that the admission of the evidence for a given purpose will be unfairly prejudicial. Accordingly we outline two instances where polygraph evidence may be admitted at trial, which we believe achieve the necessary balance.

### A. Stipulation

The first rule governing admissibility of polygraph evidence is one easily applied. Polygraph expert testimony will be admissible in this circuit when both parties stipulate in advance as to the circumstances of the test and as to the scope of its admissibility. The stipulation as to circumstances must indicate that the parties agree on material matters such as the manner in which the test is conducted, the nature of the questions asked, and the identity of the examiner administering the test. The stipulation as to scope of admissibility must indicate the purpose or purposes for which the evidence will be introduced. Where the parties agree to both of these conditions in advance of the polygraph test, evidence of the test results is admissible.

### B. Impeachment or Corroboration

The second situation in which polygraph evidence may be admitted is when used to impeach or corroborate the testimony of a witness at trial. Admission of polygraph evidence for these purposes is subject to three preliminary conditions. First, the party planning to use the evidence at trial must provide adequate notice to the opposing party that the expert testimony will be offered. Second, polygraph expert testimony by a party will be admissible only if the opposing party was given reasonable opportunity to have its own polygraph expert administer a test covering substantially the same questions. Failure to provide adequate notice or reasonable

opportunity for the opposing side to administer its own test is proper grounds for exclusion of the evidence.

Finally, whether used to corroborate or impeach, the admissibility of the polygraph administrator's testimony will be governed by the Federal Rules of Evidence for the admissibility of corroboration or impeachment testimony. For example, Rule 608 limits the use of opinion or reputation evidence to establish the credibility of a witness in the following way: "[E]vidence of truthful character is admissible only after the character of the witness for truthfulness has been attacked by opinion or reputation evidence or otherwise." Thus, evidence that a witness passed a polygraph examination, used to corroborate that witness' in-court testimony, would not be admissible under Rule 608 unless or until the credibility of that witness were first attacked. Even where the above three conditions are met, admission of polygraph evidence for impeachment or corroboration purposes is left entirely to the discretion of the trial judge.

Neither of these two modifications to the per se exclusionary rule should be construed to preempt or limit in any way the trial court's discretion to exclude polygraph expert testimony on other grounds under the Federal Rules of Evidence. Our holding states merely that in the limited circumstances delineated above, the Frye general acceptance test does not act as a bar to admission of polygraph evidence as a matter of law. As we have stated, the chief criterion in determining whether expert testimony is appropriate is whether it will help the trier of fact to resolve the issues. Fed.R.Evid. 702; Worsham v. A.H. Robins Co., 734 F.2d 676, 685 (11th Cir. 1984). The expert testimony must also, of course, be relevant. Fed.R.Evid. 401; United States v. Roark, 753 F.2d 991, 994 (11th Cir. 1985). Rule 401 defines relevant evidence as evidence "having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." Further, Rule 403 states that even though relevant, evidence may be excluded by the trial court "if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by consideration of undue delay, waste of time, or needless presentation of cumulative evidence." Thus, we agree with the Ninth Circuit "that polygraph evidence should not be admitted, even for limited purposes, unless the trial court has determined that 'the probative value of the polygraph evidence outweighs the potential prejudice and time consumption involved in presenting such evidence.'" United States v. Miller, 874 F.2d 1255 (9th Cir. 1989) (quoting Brown v. Darcy, 783 F.2d 1389, 1397 n. 14 (9th Cir. 1986)).

Thus under the Federal Rules of Evidence governing the admissibility of expert testimony, the trial court may exclude polygraph expert testimony because 1) the polygraph examiner's qualifications are unacceptable; 2) the test procedure was unfairly prejudicial or the test was poorly administered; or 3) the questions were irrelevant or improper. The trial judge has wide discretion in this area, and rulings on admissibility will not be reversed unless a clear abuse of discretion is shown. Worsham, 734 F.2d at 686.

V. Conclusion

We neither expect nor hope that today's holding will be the final word within our circuit on this increasingly important issue. The advent of new and developing technologies calls for flexibility within the legal system so that the ultimate ends of justice may be served. It is unwise to hold fast to a familiar rule when the basis for that rule ceases to be persuasive. We believe that the science of polygraphy has progressed to a level of acceptance sufficient to allow the use of polygraph evidence in limited circumstances where the danger of unfair prejudice is minimized. We proceed with caution in this area because the reliability of polygraph testing remains a subject of intense scholarly debate. As the field of polygraph testing continues to progress, it may become necessary to reexamine the rules regarding the admissibility of polygraph evidence.

The judgment of conviction is VACATED and the case is REMANDED to the district court for further proceedings consistent with this opinion.

Footnotes

[1] Piccinonna also filed a motion for a James hearing to determine whether the hearsay statements of the alleged co-conspirators were admissible in evidence against him, and a motion to incorporate by reference the transcript of an evidentiary hearing on the admissibility of polygraph tests held in the case of United States v. Irvin Freedman, et al., Case No. 81-434-CR-ARONOVITZ.

[2] See Fed. R. Evid. 401, 403.

[3] See, e.g. Fed. R. Evid. 702.

[4] For the next fifty years, the Frye holding acted as a complete bar to the admissibility of polygraph evidence. Kaminski v. State, 63 So.2d 339, 340 (Fla. 1952); Boeche v. State, 151 Neb. 368, 377, 37 N.W.2d 593, 597 (1949); Henderson v. State, 94 Okl.Cr. 45, 52-55, 230 P.2d 495, 502-505, cert. denied 342 U.S. 898 (1951). For brief history of polygraph admissibility see State v. Valdez, 91 Ariz. 274, 371 P.2d 894, 896 n.4 (1962).

[5] See also Giannelli, The Admissibility of Novel Scientific Evidence: Frye v. United States, A Half-Century Later, 80 Colum. L. Rev. 1197, 1219-21 (1980); Reed v. State, 283 Md. 384, 391 A.2d 364, 403 (1978) (Smith, J., dissenting) (Frye standard has generally not been relied upon for the admission of evidence such as fingerprints, ballistics, intoxication tests, and x-rays).

[6] In United States v. Clark, 598 F.2d 994, 995 (5th Cir. 1979), the Fifth Circuit reaffirmed its former holdings excluding polygraph evidence. However, in a per curiam opinion vacating an order which had granted rehearing of the case en banc, twelve judges agreed in a concurrence that had a proffer of evidence been made tending to show advances in polygraph testing, the issue would properly be subject to reconsideration. United States v. Clark, 622 F.2d 917 (5th Cir. 1980), cert. denied, 449 U.S. 1128 (1981).

[7] Commentators have consistently criticized application of the Frye standard. Some commentators advocate a requirement of substantial acceptance as an alternative to the general acceptance standard. J. Richardson, Modern Scientific Evidence sec. 2.5 at 24 (2d ed. 1974). Other commentators question the necessity for any special rules governing the admissibility of scientific evidence and believe that the concerns of Frye proponents could be met with careful application of traditional rules regarding relevancy and expert testimony. See e.g., Trautman, Logical or Legal Relevancy - A Conflict in Theory, 5 Vand. L. Rev. 385, 396 (1952). Professor McCormick agreed with this approach stating that "[g]eneral scientific acceptance is a proper condition for taking judicial notice of scientific facts, but it is not a suitable criterion for the admissibility of scientific evidence. Any relevant conclusions supported by a qualified expert witness should be received unless there are distinct reasons for exclusion. These reasons are the familiar ones of prejudicing or misleading the jury or consuming undue amounts of time." McCormick on Evidence, supra sec. 203 at 608 (footnotes omitted). Dean Wigmore concurs with McCormick's standard for admission of polygraph evidence. Wigmore, Evidence, sec. 990 (3d ed. 1940).

[8] Barland, Raskin, "Detection of Deception," Electro-Dermal Activity in Psychological Research (1973); Barland, Raskin, "An Evaluation of Field Techniques in the Detection of Deception," 12 Psychophysiology 321 (1975); Podlesny, Raskin, "Effectiveness of Techniques and Physiological Measurers in the Detection of Deception," 15 Psychophysiology 344 (1978).

[9] United States v. Gloria, 494 F.2d 477, 483 (5th Cir.), cert. denied, 419 U.S. 995 (1974); United States v. Skeens, 494 F.2d 1050, 1053 (D.C.Cir. 1974); People v. Anderson, 637 P.2d 354, 358 (Col. 1981); People v. Baynes, 88 Ill.2d 225, 230, 430 N.E.2d 1070, 1075 (1981); State v. Grier, 307 N.C. 628, 300 S.E.2d 351, 360 (1983); Fulton v. State, 541 P.2d 871, 872 (Okla. 1975).

[10] People v. Anderson, 637 P.2d 354, 358 (Col. 1981); People v. Baynes, 88 Ill.2d 225, 430 N.E.2d 1070, 1075 (1981); State v. Grier, 307 N.C. 628, 300 S.E.2d 351, 360 (1983); State v. Dean, 103 Wis.2d 228, 307 N.W.2d 628, 633 (1981); State v. Stanislawski, 62 Wis.2d 120, 216 N.W.2d 8 (1974).

[11] United States v. Alexander, 526 F.2d 161 (8th Cir. 1975); United States v. Jenkins, 470 F.2d 1061, 1064 (9th Cir. 1972), cert. denied, 411 U.S. 920 (1973); People v. Anderson, 637 P.2d 354, 358 (Col. 1981); People v. Baynes, 88 Ill.2d 225, 430 N.E.2d 1070, 1079 (1981); State v. Grier, 307 N.C. 628, 300 S.E.2d 351, 360 (1983); State v. Dean, 103 Wis.2d 228, 307 N.W.2d 628 (1981); State v. Stanislawski, 62 Wis.2d 120, 216 N.W.2d 8 (1974).

[12] Polygraph examiners contend that a properly administered polygraph test is a highly effective way to detect deception and cite figures between 92% and 100% for its accuracy. McCormick, supra, sec. 206 at 626. Others suggest figures in the range of 63 - 72%. Id.

[13] For instances, Sevilla points out that experts in the polygraph field have developed detailed standards for administration of polygraph tests.

The American Polygraph Association and state organizations have standards in their charters which members must follow as well. See Sevilla, supra at 19.

[14] Carlson, Pasano & Jannunzzo, "The Effect of Lie Detector Evidence on Jury Deliberations: An Empirical Study", 5 J. Pol. Sci. & Admin. 148; Markward & Lynch, "The Effect of Polygraph Evidence on Mock Jury Decision-Making," 7 J. Pol. Sci. & Admin. 324 (1979); Peters, "A Survey of Polygraph Evidence in Criminal Trials," 68 A.B.A. J. 162, 165 (1982) (citing cases in which the jury verdict in criminal trials was at odds with the testimony of the polygraph examiner.)

[15] United States v. Brevard, 739 F.2d 180 (4th Cir. 1984); De Vries v. St. Paul Fire & Marine Insurance Co., 716 F.2d 939, 945 (1st Cir. 1983); Smith v. Gonzales, 670 F.2d 522, 528 (5th Cir.), cert. denied, 459 U.S. 1005 (1982); United States v. Zeiger, 475 F.2d 1280 (D.C. Cir. 1972); United States v. Bando, 244 F.2d 833, 841 (2nd Cir.), cert. denied, 355 U.S. 844 (1957); Pulaski v. State, 476 P.2d 474, 479 (Alaska 1970); People v. Anderson, 637 P.2d 354, 358 (Colo. 1981); People v. Baynes, 88 Ill.2d 225, 430 N.E.2d 1070 (1981); Kelley v. State, 288 Md. 298, 418 A.2d 217, 219 (1980); State v. Mitchell, 402 A.2d 479, 482 (Me. 1979); State v. Biddle, 599 S.W.2d 182, 185 (Mo. 1980); State v. Steinmark, 195 Neb. 545, 239 N.W.2d 495, 497 (1976); Birdsong v. State, 649 P.2d 786, 788 (Okl.Cr. 1982); State v. Frazier, 162 W. Va. 602, 252 S.E.2d 39, 49 (1979); State v. Dean, 103 Wis.2d 228, 307 N.W.2d 628 (1981).

[16] Anderson v. United States, 788 F.2d 517, 519 (8th Cir. 1986)(for purposes of prosecution's duty to reveal favorable evidence to accused, review of polygraph statements in camera proper in determining whether the statements were material to guilt or punishment); State v. Valdez, 91 Ariz. 274, 283-84, 371 P.2d 894, 900 (1962)(In Court's discretion polygraph evidence may be admitted pursuant to signed stipulation. Opposing side is entitled to broad cross-examination and limiting instruction to the jury as to the evidentiary purpose of the testimony); State v. Bullock, 262 Ark. 394, 557 S.W.2d 193 (1977)(where there is dispute as to existence of stipulation, polygraph evidence admissible only if parties have executed a written agreement); People v. Trujillo, 67 Cal.App.3d 547, 136 Cal.Rptr. 672, 676 (5th Dist. 1977)(results of polygraph may be admitted pursuant to a stipulation by both parties provided that the stipulation was not entered into as a result of fraud, excusable neglect, misrepresentation, or mistake of fact, and further provided that the facts have not changed and there are no other special circumstances rendering it unjust to enforce the stipulation); Codie v. State, 313 So.2d 754, 756 (Fla. 1975)(stipulation need not be in writing if defendant freely and voluntarily submitted to taking polygraph examination); Pavone v. State, 402 N.E.2d 976, 978-79, 273 Ind. 162 (1980)(even if the parties enter into a written stipulation, court still retains discretion to deny admission of polygraph results); State v. Marti, 290 N.W.2d 570, 586-87 (Iowa 1980)(stipulation must be agreed to by both parties, should be a matter of record, and polygraph may be admitted only in the proceeding for which stipulation was intended); State v. Roach, 223 Kan. 732, 576 P.2d 1082, 1086 (1978)(polygraph evidence admissible if both parties stipulate, the stipulation is a matter of record, defendant knowingly and voluntarily consents to the examination, counsel and defendant stipulate that results are to be admissible, the trial court is satisfied that

the examiner is qualified and the examination is conducted under the proper conditions, and the opposing party is given adequate opportunity to cross-examine the polygraph examiner on his qualifications and the limitations of polygraph interrogation); State v. Souel, 53 Ohio St.2d 123, 134, 372 N.E.2d 1318, 1323-24 (1978) (adopts Valdez rule); Cullen v. State, 565 P.2d 445, 457 (Wyo. 1977) (in addition to stipulation by both parties, trial court must require a showing of the reliability and acceptance of the polygraph and allow cross-examination before admitting polygraph evidence).

[17] United States v. Miller, 874 F.2d 1355 (9th Cir. 1989); United States v. Johnson, 816 F.2d 918, 923 (3rd Cir. 1987); Solfel v. Holbrook, 823 F.2d 970, 972 (6th Cir. 1987), cert. denied, ___ U.S. ___, 108 S.Ct. 1035 (1988); United States v. Hall, 805 F.2d 1410 (10th Cir. 1986); United States v. Webster, 639 F.2d 174, 186 (4th Cir.) (trial judge has broad discretion to admit polygraph evidence), cert. denied, Christian v. United States, 454 U.S. 857 (1981), modified in other respects 669 F.2d 185, cert. denied, 456 U.S. 935 (1982); State v. Dorsey, 88 N.M. 184, 539 P.2d 204 (1975) (polygraph evidence admissible if polygraph expert is qualified as an expert, the testing procedure is shown reliable as approved by authorities in the field, and the tests made on the subject are shown to be valid).

* * * * * *

JOHNSON, Circuit Judge, concurring in part and dissenting in part, in which RONEY, Chief Judge, HILL and CLARK, Circuit Judges, join:

I concur with the Court's holding that polygraph evidence should be admissible in this Circuit when both parties stipulate in advance to the circumstances of the test and to the scope of its admissibility, subject to the understanding that such stipulations may be accepted or rejected by the trial judge at his discretion.[1] I dissent, however, from the Court's finding that the polygraph has gained acceptance in the scientific community as a reliable instrument for detecting lies, and from the Court's holding that polygraph evidence is admissible under Fed. R. Evid. 608.

## I. POLYGRAPH THEORY

### A. Introduction

The Court's reasoning begins with the proposition that polygraph technology has reached the point where its accuracy is generally accepted by the scientific community. In fact, the scientific community remains sharply divided on the reliability of the polygraph. U.S. Congress, Office of Technology Assessment, Scientific Validity of Polygraph Testing: A Research Review and Evaluation - A Technical Memorandum 43 (1983) [hereinafter OTA Memorandum]. Many theorists question the basic assumptions underlying the polygraph: that telling lies is stressful, and that this stress manifests itself in physiological responses which can be recorded on a polygraph. See Ney, Expressing Emotions and Controlling Feeling, in The Polygraph Test: Lies, Truth and Science 65 (A. Gale ed. 1988) [hereinafter The Polygraph Test]; Employee Polygraph Protection Act; Hearing on H.R. 208 Before the Education and Labor Comm., 100th Cong., 1st Sess. 51 (1987) (testimony of John F. Beary, III, M.D. on behalf of the American Medical Association) [hereinafter H.R. Hearing]. Moreover, Congress has sharply limited use of the polygraph in the private sector. Employee Polygraph Protection Act of 1988, P.L. 100-347, 102 Stat. 646 (codified at 29 U.S.C.A., sec. 2001 (West Supp. 1989)).[2]

The polygraph device records the subject's physiological activities (e.g., heart rate, blood pressure, respiration, and perspiration) as he is questioned by a polygraph examiner. Bull, What is the Lie Detection Test? in The Polygraph Test 11-12. There are two major types of polygraph examinations: the "control question test" and the "concealed information test." The control question test is used most frequently in investigating specific incidents. The examiner compares the data corresponding to (a) questions relevant to the crime, (b) "control" questions designed to upset the subject but not directly relevant to the crime, and (c) neutral questions. If the subject reacts more strongly to the relevant questions than to the control and neutral questions, then the examiner infers that the subject is lying. Id. at 13-17. There is much debate about the accuracy of control question tests in specific-incident investigations. Raskin, Does Science Support Polygraph Testing, in the Polygraph Test, 98-99.

The concealed information test focuses on the fact that only the person involved in the crime could know the answers to certain questions. The examiner presents a series of multiple choice questions concerning the crime

while the polygraph machine records the subject's physiological activities. If the subject has relatively strong physiological reactions to the correct alternatives, then the examiner infers that the subject is attempting to conceal information about the crime. Id. at 102. The concealed information test assumes that information about the crime is protected, but in fact police often inform all suspects and even the media about the crime. Id.

B. The Polygraph is Based on Questionable Assumptions

Lie detection is based on four assumptions: (1) that individuals cannot control their physiologies and behavior, (2) that specific emotions can be triggered by specific stimuli, (3) that there are specific relationships between the different aspects of behavior (such as what people say, how they behave, and how they respond physiologically), and (4) that there are no differences among people, so that most people will respond similarly.

The assumption that individuals cannot control their physiologies is subject to serious debate. Some theorists argue that individuals can learn to control their physiological responses and that by producing physiological responses at opportune times during the polygraph test these people could portray themselves as truthful when they are not. Ney, Expressing Emotions and Controlling Feelings at 67 ("Jet-fighter pilots learn to control their emotions (and therefore their physiology) in order to operate with maximum efficiency under extreme physical and psychological stress.") These techniques for fooling the polygraph are called countermeasures. Gudjonsson, How to Defeat the Polygraph Tests in the Polygraph Test, 126. Little research has been done on the effectiveness of countermeasures in reducing detection of lies, but the results of research that has been done, while conflicting, indicate that countermeasures can be effective. OTA Memorandum at 100-01; Gudjonsson, How to Defeat the Polygraph Tests at 135 (concluding that use of physical countermeasures (e.g., pressing toes to floor) is effective when the subject has been trained in countermeasures).[3]

Another assumption underlying the polygraph is that specific emotions will be triggered by the act of lying. Some theorists, however, do not believe that emotions are automatically triggered by the presence of such specific stimuli. These theorists see a more indirect causal chain between stimuli and emotion: a person is presented with stimuli, then appraises it, and only then reacts with an emotion, which is based on the person's cognitive appraisal of the stimuli.[4] According to this theory, people can adjust their thinking to "reappraise" the stressful stimuli and create a different emotional reaction than one might expect. Ney, Expressing Emotions and Controlling Feelings 68 ("tell the truth and think of something painful and the truth may appear on the polygraph as a lie").[5] Of course, there would be no way for an examiner to determine how the subject is appraising the stimuli in his mind.

The third assumption underlying the polygraph is that there are set patterns of physiological responses that reflect dishonesty: changed blood pressure, heart rate, respiration, and perspiration. There is controversy over this proposition in the scientific community. Id. at 70; H.R. Hearing at 51 (statement of John F. Beary, III, M.D.) ("there is no Pinocchio

response. If you lie your nose does not grow a half inch longer or some other unique bodily response.")

The fourth assumption underlying the lie detector is that people can be expected to respond to similar stimuli in similar ways. Some researchers maintain, however, that individuals do not respond to stress similarly and that no one index can be used to measure emotions in different individuals. Ney, Expressing Emotions and Controlling Feelings at 71-72; Gudjonsson, How to Defeat the Polygraph Tests 135.

C. Appellant's Statistics Are Misleading

Piccinonna claims that "the relevant scientific community"[6] estimates the accuracy of the polygraph to be in the upper-eighty to mid-ninety percent range. Appellant's En Banc Brief at 9. This figure is misleading and subject to serious dispute. The polygraph must do two things: correctly identify liars and correctly identify those who are telling the truth.[7] Employee Polygraph Protection Act: Hearing on S. 185 Before the Senate Committee on Labor and Human Resources, 100th Cong., 1st Sess. (Appendix to statement of John F. Beary, III, M.D. ( (1988) [Hereinafter "S. Hearing"]. No single figure, therefore, can fully express the accuracy of the polygraph. The Office of Technology Assessment compiled the results of six prior reviews of polygraph research, ten field studies, and fourteen analog studies that the Office of Technology Assessment determined met minimum scientific standards. All of the studies used the control question technique in specific-incident criminal investigation settings. The results were as follows:

Six prior reviews of field studies:

- average accuracy ranged from 64 to 98 percent.

Ten individual field studies:

- correct guilty detections ranged from 70.6 to 98.6 percent and averaged 86.3 percent;

- correct innocent detections ranged from 12.5 to 94.1 percent and averaged 76 percent;

- false positive rate (innocent persons found deceptive) ranged from 0 to 75 percent and averaged 19.1 percent; and

- false negative rate (guilty persons found nondeceptive) ranged from 0 to 29.4 percent and averaged 10.2 percent.

Fourteen individual analog studies:

- correct guilty detections ranged from 35.4 to 100 percent and averaged 63.7 percent;

- correct innocent detections ranged from 32 to 91 percent and averaged 57.9 percent;

- false positives ranged from 2 to 50.7 percent and averaged 14.1 percent; and

- false negatives ranged from 0 to 28.7 percent and averaged 10.4 percent.

OTA Memorandum at 97. Note that because the question "Is the subject lying?" is a yes or no question, a random method of answering the question (e.g., a coin toss) would be correct 50% of the time. The Memorandum concluded:

> The wide variability of results from both prior research reviews and [The Office of Technology Assessment's] own review of individual studies makes it impossible to determine a specific overall quantitative measure of polygraph validity. The preponderance of research evidence does indicate that, when the control question technique is used in specific-incident criminal investigation, the polygraph detects deception at a rate better than chance, but with error rates that could be considered significant.

Id.

D. Extrinsic Factors Affect Accuracy

A number of extrinsic factors affect polygraph validity. Most important, because the examiner must formulate the questions, supplement the data with his own impression of the subject during the exam, and infer lies from a combination of the data and his impressions, the level of skill and training of the examiner will affect the reliability of the results. S. Rep. No. 284, 100th Cong., 2nd Sess. 42, reprinted in 1988 U.S. Code Cong. & Admin. News 726, 729 [hereinafter Senate Report]; Barland, The Polygraph in the USA and Elsewhere in The Polygraph Test 82. Unfortunately, there are no uniform standards for the training of polygraph examiners in this country. Senate Report at 43, U.S. Code Cong. & Admin. News at 731; S. Hearing at 27 (statement of Mr. William J. Scheve, Jr., American Polygraph Association); see Barland, The Polygraph in the USA and Elsewhere at 75 (the American Polygraph Association has accredited over 30 polygraph schools with courses ranging from seven to fourteen weeks).

A quality control system that reviews the examiners' conclusions also affects the validity of polygraph results. The results of most federally administered polygraph exams are checked by quality control officers, who call for reexaminations if the data does not indicate that the examiner's conclusion was correct. Barland, The Polygraph in the USA and Elsewhere 87. Few police examiners work within such a system, and almost no private examiners have quality control. Id. at 82.

The length of a polygraph exam will also affect the validity of the results. One advocate of the polygraph has stated that an expert polygraph exam would take a minimum of several hours to complete. Senate Report at 43, 1988 U.S. Code Cong. and Admin. News at 730-31.

## II. POLYGRAPH TESTS SHOULD BE EXCLUDED UNDER THE FEDERAL RULES OF EVIDENCE

Under Federal Rule of Evidence 702, expert testimony is proper if the testimony would assist the trier of fact in analyzing the evidence. Fed. R. Evid. 702 advisory committee's note (West 1989). Because the polygraph can predict whether a person is lying with accuracy that is only slightly greater than chance, it will be of little help to the trier of fact. Moreover, this slight helpfulness must be weighed against the dangers of unfair prejudice, confusion of the issues and waste of time. Fed. R. Evid. 403. The Ninth Circuit has found that polygraph evidence has an overwhelming potential for prejudicing the jury. Brown v. Darcy, 783 F.2d 1389, 1396 (9th Cir. 1986) (citing United States v. Alexander, 526 F.2d 161, 168 (8th Cir. 1975); see also, Gianelli, the Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later, 80 Colum. L. Rev. 1197, 1237 (1980) ("The major danger of scientific evidence is its potential to mislead the jury; an aura of scientific infallibility may shroud the evidence and thus lead the jury to accept it without critical scrutiny.") The Brown court determined that unstipulated polygraph evidence is inadmissible under both Rule 702 and Rule 403. Brown, 783 F.2d at 1396 n. 13. The polygraph presents itself as being very scientific. For instance, it is said to measure "galvanic skin response," Appellant's En Banc Brief at 10, which merely means that it measures how much a person perspires. Bull, What is the Lie-Detection Test? at 11. This scientific aura tends to cloud the fact that the machine's accuracy at detecting lies is little better than chance. Brown, 783 F.2d at 1396 (quoting Alexander, 526 F.2d at 168); OTA Memorandum at 97.

The Ninth Circuit also found that admission of polygraph evidence had the potential of confusing the issues and wasting time. Id. at 1397; see Fed. R. Evid. 403. In the Brown case, for instance, the polygraph evidence consumed one fourth of the entire trial. Brown, 783 F.2d at 1397 (two full days of an eight-day trial). Because polygraph evidence is of little help to the trier of fact, and has great potential for prejudicing the trier of fact, confusing the issues and wasting time, it should be excluded under Federal Rule of Evidence 403.

The danger of prejudice, confusion of the issues and wasting time should also prevent courts from admitting polygraph evidence under Rule 608 for purposes of impeaching a witness. As the Court's opinion correctly states, all offers of polygraph evidence should be analyzed in light of Rule 403. Cf. United States v. Miller, 874 F.2d 1255, 1261 (9th Cir. 1989) (even when offered for a limited purpose, polygraph evidence must go through a Rule 403 analysis). To hold that polygraph evidence is admissible under Rule 608 would create too large an exception to the rule barring polygraph evidence generally, and polygraph test results would wind up being admitted into evidence in most cases. Moreover, there is nothing special about the Rule 608 impeachment procedure that lessens the dangers of prejudice and confusion of the issues. Cf. United States v. Toney, 615 F.2d 277 (5th Cir. 1980) ("Rule 403 is a general rule, 'designed as a guide for the handling of situations for which no specific rules have been formulated.'")

## III. CONCLUSION

The scientific community remains sharply divided over the issue of the validity of polygraph exams. Although presented as a rigorously "scientific" procedure, the polygraph test in fact relies upon a highly subjective, inexact correlation of physiological factors having only a debatable relationship to dishonesty as such. The device detects lies at a rate only somewhat better than chance. Polygraph evidence, therefore, should not be admissible under Rule 702 or under Rule 608 to impeach a witness.

In this case, the government did not stipulate to the admissibility of the defendant's polygraph evidence and did not participate in selection of the examiner or the determination of the circumstances of the test. I would therefore AFFIRM the judgement below.

Notes

[1] If the parties wish to alter the applicability of Rules 403 and 702 in their case, they should be able to do so by advance stipulation, as long as they do not interfere with any third party's interests or the adjudicatory role of the courts. See Wigmore on Evidence sec. 7a (P. Tillers rev. 1983). But see id. at 602 n. 35 (courts generally hold polygraph results inadmissible even where there is a stipulation). Because such a stipulation would alter the applicability of rules of evidence, however, the trial judge has the discretion to reject the parties' proposed stipulation. The trial judge has broad discretion on questions of the admissibility of evidence and should not be reversed unless there is a clear abuse of discretion. United States v. Borders, 693 F.2d 1318, 1324 (11th Cir. 1982); Scheib v. Williams-McWilliams Co., 628 F.2d 509, 511 (5th Cir. 1980).

[2] The Employee Polygraph Protection Act prohibits the use of polygraphs in pre-employment screening and sharply curtails the permissible uses of the polygraph in specific-incident investigations. 29 U.S.C.A. sections 2002, 2006 to 2007 (West. Supp. 1989).

[3] In order to fool the control question test, the subject must enhance his physiological reactions to neutral questions, and/or decrease his physiological reactions to relevant questions. Inducing physical pain or muscle tension during non-relevant questions can reduce the difference between physiological responses to relevant and neutral questions. One study found that pressing one's toes against the floor during neutral questions reduced the detection of lies from 75% to 10%. Gudjonsson, How to Defeat the Polygraph Test, at 129 (citing Kubis, Studies in Lie Detection: Computer Feasibility Considerations (Technical Report 62-205, prepared for Air Force Systems Command) (1962)). A competing study concluded that such countermeasures caused no reduction in detection of lies. Id. (citing More, Polygraph Research and the University, 14 Law and Order 70-78 (1966)). The Office of Technology Assessment reviewed the available research on this issue in 1983 and concluded that counter-measures can be effective and that further research in the area is necessary to prevent persons engaged in illicit activities from creating "false negatives" on polygraph exams and, in this way, clearing themselves of any suspicion. OTA Memorandum at 100-01 ("The

possible effects of countermeasures are particularly significant to the extent that the polygraph is used and relied on for national security purposes ... [T]hose individuals who the Federal Government would most want to detect (e.g., for national security violations] may well be the most motivated and perhaps the best trained to avoid detection.')

[4] This is Lazarus' cognitive appraisal theory of emotion. See Ney, Expressing Emotions and Controlling Feelings at 68 (citing Lazarus, Coyne, and Folkman, Cognition, Emotion and Motivation; The Doctoring of Humpty-Dumpty, in Approaches to Emotion (K. Scherer and P. Ekman, eds. 1984)).

[5] Even when the subject is not employing countermeasures, cognitive appraisal seems to affect the results of tests where the subject is accused of a nebulous crime or where the sole issue is criminal intent. In these cases, the issue is not as distinct as in cases where the subject is accused of a physical act. The issue calls for an interpretation, which may be subject to distortion or rationalization in the defendant's mind. Barland, the Polygraph Test in the U.S.A. and Elsewhere in The Polygraph Test 83-84. In the instant case, the defendant is accused of knowingly telling a falsehood when he denied knowledge of an agreement among south Florida garbage companies. The defendant could have rationalized his answers to questions on such ambiguous issues, and avoided an emotional and a physiological response to the questions.

[6] Piccinonna claims that the "relevant scientific community" is "those who have done research on the techniques and/or have had training or experience in the techniques [of polygraph testing] ..." Appellant's En Banc Brief at 9. The Office of Technology Assessment has stated, however, that "Basic polygraph research should consider the latest research from the fields of psychology, physiology, psychiatry, neuroscience, and medicine" in order to develop a stronger theoretical base for the polygraph. OTA Memorandum at 6. It is reasonable to argue, therefore, that experts from these fields are competent to comment on the validity of polygraph testing. Gianelli, The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later, 80 Colum. L. Rev. 1197, 1210 (1980) ("'The purpose of the Frye test is defeated by an approach which allows a court to ignore the informed opinions of a substantial segment of the scientific community which standards in opposition to the process in question.'" (quoting Reed v. State, 283 Md. 374, 399, 391 A.2d 364, 377 (1975))). Congress has recognized that the community of experts competent to testify on the polygraph reaches beyond polygraph examiners and their proponents. For example, Dr. John F. Beary III appeared on behalf of the American Medical Association before the House Education and Labor Committee and the Senate Committee on Labor and Human Resources to oppose the use of polygraphs in the workplace. H.R. Hearing at 51; S. Hearing at 16.

[7] For example, a polygraph examiner who accused every subject of lying would be 100% accurate at detecting liars. His accuracy at detecting those who are truthful, however, would be unacceptably low.

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# METHODOLOGICAL CONSIDERATIONS AFFECTING THE UTILITY OF INCORPORATING INNOCENT SUBJECTS INTO THE DESIGN OF GUILTY KNOWLEDGE POLYGRAPH EXPERIMENTS

By

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ABSTRACT

The purpose of this study was to determine whether or not innocent parties who are given the guilty knowledge polygraph test are incorrectly diagnosed as guilty at chance levels as theorized in the literature. The first phase of the study compared the reported distribution of scores attained by innocent subjects in earlier studies to the values expected by chance. It was found that significantly fewer ($p<.0001$) false positives were reported in these studies than predicted by the probability model. The second phase consisted of a guilty knowledge polygraph experiment which included 54 innocent subjects. The false positive rate for those subjects did conform to chance expectancies. Possible explanations and implications of the findings were noted.

This article examines the methodological considerations affecting the utility of incorporating innocent subjects into the design of guilty knowledge (concealed information) polygraph experiments. The guilty knowledge technique is a procedure which appears to be useful for determining whether suspects are attempting to conceal their prior involvement in given crimes. It is based on the premise that guilty people will know certain facts related to their crime that are unknown to innocent parties. The questioning format used during the polygraph testing consists of asking several different question series, each containing one relevant and several presumably equally plausible irrelevant alternatives (e.g., Did you steal a: 1) ring, 2) lighter, etc.). It is believed that guilty suspects will: a) recognize the relevant alternatives, b) attribute greater meaning to those alternatives than to the irrelevant alternatives, and c) in certain instances be

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concerned that their physiological responses to those relevant alternatives might result in their being detected. Conversely, it has been presumed (e.g., Lykken, 1983: 299; Timm, 1982b) that if a guilty knowledge test is well constructed innocent suspects will both attribute greater meaning to the relevant alternatives, and subsequently have their strongest physiological responses to them, at only chance level.

While most guilty knowledge studies have included innocent subjects, studies conducted by Timm (1982a, 1985) and Mullins and Timm (1984) have omitted them, using instead values derived from the theoretical probability distributions associated with innocent subjects. The utilization of innocent subjects in guilty knowledge polygraph experiments results in either an added burden for investigators (time, effort, and financial expense), assuming that it leads to an increase in the total number of subjects tested; or in lowering the power of the statistical procedures which are used to test the hypotheses if the total number of subjects is kept the same. It appears that in certain situations, however, investigators might be justified in omitting innocent subject conditions from the design of their experiments.

Those situations which appear to give investigators the best rationale for not testing innocent subjects include: 1) when the tasks to be completed by the guilty subjects are assigned at random, as opposed to all guilty subjects being exposed to the same information, and 2) when the primary focus of the experiment relates to matters which are particularly germane to guilty parties, such as in certain countermeasure studies. Other factors which might be important to consider when making this decision are: a) whether, given the procedures to be employed, there is reason to believe that habituation might significantly affect the results attained by innocent subjects; and b) whether there is reason to believe that either the questions utilized or the order of their presentation might systematically affect the innocent subjects' scores.

While it is alluring to omit innocent subjects in the aforementioned situations and to rely instead upon the probability distributions, this approach has not been fully accepted (e.g., U.S. Congress, Office of Technology Assessment, 1983: 75). To more fully understand the appropriateness of this approach, the first phase of this study compares the reported distribution of scores attained by innocent subjects in prior studies to those values one might theoretically expect to have occurred based upon probability models. The second phase consists of a separate experiment which examines the guilty knowledge scores attained by innocent subjects using the same mock crime situation used by Timm (1982b, 1985) and Mullins and Timm (1984).

## ANALYSIS OF SCORES REPORTED IN PRIOR STUDIES

A review of the literature disclosed 11 guilty knowledge studies possessing the following characteristics: a) innocent subjects were included; b) the scoring system used to score the responses either involved Lykken's (1959) method in which the relevant alternative in each question series is scored 2 if it evoked the greatest physiological response within that series, a 1 if it elicited the second highest response, or 0 if it resulted in a third or higher ranked response; or the scoring system that was used

awarded a 1 if the relevant alternative yielded the greatest response and 0's for all others; c) it utilized either a mock crime or code word paradigm; and d) the number of questions that were scored remained constant for all of the subjects included in that study.

In each of the studies selected the individual scores the subjects received for each question series were added together. In addition, the researcher selected a cut-off point at which subjects were classified as either appearing to be innocent or guilty depending upon the value of their composite guilty knowledge score.

The expected proportion of innocent subjects that would receive each of the possible guilty knowledge scores can be calculated if one assumes that either the selection of the relevant alternatives or the largest physiological responses the innocent subjects have within each question series occurs at random. When the scoring system awards either a 1 or 0, it is assumed that the scores will follow a binomial distribution. The formula for calculating binomial distributions is presented in many introductory statistics books (e.g., Walpole, 1974: 81). When the Lykken scoring system is used, it is believed that the expected values will follow a multinomial distribution. The procedure for calculating the distribution of random scores when the Lykken method is used is presented in Appendix A.

The expected and reported percentages of innocent subjects misclassified as guilty in the 11 studies are presented in Table 1. Only the studies reported by Waid, Orne, and their colleagues reported instances where the observed values actually exceeded the expected values, as opposed to that occurring by chance in about half of the studies. To examine whether the apparent difference between the reported and expected values was statistically significant, two Chi-square tests for goodness of fit were conducted. To avoid violating the Chi-square restrictions described by Siegel (1956: 46) which pertain to small expected frequencies, the separate trials and experiments were collapsed into seven groups. A separate category was established for each senior author, with the exceptions of Podlesney and Stern whose expected and observed values were combined. The first Chi-square, which omitted the Waid studies, indicated the difference was significant, $X^2$ ($\underline{df}$ = 5) = 28.0, $p$ = .0000; as did the second analysis including the Waid studies, $X^2$ ($\underline{df}$ = 6) = 28.2, $p$ = .0001.

## Method

As previously noted, the second phase of this study consists of an experiment which examines the guilty knowledge scores attained by innocent subjects when the same mock crime situation used by Timm (1982B, 1985) and Mullins and Timm (1984) is employed.

### Selection of Subjects

The selections consisted of 61 volunteers enrolled in a security administration class at a large Midwestern university during the Spring 1985 semester. Prior to volunteering for the experiment, the subjects were informed of the purpose and design of this study and told that the number of

Table 1
The Expected and Reported Percentages of Innocent Subjects Misclassified as Guilty by Study

| Study | No. Tests | No. alternatives[1] | Guilty cut-off point | Innocent N | Percent misclassified expected | Percent misclassified reported |
|---|---|---|---|---|---|---|
| Balloun & Holmes (1979) Trial 1 | 5 | 4 | 6+[2] | 16 | 17.7%[3] | 12.0% |
| Balloun & Holmes (1979) Trial 2 | 5 | 4 | 6+[2] | 16 | 17.7%[3] | 6.0% |
| Bradley & Ainsworth (1984) | 9 | 4 | 8+[4] | 8 | 37.4% | 0.0% |
| Bradley & Janisse (1981) | 4 | 5 | 4+ | 96 | 24.6% | 11.5% |
| Bradley & Warfield (1984) | 10 | 4 | 11+ | 8 | 12.9% | 0.0% |
| Davidson (1968) | 6 | 4 | 7+ | 36 | 16.5% | 0.0% |
| Giesen & Rollison (1980) | 6 | 4 | 6+ | 20 | 30.7% | 0.0% |
| Lykken (1959) Theft | 6 | $\underline{M}$ = 5.0[5] | 7+ | 24 | 7.7% [6] | 0.0% |
| Lykken (1959) Murder | 6 | $\underline{M}$ = 4.7[5] | 7+ | 24 | 7.7%[6] | 0.0% |
| Podlesny & Raskin (1978) | 5 | 5 | 6+ | 10 | 9.2% | 0.0% |
| Stern et al.(1981) | 6 | 4 | 7+ | 26 | 16.5% | 11.5% |
| Waid & Orne(1980) | 24 | 4 | 8+ | 10 | 12.3% | 10.0% |
| Waid et al.(1980) Exp. 1 | 10 | 4 | 3+ | 11 | 22.4% | 27.3% |
| Waid et al.(1980) Exp. 2 | 25 | 4 | 7+ | 10 | 27.4% | 10.0% |
| Waid et al.(1980) Exp. 3 | 20 | 6 | 6+ | 15 | 3.7% | 20.0% |
| Waid et al.(1979) | 24 | 4 | 7+ | 15 | 23.4% | 6.7% |

Notes:

[1] Excluding buffer questions

[2] Actual cut-off point used was 5.5

[3] based on a cut-off point of 6+

[4] cut-off point selected post facto to eliminate misclassification of innocent subjects

[5] the number of alternatives within question series varied

[6] based on 5 alternatives for each question series

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extra credit points they would receive for participating would be determined by objectively scoring their lie detector charts. If their responses on the polygraph test indicated they were guilty (regardless of whether or not they were innocent), they were to receive only 1.5% extra credit in the class. However, if their responses indicated they were innocent they were to be awarded 3% extra credit.

The subjects included 47 males and 14 females. Six volunteers were originally assigned to the guilty treatment group. However, one of the six guilty subjects and four out of 60 innocent subjects failed to complete the experiment. The ages of the subjects who completed the experiment ranged from 20 to 42 ($M$ = 22.34; $SD$ = 3.885).

Apparatus

A Stoelting field polygraph (Model #122656) was used to record both the respiration and the skin resistance responses (SRR) of the subjects. Respiration was recorded using a pneumatic tube positioned around the subject's thoracic area. The SRR was recorded from two stainless steel electrodes attached to the volar surfaces of the first and third fingers of the subject's right hand. All SRR recordings were made with the instrument in the automatic centering mode.

The instrument used to objectively score respiration responses was a Tektronix Digitizer (Model #4552) interfaced with Tektronix micro computer (Model #4051) programmed to measure the curvilinear distances between two points on a sheet of paper.

Mock Murder Procedure

All subjects assigned to the Guilty group reported individually to a room where they were to commit their mock murder. When they arrived they met with a research assistant who worked independently of the polygraph examiner. Subjects were first shown a mock murder contract, which specified: a) they were to shoot a policeman; b) their victim's name was Henry Clark; c) they should fire five shots at him; d) a Miami mafia family was

hiring them; and e) they would be paid $40,000 for shooting the victim. A picture of the intended victim also appear on the contract.

The assistant showed each of the guilty subjects the same set of six slides. All of these slides were of the same uniformed police officer who was displayed in their mock murder contract.

The slides were shown on a white paper screen situated directly in front of a bullet stopping device. the subject was given a loaded pellet gun closely resembling a real .38 caliber revolver. The subject was told to stand on a spot on the side of the screen, which was close enough to ensure that each shot would strike the intended victim's image. Before shooting, the subject was required to say "Henry Clark I am shooting you for betraying the Miami branch of the Mafia". After the subject was instructed to shoot and had fired at the victim five times, the assistant counted out the appropriate amount of play money and handed it to the subject who was then also required to count the money. Within two days after committing their mock murders, subjects in the guilty condition were given their polygraph test.

Subjects assigned to the innocent group were called by the same assistant who was in charge of supervising the mock murder. They were told which group they were assigned to, reminded of the design and extra credit arrangement, and told that if they informed the polygraph examiner that they were assigned to the innocent group they would be disqualified from the study.

Polygraph Testing

All subjects reported individually to the polygraph testing room. The subjects met with the polygraph examiner who was unaware of both the details of the mock murder committed and the treatment condition to which the subjects had been assigned.

Each of the subjects was given a description of the equipment and the procedure that was to be used. Next, the polygraph test was administered, which consisted of five different sections. Each section began with a brief, informative statement indicating that the questions would pertain to one of the following areas: the victim's occupation, the victim's name, the location of the Mafia organization paying for the assassination, and the amount of money paid. Six questions relating to the mock crime were contained in each section.

The following questions series comprised one of the test sections and illustrates the question format:

During the following series of questions you will be asked about the victim's occupation. Are you ready to begin?

1. Was the image you shot a doorman?

2. Was the image you shot a fireman?

3. Was the image you shot a soldier?

4. Was the image you shot a surgeon?

5. Was the image you shot a priest?

6. Was the image you shot a policeman?

The first question in each series was not scored. Those questions were included to buffer subjects' responses to the introduction of a new question series.

Prior to testing, subjects were asked to close their eyes and face forward without moving while responding to the questions. The subjects were also instructed to respond "no" to each question asked during the test, except to those questions when they were asked if they were ready to begin the new test series. Those questions were included to make sure the subjects paid attention to the content of the questions.

To increase the standardization of the questioning procedure, the questions were tape recorded. Questions were asked at fifteen second intervals with twenty second intervals between test series.

After the testing the attachments were removed. Subjects were thanked and informed they would be told later in the term how many extra-credit points they would receive. No subjects were permitted to see their charts or to find out how many points they had received until all subjects had been tested, since feedback to other volunteers might have contaminated the study.

Objective Scoring Procedures

The charts were analyzed by objectively scoring respiration, SRR amplitude, and SRR maximum height. With the field polygraph used, a rising SRR pattern on the polygraph chart indicated less electrical resistance, suggesting an emotional and/or cognitive reaction. In order to score both the respiration and the SRR responses, it was necessary to correct for the tangent errors, which resulted from the use of fixed length pivoting polygraph pens. This was accomplished by making a tracing of the semicircle path of travel of the polygraph pen when the chart paper was stationary. This tracing was then placed over the polygraph chart and aligned with each question marker tick at the top of the chart. A line was then drawn intersecting the points on the SRR and respiration patterns where the constructed tangent error templates crossed them.

Respiration patterns were scored by measuring the curvilinear length of the pattern recorded by the polygraph respiration pen beginning when each question was asked and ending 15 seconds later. The respiration patterns corresponding to the five questions in each test were ranked from 1 to 5. The respiration patterns were traced with a Tektronix Digitizer and assigned a value that corresponded to their total length. Since breathing suppression is believed to be associated with deception (Timm, 1982a), the shortest

length of respiration was assigned a value of 1. The other four responses were then ranked from 2 to 5, using the same criteria.

The SRR amplitude was scored by measuring the vertical rise of the largest wave occurring between the onset of the stimulus question and 15 seconds henceforth. The length of the vertical rise was measured from its lowest point before the wave began a positive slope to the highest point it reached within the fifteen second period. When no positive SRR rise on the chart occurred during the fifteen-second intervals, those responses were assigned equal ranks, which denoted the smallest measurements. Therefore, if only one nonresponse occurred among the five, it was assigned a rank of 5; if two occurred, they were both given the rank of 4.5; if three occurred, all three were ranked 4; and so on.

SRR maximum height was also objectively determined. This was accomplished by measuring the highest point the patterns reached on the chart during the fifteen second interval. This was determined by measuring the length in millimeters of a vertical line drawn from the highest point reached by the pen (during each time interval) to the bottom of the chart paper. The SRR maximum height values for the five questions associated with each test were determined by ranking them from 1 (largest value) to 5 (smallest value).

## Results

The accuracy of the polygraph based decisions in this experiment was analyzed using the scoring procedure developed by Lykken (1959). If the dependent variable associated with the critical items (questions on the polygraph test specifying the options actually involved in the guilty subjects' mock murder) was ranked "one" (most indicative of deception), it was given a score of two on that test. If the dependent variable associated with the critical item was ranked "two', it was given a score of 1. After summing the scores on the five polygraph tests, a perfect score for each of the dependant variables was 10.

The five guilty subjects had significantly higher guilty knowledge scores than the 56 innocent subjects based on the values derived from their respiration patterns ($\bar{M}i = 3.14$, $\bar{M}g = 5.20$; $t = 2.46$, $p = .009$); their SRR amplitude responses ($\bar{M}i = 3.07$, $\bar{M}g = 6.00$; $t = 3.19$, $p = .001$); and their SRR height measures ($\bar{M}i = 2.77$, $\bar{M}g = 5.60$; $t = 3.25$, $p = .001$). If subjects who had guilty knowledge scores of 5 or more were classified as guilty, 4 out of the 5 guilty and 34 out of the 56 innocent subjects would have been correctly classified based solely on respiration, 5 of the guilty and 33 of the innocent would have been correctly classified based upon SRR amplitude, and 4 out of the 5 guilty and 34 out of the 56 innocent correctly classified based solely upon SRR height.

The degree of association between the guilty knowledge scores attained by the innocent subjects was calculated for the three dependent measures. The value comparing: respiration with SRR amplitude was $r = .12$, $p = .19$; SRR amplitude with SRR height was $r = .78$, $p = .000$; and respiration with SRR height was $r = .11$, $p = .21$. Given the relatively low degree of association between respiration and SRR amplitude, as well as their fairly high

levels of detection efficiency, it appears justifiable to add those two values together. After doing so, and classifying subjects with a composite guilty knowledge score of 10 or more as guilty, 5 out of the 5 guilty and 48 out of the 56 innocent subjects were correctly classified.

The expected and observed percentages of innocent subjects attaining each of the possible guilty knowledge scores in this study are presented in Table 2. Chi-square tests for goodness of fit were calculated comparing the expected and observed values for the score categories 0 through 6, plus 7 and over. The Chi-square value (df = 7) for the scores associated with: respiration was $X^2 = .70$, $p = .99$; SRR amplitude was $X^2 = 9.15$, $p = .24$; and SRR height was $X^2 = 4.65$, $p = .70$. Therefore, the scores attained by the innocent subjects in this study appear to conform rather well to the chance expectancy model.

Table 2
The Expected and Observed Guilty Knowledge Score Values for Innocent Subjects in the Present Study

| | Expected | Observed % | | |
|---|---|---|---|---|
| Score | % | Respiration | SRR Amplitude | SRR Height |
| 0 | 7.8 | 7.1 | 7.1 | 10.7 |
| 1 | 13.0 | 12.5 | 12.5 | 17.9 |
| 2 | 21.6 | 17.9 | 30.4 | 21.4 |
| 3 | 20.2 | 21.4 | 14.3 | 17.9 |
| 4 | 17.8 | 19.6 | 12.5 | 10.7 |
| 5 | 10.6 | 10.7 | 8.9 | 14.3 |
| 6 | 6.0 | 7.1 | 5.4 | 3.6 |
| 7 | 2.2 | 1.8 | 7.1 | 1.8 |
| 8 | .8 | 1.8 | 1.8 | 1.8 |
| 9 | .2 | 0 | 0 | 0 |
| 10 | .0 | 0 | 0 | 0 |
| 5+[1] | 19.7 | 21.4 | 23.2 | 21.5 |
| 6+[2] | 9.2 | 10.7 | 14.3 | 7.2 |

Note. N = 56
[1] values for all scores 5 or more
[2] values for all scores 6 or more

Since guilty knowledge scores of 2 and 1 were assigned within every question series and each question series include 5 questions, the average guilty knowledge score per question is .6. To determine whether the observed mean guilty knowledge values for the 5 different alternatives within each question series were equal across the innocent subjects, a repeated measures MANOVA procedure (S = 1, M = 1, N = 25) was employed. The means and the level of statistical significance associated with the hypothesis that all five of the group centroids are equal are presented in Table 3. The differences in the means appear to be the most dramatic on the first and third test, which pertained to the victim's occupation and the number of shots fired, respectively. In addition, despite the use of buffer questions, order of presentation effects appear to be particularly pronounced on the first question series.

Table 3
Mean Guilty Knowledge Scores for Each Alternative Based on Respiration, SRR Amplitude and SRR Height

| Question Series | Alternative | | | | | Level of Significance |
|---|---|---|---|---|---|---|
| | First | Second | Third | Fourth | Fifth | |
| | | | Respiration | | | |
| 1 | .375 | .554 | .482 | .750 | .839* | .044 |
| 2 | .500 | .661 | .625 | .554* | .661 | .832 |
| 3 | .321 | .714 | .696 | .589* | .679 | .047 |
| 4 | .339 | .517* | .661 | .768 | .732 | .039 |
| 5 | .607 | .607 | .643 | .571 | .571 | .994 |
| | | | SRR Amplitude | | | |
| 1 | .929 | .696 | .589 | .339 | .446* | .006 |
| 2 | .661 | .607 | .679 | .500* | .571 | .811 |
| 3 | .786 | .357 | .643 | .696* | .536 | .036 |
| 4 | .500 | .679* | .607 | .643 | .571 | .843 |
| 5 | .750 | .589 | .750* | .500 | .439 | .200 |
| | | | SRR Height | | | |
| 1 | 1.250 | .786 | .500 | .143 | .321* | .000 |
| 2 | .804 | .696 | .363 | .518* | .518 | .283 |
| 3 | .786 | .321 | .643 | .643* | .607 | .042 |
| 4 | .446 | .554* | .661 | .750 | .607 | .424 |
| 5 | .786 | .589 | .732* | .554 | .339 | .077 |

Note. The mean value across each question series is .6.
[1] Based upon a repeated measures MANOVA comparing the means across each question series (S = 1, M = 1, N = 25).
* Relevant alternatives

## Discussion

The most puzzling finding associated with this study was the low rate of innocent subject misclassification reported by most of the other studies which have been conducted in this area. Assuming that researchers were not "screening out" what they might have perceived as "bad" cases or journal reviewers/editors "screening out" studies which failed to report accuracy levels as high as those reported in the initial studies, the most plausible explanations for the occurrence of this phenomenon appear to involve certain procedural issues. For example, if the innocent subjects' responses habituated to the point where the researchers were unable to rank them within the question series and gave them all an average ranks of three, no guilty knowledge points would be awarded for those series. Another explanation is that the researchers took into consideration the potential order effects, as well as how responsive their subjects might be to the different alternatives, then chose the least response provoking alternatives as their relevant items.

While only five of the subjects were guilty in this study, their guilty knowledge scores appear consistent with the values found for guilty subjects in the other studies which were based on a similar mock crime situation (i.e., Mullins & Timm, 1984; Timm, 1982b, 1985). As in those earlier studies and in Timm (1982a), respiration was found to be a useful measure for detecting prior involvement and/or knowledge, which may be in part due to the manner in which it was quantified. Given the fairly low degree of association found between the guilty knowledge scores based on SRR with those based on respiration, as well as the improved ability of the combined measure to discriminate between guilty and innocent subjects in the present study, this technique may prove to be a simple way of decreasing the number of false positives that occur in future polygraph studies.

In summary, these results appear to have both practical and theoretical implications. It was noted that utilizing innocent subjects in guilty knowledge polygraph experiments results in either an added burden for investigators (time, effort, and financial expense) or in lowering the power of the statistical procedures that are used to test the hypotheses if the total number of subjects is kept the same. It appears that in certain situations, however, investigators might be justified in omitting the innocent subjects from the design of their experiments.

As suggested earlier, those situations which appear to give investigators the best rationale for not testing innocent subjects include: 1) when the tasks to be completed by the guilty subjects are assigned at random, as opposed to all guilty subjects being exposed to the same information, and 2) when the primary focus of the experiment relates to matters which are particularly germane to guilty parties, such as in certain countermeasure studies. Other factors which might be important to consider when making this decision are: a) whether, given the procedures to be employed, there is reason to believe that habituation might significantly affect the results attained by innocent subjects; and b) whether there is reason to believe that either the questions utilized or the order of their presentation might systematically affect the innocent subjects' scores.

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## APPENDIX A

### Method for Determining the Probability Distribution for Guilty Knowledge Scores with Possible Question Series Values of 2, 1, or 0.

Step 1) Calculate the probability for having no guilty knowledge scores of zero during any of the question series (those subjects receiving only guilty knowledge scores of either 2 or 1 on each of the question series), one score of zero, ..., zeros on all question series. The formula for deriving each of these values is:

$$(P)^X \left(\frac{1-p}{2}\right)^{n-X}$$

where P = probability of having a score of zero on any one question series (e.g., .5 on a 4 option (excluding buffer question) guilty knowledge question series, .6 on a 5 option question series)

where n = number of question series administered

where X = number of zero scores received over the entire battery of question series

Step 2) Determine the different ways each of the different guilty knowledge scores could be attained and the number of possible permutations associated with each. The formula for calculating the number of permutations is:

$$\frac{N!}{X!Y!Z!}$$

where N = number of question series

where X = number of zeros

where Y + number of ones

where Z = number of twos

For example a guilty knowledge score of 9 on a 12 question series test could be achieved in the following ways:

| Total score | possible series scores | permutations |
|---|---|---|
| 9 | 222210000000 | $\frac{12!}{4!1!7!} = 3960$ |
| 9 | 222111000000 | $\frac{12!}{3!3!6!} = 18480$ |
| 9 | 221111100000 | $\frac{12!}{2!5!5!} = 1782$ |
| 9 | 211111110000 | $\frac{12!}{1!7!4!} = 3960$ |
| 9 | 111111111000 | $\frac{12!}{9!3!} = 220$ |

Step 3) For each of the different ways a given guilty knowledge score could be attained, multiple the number of permutations derived in step 2 by the appropriate probability value derived in step 1 (based on the number of zeros associated with that set of series scores). The sum of those values is the chance probability for someone attaining that particular score. For example, the chance probability of someone receiving a guilty knowledge score of exactly 9 on a four item guilty knowledge test is 3960.

$$(.5)^7(.25)^5 + 18480\ (.5)^6(.25)^6 + 1782(.5)^5(.25)^7 + 3960(.5)^4(.25)^8 + 220(.5)^3(.25)^9 = .108 \text{ or } 10.8\%$$

## Innocent Subjects' Polygraph Results

### Score Distribution for 9 Tests

$P_0 = 0.50,\ P_1 = 0.25,\ P_2 = 0.25)$

| SCORE | PROBABILITY |
|---|---|
| 0 | 0.001953125 |
| 1 | 0.008789063 |
| 2 | 0.026367188 |
| 3 | 0.055664063 |
| 4 | 0.094482422 |
| 5 | 0.130737305 |
| 6 | 0.153808594 |
| 7 | 0.154357910 |
| 8 | 0.134651184 |
| 9 | 0.101810455 |
| 10 | 0.067325592 |
| 11 | 0.038589478 |
| 12 | 0.019226074 |
| 13 | 0.008171082 |
| 14 | 0.002952576 |
| 15 | 0.000869751 |
| 16 | 0.000205994 |
| 17 | 0.000034332 |
| 18 | 0.000003815 |

Mean = 6.75 Standard Deviation = $\sqrt{6.1875}$

Let $P_0$, $P_1$, $P_2$ be the probabilities that on a given test, the critical question will be assigned a score of 0, 1, 2 respectively. Let the random variables $N_0$, $N_1$, $N_2$ be the number of tests (out of the n total tests) which have a score of 0, 1, 2 assigned to the critical question. Then the joint distribution of the random variables $N_0$, $N_1$, $N_2$ is multinominal with

$$P[N_0=n_0, N_1=n_1, =N_2=2] = \begin{cases} \dfrac{n!}{n_0!n_1!n_2!} P_0^{n_0} P_1^{n_1} P_2^{n_2}, & \text{if } n=n_0+n_1+n_2 \\ 0, & \text{otherwise} \end{cases}$$

The score random variable is defined by

$$S = 2N_2 + N_1$$

and so

$$(*)\ P[S=s] = \sum_{\substack{n_0+n_1+n_2=n \\ n_1+2n_2=s}} \frac{n!}{n_0!n_1!n_2!} P_0^{n_0} P_1^{n_1} P_2^{n_2}$$

# VALIDITY OF THE POSITIVE CONTROL POLYGRAPH TEST: COMMENTS ON FORMAN AND MCCAULEY

By

Charles R. Honts and Lawrence N. Driscoll

Abstract

In 1986, Forman and McCauley reported a laboratory mock crime experiment where they contrasted the validity of the positive control, guilty knowledge, and control question detection of deception techniques. They concluded that the positive control was a superior technique and they made a strong case for enhanced generalizability of the results obtained with their field practice model over the results of other mock crime paradigms. We examined the Forman and McCauley claims and concluded that their field practice model has no claim to enhanced generalizability over other mock crime paradigms. Our analysis indicated that the Forman and McCauley results with the guilty knowledge and control question techniques were suspect since the Forman and McCauley raters achieved unusually low and unacceptable interrater reliabilities with techniques that are usually very reliable. Further analyses compared the Forman and McCauley results with the results of another experiment (Driscoll, Honts, & Jones, 1987) and it was concluded that the positive control test is not a superior detector of deception technique.

In a 1986 experiment Forman and McCauley tested the validity of three physiological detection of deception techniques, positive control, control question, and guilty knowledge, in a laboratory experiment. Forman and McCauley claimed that their "study using the field practice model offers a strong claim for external validity" (p. 695) indicating that they believe their results to be more strongly generalizable to field situations than other laboratory studies of the detection of deception. They reported that the three detection of deception techniques were of similar overall accuracy. However, they concluded that guilty knowledge technique was "biased toward judgements of innocence" (produced more false positive than false negative outcomes) and the positive control was "evenly balanced

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See Forman, R.F. and McCauley, C. (1986). Validity of the positive control polygraph test using the field practice model. Journal of Applied Psychology, 71, 691-698. See also, Driscoll, L.N., Honts, C.R. and Jones, D. (1987). The validity of the positive control physiological detection of deception technique. Journal of Police Science and Administration, 15(1), 46-50. The Forman article was republished in Polygraph, 16(2), 145-160. The Driscoll article was republished in Polygraph, 16(3), 218-225. Requests for reprints should be sent to Dr. Charles R. Honts, Research Division, DoD Polygraph Institute, Ft. McClellan, AL 36205.

between judgements of guilt and innocence" (p. 694). We have closely examined the Forman and McCauley logic, experiment, analysis, and data from another experiment on the validity of the positive control and control question techniques and find none of the above claims to be tenable.

Cook and Campbell (1979) define external validity as "the approximate validity with which conclusions are drawn about the generalizability of causal relationships to and across populations of persons, settings, and times" (p. 39). Cook and Campbell go on to indicate that the requirements for external validity are quite different depending upon the experimenter's desire to generalize to across populations, settings and times. Although it is not clear from their presentation, Forman and McCauley appear to want to generalize to the population of individuals who are suspects in criminal cases. With that target population and setting let us consider their arguments that they have enhanced the external validity of their experiment through the use of their field practice model.

Forman and McCauley discuss six points on which they base the argument that the field practice model enhances external validity. However, only three of those points actually deal with issues that may properly be called external validity issues. Forman and McCauley's other three points are more germane to a consideration of construct validity. Construct validity of causes or effects is also concerned with the problem of generalization but is defined as "the approximate validity with which we can make generalizations about higher-order constructs from research operations" (Cook & Campbell, 1979, p. 38). We will consider the external validity and construct validity issues separately.

The first external validity issue raised by Forman and McCauley concerns the population of subjects used as the sample for the experiment. Forman and McCauley used a population of higher socioeconomic female undergraduate students from a small eastern college. After a brief consideration of age, gender, education, and intelligence, Forman and McCauley state that "there is no evidence to suggest that the sex, education, or age of our subjects created problems for generalizability;" and they then puzzling conclude "if anything, our higher socioeconomic subjects may have been less detectable than the typical field examinee" (p. 695) as if underestimating the detection rate is not a problem for generalizability. However, Forman and McCauley's statement that there is no evidence of a problem in generalizing from undergraduate convenience samples to criminal suspect population is incorrect.

Several reports have indicated that individual differences are related to detectability. Significant associations of individual difference and detectability have been found for the following measures: socialization (Honts, Raskin, & Kircher, 1985; Honts, Raskin & Kircher, 1986a; Waid, Orne, & Wilson, 1979), extraversion (Bradley & Janisse, 1981; Gudjonsson, 1982; Gudjonsson & Haward, 1982; Honts et al., 1986a), neuroticism (Gudjonsson, 1982; Honts et al., 1986a), state and trait anger, Type A, seriousmindedness, arousal avoidance, and age (Honts, et al., 1986a), and gender (Honts, Hodes, & Raskin, 1985). High socioeconomic female undergraduates are likely to represent a rather homogeneous sample of subjects on many of the above individual differences. To the extent that the selected

sample differs from the target population on important subject variables external validity is threatened. Honts, Kircher, and Raskin (1986) recently contrasted a mixed gender college student sample with a mixed gender subject sample recruited from the general community (a sample that arguably should be more representative of the criminal subject population) on 14 individual difference measures. The college student sample was found to significantly differ from the community sample on 13 of the 14 individual difference measures contrasted.

Several authors have noted other differences between college student and criminal suspects that may result in a decrease in external validity. Honts, et al. (1985) noted that the laboratory studies that have produced relatively poor rates of detection have all used college students as the subject sample, and they speculated that "college students may perceive the mock crime as more of a game and may thus be less stimulated by the situation in general" (p. 186). A recent meta-analysis (Kircher & Horowitz, 1985, 1987) resulted in a similar conclusion suggesting that detection rates in laboratory experiments were highly correlated with subject sample ($r$ = .62), with college students consistently producing lower detection rates. Thus, Forman and McCauley's claim that the use of undergraduates is neutral (or beneficial) to external validity is not supported in the literature, and there is considerable evidence that external validity of detection of deception experiments may be limited by the use of undergraduate populations.

The second point raised by Forman and McCauley in support of enhanced external validity for their field practice model concerns the differences in the nature of the mock crime situation. Most laboratory studies of the detection of deception use a mock crime where subjects are randomly assigned to guilty and innocent conditions. Forman and McCauley use a clever situation where the individual makes a decision to commit the crime of opening an envelope. Innocent and guilty conditions are thus formed by the volitional acts of the subjects themselves. Forman and McCauley argue that their procedures "parallel those involved in real criminal situations" as compared to random assignment "a practice that clearly deviates substantially from real criminal situations" (p. 695). While the Forman and McCauley procedure does substantial damage to the assumptions of random assignment of the statistical tests they later conduct, this risk to internal validity might be acceptable if external validity were actually enhanced by the procedure. However, we believe that the Forman and McCauley procedure more closely models the real world only for one category of subject. In real criminal situations many guilty suspects may have actively chosen to commit criminal acts, but this point is arguable, consider criminal acts of passion, and the case where individuals are coerced into committing criminal acts.

However, the real problem with the Forman and McCauley field practice model concerns innocent subjects. We think that it is unlikely that most innocent suspects in real criminal cases have actively made a decision not to commit the acts they have been accused of. Most likely, they have not even considered the acts in question, but surely some suspects are tested in real world polygraph examinations who are innocent, but would have committed the acts in question if they had the chance. Innocent suspects in real world polygraph examinations appear likely to have been selected by some random process, that of being in the wrong place at the wrong time. Thus,

we feel that the Forman and McCauley procedure copies the volitional acts of real suspects only for those that are guilty, and then only for some of them. The logical evidence presented by Forman and McCauley does not support the risks to internal validity entailed by the abandonment of random assignment of subjects to conditions.

The third external validity point raised by Forman and McCauley concerns the motivational setting of the experiment. It seems to be generally accepted that real world motivational settings cannot be reproduced ethically in the laboratory (Lykken, 1981; Office of Technical Assessment, 1983; Podlesny & Raskin, 1977; Raskin, 1986; however, see Ginton, Netzer, Elaad, & Ben-Shakhar, 1982). Forman and McCauley offer no solution to this problem through their field practice model. They do argue (on the basis of a nonsignificant result) that increased motivation improves guilty detection, but also increases false positive errors, and they conclude that motivation does not effect the overall accuracy rate of detection of deception tests. However, a meta-analysis of 14 mock crime studies does not support this conclusion. Kircher and Horowitz (1985, 1987) reported a strong association between incentives and detection rates ($r$ = .74). With stronger motivations being associated with improved detection rates.

Construct Validity

Forman and McCauley raise three issues that are more formally related to construct validity (Cook & Campbell, 1979) than to external validity, although they are of concern in generalizing the results of the experiment. The first of these issues raised by Forman and McCauley concerns the examiner who conducted the examination and the examiner who independently evaluated the physiological recordings. The examiners are presented as "certified" and "experienced" field polygraph examiners, although it is not clear what they are certified as. While it is clear that the independent evaluator is well experienced with the positive control technique, neither examiner is presented as having had formal training in the administration of the control question or guilty knowledge techniques. To the extent that neither of the examiners was well-trained in the latter techniques the construct validity of any results of the administration of those techniques would be damaged and generalizability limited.

The second construct validity point raised by Forman and McCauley concerns the test environment. Forman and McCauley report that a typical field practice was reproduced and that "scoring was by the nonnumerical majority rule that is standard field procedure" (p. 695). They further suggest that most field examiners ignore the first chart of a control question test. This is a clear misrepresentation of the general field practice with the control question and guilty knowledge techniques. At present, none of the American Polygraph Association accredited schools teach nonnumerical majority rule scoring, and most American Polygraph Association accredited polygraph schools teach some variation of the semi-objective numerical scoring technique developed at the United States Army Military Police School. It is notable that all government examiners in the United States and Canada are required to use numerical scoring before a decision can be rendered in a criminal issue polygraph examination. Additionally, no currently accredited polygraph school ignores the first chart of a control

question test as Forman and McCauley have suggested. Guilty knowledge tests are routinely scored by taking objective measurements of the electrodermal response amplitude and applying scoring procedures described by Lykken (1960). Thus, Forman and McCauley's assertions that their scoring practices are "standard field procedure" (p. 695) is incorrect and misleading. Construct validity and generalizability of Forman and McCauley's results with the control question and guilty knowledge test appear to be severely limited by their use of nonstandard scoring techniques.

The third construct validity point raised by Forman and McCauley concerns the tailoring of relevant and control question with the same kind of precision found in the field. The notion here is that relevant and control questions have to be delicately balanced for each subject in order for the technique to be effective (Lykken, 1979; 1981). Forman and McCauley suggest that their ability to model the field practice in the development of test questions is a direct result of the use of their field practice model. However, it is certainly possible to tailor relevant and control questions within the context of random assignment mock crime experiments and many experimenters have done so (Dawson, 1981; Driscoll, Honts, & Jones, in press; Honts, et al., 1985; Honts, Raskin & Kircher, 1986b; 1986c; Kircher & Raskin, 1987; Podlesny & Raskin, 1978; Raskin & Hare, ;978; Rovner, 1986). Furthermore, it is not clear that a great deal of question tailoring is required or even desirable in field polygraphs. Podlesny and Raskin (1978) and Raskin and Podlesny (1979) have noted that the procedures for the development and presentation of relevant and control questions are relatively simple and that no extraordinary procedures are required in tailoring questions for each subject.

Forman and McCauley end their arguments for enhanced generalizability for their field practice model with an argument of converging results. They claim that their results with the control question test converge with field data from the Horvath (1977) study. They describe the Horvath study as "generally considered (Lykken, 1981; Waid & Orne, 1981) the best field study available" (p. 695). However, recent revelations (Barland, 1982; Raskin, 1986) about the Horvath study indicate that it is not the best field study available, and it is apparently unacceptable for estimating the validity of the control question test with criminal suspects since a number of the subjects in the study were victims, and none of the blind evaluators were trained in blind chart evaluation techniques.

Our analysis of Forman and McCauley's field practice model indicates that it has no claim to enhanced generalizability over other mock crime studies. Rather, it seems likely that the Forman and McCauley study is limited in its generalizability by using a convenient subject sample that is likely to be dissimilar from criminal suspect populations on a number of important individual difference variables. The generalizability of Forman and McCauley's results is even more strongly limited by the use of unrepresentative procedures for scoring the control question and guilty knowledge portions of the experiments. Further, the field practice model by not using random assignment introduces problems of internal validity since the inferential statistics employed by Forman and McCauley assume random assignment of subjects to conditions.

The Forman and McCauley Experiment

Despite the generalizability problems described above the Forman and McCauley results still may be of interest in comparing the techniques. Forman and McCauley conclude that the three techniques are of equal validity, but with differing error rates. However, there is another study of the validity of the positive control technique in contrast with the control question test (Driscoll, et al., 1987). In sharp contrast to Forman and McCauley, Driscoll et al. reported that the control question test was significantly more accurate than the positive control test and concluded that the positive control test should be abandoned in favor of the control question test. An analysis of the results of these two studies gives insight into these strikingly dissimilar conclusions.

The first difference between the results of the two experiments concerns the reliability of the various techniques. Forman and McCauley assessed reliability by reporting percent agreement of decisions and by calculating a Pearson Product Moment correlation between the trichotomous judgments of the two evaluators. Percent agreement of raters is not a sensitive measure of interrater reliability (Hartmann, 1982), and there would seem to be a violation of the level of measurement assumed for the calculation of the product moment correlation, and they may have overestimated interrater reliability. Using the information provided by Forman and McCauley we have estimated their interrater reliabilities using Cohen's (1960) Kappa as a more appropriate measure of reliability between categorical judgments. The resulting Kappas were 0.67 for the positive control test, 0.5 for the control question test, and 0.38 for the guilty knowledge test. A minimum acceptable value of interrater reliability when using the Kappa statistic is suggested as 0.6 (Gelfand & Hartmann, 1975). In contrast, Driscoll et al. employed standard numerical scoring techniques and achieved substantial interrater reliability of numerical scores and decisions for the control question test ($r$ = 0.95, Kappa = 0.68) and the positive control test ($r$ = 0.87, Kappa = 0.60). Forman and McCauley's dismal interrater agreement on the Guilty Knowledge test is particularly disturbing since interrater reliability using Lykken's (1960) objective procedures is expected to approach unity.

Considering the unacceptably lower interrater reliabilities reported by Forman and McCauley it is meaningless to further pursue the question of the validity of the control question and guilty knowledge techniques in their experiment. However, their interrater reliability with the positive control technique was acceptable and it may be useful to compare their results with those of Driscoll et al.

Forman and McCauley reported the blind evaluator's decisions with the positive control test were 54% correct with guilty and 75% correct with innocent subjects, and 16% of the outcomes were inconclusive. Excluding inconclusives the Forman and McCauley's decisions were 78% correct. Driscoll et al. reported an accuracy rate of 35% with guilty subjects, 65% with innocent subjects, and 45% of their outcomes were inconclusive. Excluding inconclusives the blind evaluator in the Driscoll et al. experiment achieved an accuracy rate of 91%.

Forman and McCauley further assessed the validity of the Positive Control technique by calculating a Pearson Product Moment correlation between the trichotomous decisions of their blind evaluator and the criterion of guilt and innocence, and their reported validity coefficient was 0.56. Although this is a violation of the assumptions of level of measurement of the statistic used, for sake of argument we will consider the reported validity coefficient as a reasonable estimate even though it is likely to overestimate the true relationship. Driscoll et al. calculated a point-biseral correlation between the numerical scores produced by their independent evaluator and the criterion of guilt and innocence. Driscoll et al. reported a validity coefficient for the positive control test of 0.66 as compared to a validity coefficient 0.86 for the numerical scores generated with the control question test. The difference is predictive power between the two techniques in the Driscoll et al. experiment was thus substantial. Similarly, there is a dramatic difference in the predictive power of the properly administered and evaluated control question test in the Driscoll et al. experiment and the positive control test in the Forman and McCauley experiment, 0.86 versus 0.56 respectively.

However, despite achieving an accuracy rate and validity coefficients exceeding those reported by Forman and McCauley, Driscoll et al. concluded that the positive control test was an inferior detection of deception technique. Driscoll et al. commented in their discussion that the failing of the positive control test was that it did not provide the differential reactivity between the innocent and guilty subjects required for detection. Driscoll et al. speculated that within the positive control test subjects tended to react more to the first item of the positive control pair regardless of their guilt/innocence or how the question was answered. However, Driscoll et al. did not present analyses to support this contention.

We have subjected the Driscoll et al. data to new analyses to test the hypothesis that subjects react more strongly to the first item of the positive control pair regardless of their Guilt/Innocence status. In the Driscoll et al. study all subjects were presented three repetitions of the positive control and three repetitions of the control question sequence. The design was counterbalanced so that half the subjects received the control question sequence and half received the positive control sequence first. There were no significant effects for order of presentation of technique. During the first repetition of the positive control sequence the subjective lie was presented first, during the second repetition the subject truth was resented first, and during the third repetition the subjective lie was presented first. The control question sequence was also presented three times, and the order of the questions was varied slightly from chart to chart.

The mean numerical scores of the three repetitions of the positive control and control question sequences are shown in Table 1. The numerical scores generated by the independent evaluation of the positive control sequence and the control question sequence were subjected to a 2 (Guilty/Innocence) x 3 (Repetitions) repeated measures ANOVA. If the Driscoll et al. hypothesis were correct then there should be a main effect for Repetitions with the positive control test, and that was main effect was

indicated by the ANOVA, $F$ (2,72) = 17.07, $p < 0.0001$. The main effect for Repetitions with the control question test was not significant.

TABLE 1

Mean Numerical Scores for Positive Control and Control Question Repetitions

| | Repetition 1 | Repetition 2 | Repetition 3 |
|---|---|---|---|
| Positive Control | | | |
| Innocent | 3.65 | -1.60 | 3.20 |
| Guilty | 0.75 | -2.20 | 0.70 |
| Control Question | | | |
| Innocent | 3.75 | 2.50 | 2.90 |
| Guilty | -3.90 | -3.65 | -2.95 |

The above results clearly indicate that the rationale of the positive control test is incorrect. The positive control test does not elicit differential physiological reactivity between innocent and guilty subjects. The test is not biased in favor of the detection of "Innocence" as Forman and McCauley indicated, rather that finding was an artifact of their procedure of only asking the subjective lie first. Had Forman and McCauley decided to ask the subjective truth first they would probably have found that the test was biased in favor of the detection of "Guilt", but the existing data indicate that the positive control test is not biased at all, it simply does not work.

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# MANAGEMENT AND SUPERVISION OF POLICE POLYGRAPH OPERATIONS
# A BIBLIOGRAPHY

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# LAW NOTES: TWO JURISDICTIONS AND ADMISSIBILITY

## Federal and Case Notes and Abstracts

By

Norman Ansley

The decision of the Eleventh Circuit in United States v. Piccinonna is so important we have printed it in its entirety in this journal. the decision discards Frye as a rule of law, and sets procedures and limits on future admissibility of polygraph test results in the Circuit's district courts. The decision, reversing a long-standing prohibition, inherited from the Fifth Circuit, does not permit blanket admissibility. Rather, it sets a reasonable standard for letting the results of stipulated polygraph tests into evidence, plus an awkward set of rules for introduction over objection of opposing counsel. The decision does not at all limit the trial court's discretion to exclude polygraph evidence, but states only that the Frye general acceptance test does not bar admission of the evidence as a matter of law. The Court of Appeals outlined two instances where polygraph evidence may be admitted at trial. One is where there is a stipulation in advance of the test as to the scope of its admissibility and the purpose or purposes for which the evidence will be introduced. The second situation in which polygraph evidence may be admitted is when it is used to impeach or corroborate the testimony of a witness at trial. In this case, the Court set some unusual rules. It said that when a party gives a test with intent to use the results at trial, that party must give adequate notice to the opposing party that the expert testimony will be offered. then the party may use their results only if the opposing party is given reasonable opportunity to have its own polygraph expert administer a test covering substantially the same questions. Finally, whether used to corroborate or impeach, the evidence may be entered only after the subject of the test has testified and his credibility has been attacked.

Even with all of these procedures, the trial court may bar admission of the test results. The Court of Appeals set some guidelines for the trial court. The examiner's qualifications must be acceptable, and the procedure must be fair. The test must be properly administered.

Idaho has finally made a decision on the admissibility of polygraph test results in criminal trials. Previously, the Supreme Court of Idaho allowed introduction of such evidence over objection in a Family Court case involving alleged child abuse, but the rules of evidence in a Family Court are much more relaxed. In State v. Fain, abstracted in this issue, the Idaho Supreme Court rejected the appellant's claim that the trial court erred in rejecting the results of a polygraph test he took before he was arrested. There was no stipulation. After an extensive review of cases from other jurisdictions the Court said that for the present, only stipulated polygraph test results would be admitted. The Court held out the hope that refinements may improve polygraph examinations so they will more frequently merit admission into evidence. The Idaho Supreme Court said that in stipulated tests the examinee's participation must be free and voluntary,

the stipulation complete, the examiner qualified, and the test condition fair. At trial, the opposing party may cross-examine the examiner as to his expertise, the reliability of polygraph examinations, the accuracy of the instrument used, and other points reflecting on the accuracy of polygraph testing in general and in the case before the trial court. In addition, the trial court must give the jury an instruction that the examiner's evidence is not conclusive, but is only an expert opinion. The Eleventh Circuit would have done well to have included some of Idaho's rules in their decision.

In Barnes v. State, the Indiana Supreme Court affirmed a conviction where stipulated polygraph evidence was admitted. In the course of a polygraph test, one of the questions was "Did you tell your attorney the truth in this case?" The subject answered "yes" and the examiner said he was deceptive to that. He was also reported as deceptive to all the relevant questions. The defense objected to the question about telling his attorney the truth, and said it was a violation of the attorney-client privilege. The trial court and the Indiana Supreme Court disagreed. Indiana, in Perry v. State, reaffirmed the need for a stipulation in their state, and in Conn v. State, noted that every mention of a polygraph test is not so grievous as to require a mistrial.

It really seems unfair, but in United States v. MacEntee, the judge supported a motion in limine that prevented the defense from bringing in to testify an FBI examiner who tested a government witness and found him deceptive to all relevant questions. The Judge, under Rule 403 said the witness' testimony wasn't crucial, and he could be impeached by other means.

In Miller v. State and State v. Eldredge the Georgia and Utah supreme courts reaffirmed the requirement for stipulation in their states and in State v. Moss, West Virginia's Supreme Court of Appeals said again that polygraph results are not allowed in any criminal trials.

## Abstracts

United States v. MacEntee, 713 F.Supp. 829 (E.D.Pa. 1989)

In the United States District Court, E.D. Pennsylvania, the prosecution in the trial of MacEntee moved to exclude evidence of a polygraph examination of a government witness.

Four days before trial, the government served the defense with the FBI polygraph examination report of government witness John Stayton. The report, prepared by Examiner Frank A. Cryon, stated "deception indicated" with respect to every relevant question posed. The defense wished Cryon to testify as an expert regarding the examination of Mr. Stayton, who is one of several alleged co-conspirators of the accused who will testify against them. The government moved in limine to suppress any reference to the polygraph examination.

The judge examined various precedential cases, which were inconsistent, particularly with admitting the results of the test of a witness who was

tested without stipulation. He finally decided that the probative value of the polygraph evidence in this case was substantially outweighed by the danger of unfair prejudice or the danger of misleading the jury. He noted that Stayton's testimony was not crucial to the government's case, which would rely on the testimony of numerous other alleged former accomplices. The Judge was of the opinion that Stayton may be impeached by means other than admission of the polygraph examination results, satisfying Federal Rule 403.

The motion in limine regarding the polygraph evidence was granted.

Miller v. State, 380 S.E.2d 690 (Ga. 1989)

Defendant was convicted of murder and armed robbery and was sentenced to death. He appealed.

On November 24, 1987, Miller was given a polygraph examination. Before the test, Miller read and signed a waiver of his Miranda rights and also signed a form stipulating the results would be admissible at trial. The examiner testified at trial that, in his opinion, Miller was untruthful when he denied shooting Larry Sneed. Miller, on appeal, contended the stipulation was not binding and the examiner's testimony should have been excluded because the District Attorney did not personally sign the stipulation. Instead, he authorized the examiner, Investigator Yarbrough, to obtain the stipulation and administer the test.

The Supreme Court of Georgia said that Yarbrough was properly acting as an agent for the District Attorney and thus had the power to enter into the stipulation. Stipulated polygraph test results are admissible in Georgia. State v. Chambers, 240 Ga. 76, 239 S.E.2d 324 (1977).

Affirmed.

State v. Fain, 774 P.2d 252 (Idaho 1989)

Defendant was convicted of first-degree murder, lewd and lascivious conduct with a minor under age of 16 and first-degree kidnapping, and he appealed.

The defendant claimed the trial court erred in not admitting into evidence the results of his polygraph test, a test he took prior to his arrest.

The Supreme Court of Idaho said that as a general rule in other states, results of polygraph examinations are inadmissible absent a stipulation by both parties. The Court added that where stipulated polygraph results may be admitted, the defendant's participation in the examination must be free and voluntary. The trial court has the discretion to exclude evidence if it finds that an examiner was not qualified or that the conditions under which the test was administered were unfair. The opposing party must be permitted to cross-examine the examiner as to his or her expertise, the reliability of

polygraph examinations, the accuracy of the apparatus used, and all other points reflecting on the accuracy of polygraph both in general, and in the particular case. Also, said the Court, the jury must be instructed that the examiner's testimony as to the results of the test is not conclusive, but is to be taken only as an expert opinion. In this case, the prosecution did not stipulate to Fain's polygraph examination.

The Court added, "While scientific developments may one day refine the polygraph examination so that the results of the test may more frequently merit admission into evidence, we will not now overturn the trial court's exclusion of such results absent a stipulation by both parties."

Affirmed, but remanded for resentencing.

Barnes v. State, 537 N.E.2d 489 (1989)

Defendant was convicted of rape and found to be an habitual offender, and he appealed.

Prior to trial, appellant's counsel filed a motion to transfer appellant to the Keeler Polygraph Institute in Chicago for a polygraph examination. The motion was countersigned by the prosecuting attorney's office. The parties then appeared in open court where they entered into a stipulation that the results of the test would be admissible in any trial resulting from the examination. The court accepted the stipulation and entered an order accordingly. At trial, the polygraph examiner was called to testify concerning the results of the test. During the testimony, the examiner stated he asked appellant the question "Did you tell your attorney the truth about this case?" Appellant's counsel objected on the ground that the question was irrelevant, and later expanded the argument to include a claim of violation of the attorney/client privilege. The trial court observed that the polygraph examiner did not ask for any communications between attorney and client but merely asked if appellant had told his attorney the truth. The trial court also noted that the question was but one in a series of questions calculated to determine appellant's truthfulness concerning the commission of the crime.

The examiner testified that in his opinion appellant was not telling the truth when he answered "yes" concerning his truthfulness with his attorney. The examiner further testified that appellant was not telling the truth when he denied his attack on the victim.

The Supreme Court of Indiana said that in this case, appellant requested and the State agreed to the polygraph examination. The agreement was formalized in court where it was understood that the examination results would be available at trial. The Court said the trial court was correct in holding that no privileged communication was violated and that the results of the test could be admitted as evidence.

Affirmed.

Conn v. State, 535 N.E.2d 1176 (Ind. 1989)

Defendant was convicted of delivery of a controlled substance, and he appealed.

In response to the prosecutor's question about why an investigation of a crime was terminated, the detective replied "I told Mr. Conn that in my opinion he knew who it was who had been to the pharmacy early that morning and robbed him, and I asked him if he would submit to a polygraph test and he refused." Defense counsel moved for a mistrial, which was denied. Also denied was a subsequent motion for an admonition to disregard the testimony.

The Supreme Court of Indiana said the prejudice was in the "low range," and it was not error to deny the motion for a mistrial. The motion for an instruction should have been granted, said the Court, but the failure was harmless.

Affirmed.

Perry v. State, 541 N.E.2d 913 (Ind. 1989)

Defendant was convicted of three counts of dealing in controlled substances and he appealed.

Appellant agreed that the trial court's refusal to admit into evidence results of a polygraph examination and related exhibits denied him a fair trial.

The Supreme Court of Indiana noted that in an offer of proof, away from the jury, a police Lieutenant testified that he gave a polygraph test to a witness who said that he sold the drugs to the informant, not the defendant, and that the witness was telling the truth. However, no stipulation was made by the parties concerning admission of polygraph evidence. Lacking stipulation the trial court refused to admit the evidence. Evans v. State, 489 N.E.2d 942 (Ind. 1986). Defendant said the evidence should have been admitted anyway as it was analogous to Rock v. Arkansas (1987) 483 U.S. 44, 107 U.Ct. 2704, 97 L.Ed.2d 37). The Supreme Court of Indiana said the cases were distinguishable because it was a witness' testimony that was excluded in Perry, not the appellant's, the content of the excluded testimony was admitted when the witness testified, and purpose of the proffered polygraph evidence was to bolster that witness' testimony. No error said the court.

Affirmed.

State v. Eldredge, 733 P.2d 29 (Utah 1989)

Defendant was convicted of sodomy with a child, and he appealed.

Defendant said the trial court erred in not admitting results of a polygraph examination he took which he claimed would have bolstered his

claim of innocence. There was no stipulation before the test to admit the results of the test.

The Supreme Court of Utah said that absent a stipulation between the State and accused, polygraph test results are inadmissible. State v. Abel, 600 P.2d 994 (Utah 1979). The defendant said that in his case the test results should have been admitted to balance the testimony of a witness who functioned as a human lie detector when he testified as to the credibility of the victim's out-of-court statements. The Court agreed that the testimony that the child's statements were truthful was improper, but it should have been the subject of objection to exclude it. Countering it with equally inadmissible evidence was not the proper response, and not persuasive on appeal.

Affirmed.

State v. Moss, 376 S.E.2d 569 (W.Va. 1988)

Defendant was convicted of first degree murder, and he appealed.

During the investigation the deceased woman's husband became a suspect in the murders soon after they were committed. The same police who later interrogated the appellant extracted a confession from the husband, and he was indicted by the grand jury. While the husband was in custody awaiting trial, the same trial judge who presided over appellant's trial, ruled that the husband's alleged confession was admissible. However, the indictment against the husband was dismissed after he passed one of two polygraph tests administered by the police. The police officer who administered the polygraph tests was called as one of the state's witnesses at the appellant's trial. The prosecutor elicited from the officer the fact that after the polygraph tests, he believed the husband was being truthful and that the prosecution "got the wrong man" when it brought charges against the husband. Although the defendant objected the prosecutor also elicited testimony from the attorney who had represented the husband to the effect that, pursuant to an agreement between the prosecuting attorney's office and the husband, the husband voluntarily submitted to the polygraph examinations and was thereafter released from jail and the indictment was dismissed.

The Supreme Court of Appeals of West Virginia held that the introduction of the husband's polygraph test results in this instance was so prejudicial that the trial court's instruction not to consider such evidence was insufficient to cure the error. The Court emphasized that trial courts must not allow polygraph test results to be admitted into evidence in a criminal case. State v. Frazier, 162 W.Va. 602, 252 S.E.2d 39 (1979).

For this and other errors, reversed and remanded.

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# HONESTY AND INTEGRITY TESTING: A PRACTICAL GUIDE

By

R. Michael O'Bannon, Linda A. Goldinger and Gavin S. Appleby, Atlanta, GA: Applied Information Resources, 1989, 226pp., indexed, references cited, directory of honesty tests. $39.95 [+ $3.00 shipping] each from Applied Information Resources, P.O. Box 420281, Atlanta, GA 30342

## A REVIEW

By

Norman Ansley

This is an excellent, straight-forward guide to all of the major paper and pencil honesty tests now frequently being used as a substitute for polygraph examinations.

The book includes discussions of prevalence of the tests, what they measure, the factors in deciding to use them, how the tests are administered, how the results are used in the selection process, the testing of current employees, assessing validity, reliability and adverse impact, the research literature and studies of validity and reliability, legal aspects of honesty testing, and the future of honesty testing.

There is a very useful directory of over forty honesty tests, devoting exactly two facing pages to each test with a systematic format: name, author, address, telephone number, copyrights, dimensions, types of results or reports, the format of the test, number of questions or items, types of questions, focus of questions or items, item content, reading level, targeted population, language options, scoring methods, time required to take the test, services from the publisher, cost per test in small quantities and bulk, research studies on that test, and independent reviewer's comments.

This guide will be very useful if you are considering using honesty tests. Also, the guide serves as a valuable reference to the features of each test and where to obtain it. If you are giving such tests now, the book will help you determine if you are using the best test available for the population you serve.

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Skin conductance and resistance

Wolfram Boucsein and Georg Hoffmann (1979). A direct comparison of the skin conductance and skin resistance methods. Psychophysiology, 16(1), 66-70.

The purpose of the study was a direct comparison between simultaneous recordings of skin conductance and skin resistance. Sixty male students received a series of 30 white noise stimuli, while measures were taken continuously from four sites on the palmar surfaces of the fingers. Evaluations were made for response amplitudes, recovery, and for an approximate area measure. Magnitude of reactions and reliabilities were compared using ANOVA procedures. Behavioral concordances were estimated as correlations with the subjects' rating on stimulus intensities.

Conductance and resistance measures do not differ in amplitude, in area, or in strength of their reliabilities and behavioral concordances. No differences in any respect are found between sites. Skin conductance yields significantly (<.01) shorter recovery times than skin resistance, which is discussed in terms of membrane permeability change.

Although this research was conducted in 1979, we believe that it is currently of interest to polygraph examiners because of the availability of skin conductance equipment on polygraph instruments. [ed.]

Malingering

David J. Schretlen (1988). The use of Psychological tests to identify malingered symptoms of mental disorder. Clinical Psychology Review, 8, 451-476.

The differentiation between malingered and genuine mental disorders presents difficult problems in various medical and legal settings. This review describes the research designs that have characterized empirical studies of faking on psychological tests. Specific detection strategies for intelligence tests and three personality tests (Rorschach, MMPI, and Bender-Gestalt) are described. Where possible, the accuracy with which each test can detect three frequently malingered conditions (mental deficiency, psychosis, and neurological impairment) is described. The majority of studies show that psychological tests can accurately detect faking. Test batteries yield more accurate predictions than single tests, and simulated mental deficiency appears to be the most easily detected condition. The findings suggest that, until research validates use of the diagnostic interview for this purpose, it is probably indefensible to render expert testimony regarding the likelihood of malingering without psychological test data bearing on this question.

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Interrogation

Gisli H. Gudjonsson (1989). Compliance in an interrogative situation: A new scale. Personality and Individual Differences [Great Britain], 10(5), 535-540.

The paper describes the development of a compliance questionnaire by the author which compliments his original scale, the "Gudjonsson Suggestibility Scale." In Britain, the scale stimulated a considerable amount of research and resulted in the development of a theoretical model of suggestibility in police interrogation. The new questionnaire consists of 20 true-false statements which have particular application to interrogative situations involving retracted confession statements. The report indicates satisfactory internal consistency and test-retest reliability and data which support the construct validity of the questionnaire.

This second work by Gudjonsson may be more resistant to self-report bias and possible faking than the earlier compliance questionnaire. Forensic psychologists will find this scale particularly useful.

For reprints of the article and more information on the questionnaires write to Dr. Gisli H. Gudjonsson, Department of Psychology, Institute of Psychiatry, De Crespigny Park, Denmark Hill, London SE5 8AF, England.

Lying

Freddy A. Paniagua (1989). Lying by children: Why children say one thing, do another." Psychological Reports, 64, 971-984.

The analysis suggests that lying by children is, in part, a lack of correspondence between saying an doing, and that effective correspondence training procedures can be designed to teach truthfulness in children. The paper proposes a relational definition of lying and shows its application in the area of correspondence training.

Requests for reprints should be addressed to the author, Division of Child and Adolescent Psychiatry, University of Texas Medical Branch, Galveston, Texas 77550.

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