

Pre-Employment Integrity Testing: Current Methods, Problems, and Solutions

Paul Barrett

Chief Scientist
The State Hospital
Dept. of Psychology
Carstairs
Lanark
ML11 8RP

& Hon. Senior Research Fellow
University of Liverpool
Dept. of Clinical Psychology
Whelan Building, Brownlow Hill
Liverpool
L69 3GB

Paper presented at: British Computer Society: Information Security Specialist Group
March 29th-30th, 2001, Milton Hill, Oxford.

Abstract

In this paper, the entire range of current and leading-edge methodologies for the assessment of integrity, honesty, and deception are outlined and briefly reviewed. The relevant evidence for and accuracy of each methodology is also presented. Particular regard is paid to questionnaire measures of integrity and honesty, as this is the current growth area in psychological testing for pre-employment screening. In order that the paper might also have tangible practical value for the conference members, two tables are provided which list all major tests of integrity and honesty, along with their publishers. An appendix then lists all the relevant addresses and electronic contact details for each of these publishers. This written paper is targeted as the essential background to the presentation to be given at the conference. The presentation itself moves on from the information presented here, and examines 6 critical problems/issues with the current use of integrity tests:

1. The axiomatic basis for quantitative scientific measurement within the natural sciences, and the “measurement” of integrity, honesty, and personality.
2. Reliability, restriction of range, and corrected validities.
3. The nature of the criterion – are supervisor ratings really of any value?
4. The use of self-report of counter-productive behaviours – who is kidding who?
5. What constitutes “accuracy” when using an integrity or personality-based measure, and are validity coefficients of any practical (rather than theoretical) use?
6. The Ethical use of integrity tests – is any employer likely to employ a candidate who scores “acceptably” on personality and ability measures, but who “fails” an integrity test

The presentation then proceeds to lay out the solution strategy to effective introduction and use of these forms of psychological screening test within an organisational setting.

What is to be measured? And why?

A glib answer to the first question is “honesty”. However, most psychometric test authors and users of the various methodologies for assessing honesty speak of “integrity”. The Collins English Dictionary, 3rd edition (1991) defines an honest person as one “not given to lying, cheating, stealing etc., trustworthy; not false or misleading, genuine; and characterised by sincerity and candour”. Integrity is defined as “adherence to moral principles, honesty; the quality of being unimpaired”. Thus, the two terms convey virtually the same meaning. However, two other terms have come into usage more recently, “employee reliability” (Sackett and Harris (1985), and Hogan and Hogan (1989), and “counter-productive behaviour” (Hollinger, 1986). These two terms reflect the broadening of the meaning of honesty and integrity from the relatively narrow conceptualisation of theft, lying, and cheating that first defined the overt integrity tests of the early 1980s, through to a range of behaviours, attitudes, and dispositions that were considered “not conducive to efficient and effective work practices” or counter-productive to organizational “health”. It is in this widening of the definition that the use of personality tests came more to the fore in I/O practice.

In answering the second question of the heading above, the most obvious response is that dishonest employees invariably cause loss of profit to the organization. This can be direct (theft of products, services, or property) or indirect (negligent or sabotage behaviours that cause other events to occur that eventually lead to a cost for the organization). Further, those employees who may be considered as holding counter-productive attitudes are likely to influence others around them, having an overall negative or deleterious effect on general employee morale and organizational affect. We are all familiar with the employee who is constantly “rubbishing” the employer, is passive aggressive (in that they seem to comply with supervisor instructions, but in fact are always trying to sabotage the work in various “permissible” ways), who encourages other employees to find difficulties with their own work, and who is generally obstructive rather than constructive in any matters of organizational work-practices. This is the essence of counter-productivity. It is not that the employee lacks honesty or integrity per se, but rather, the employee lacks (or may be said to possess) other characteristics that cause them to have a negative impact within the organizational environment.

Available Methodologies for Assessing Integrity and Honesty

Figure 1 provides a schematic of all the available methodologies that may be employed by anyone investigating another individual’s potential dishonesty and/or counterproductive behaviour/attitudes.

Psychophysiology

This heading encompasses four subset techniques. The first two are used primarily in conjunction with polygraphy. The polygraph is essentially a recording instrument that will output various biosignals onto either a continuous-feed chart or some other display device, whether electronic or otherwise. The biosignals most usually recorded are all or some subset of heart-rate, blood pressure, skin conductance and resistance, respiration rate and depth, and peripheral skin temperature. Another index sometimes used in tandem with these overt psychophysiological measures is the measurement of pupil diameter changes (pupillometry). The basic premise is that when an individual is lying or evading some “truth-laden” statement, the individual in essence “fears” detection. This “fear” emotion is then hypothesised to cause a change in the individual’s physiology can be detected, which can then be used as an index of “deceitfulness”. As an individual becomes “aroused” by the deception being perpetrated, we expect to see the heart rate increase, blood pressure increase,

skin conductance increase, skin resistance decrease, respiration rate increase with perhaps depth decreasing, and skin temperature decreasing (as adrenalin invokes evacuation of the peripheral blood flow). If looking at pupil size, then this would be expected to increase. The CQT (control question technique) uses the difference between responses to “neutral” questions and to “target” questions as an index of “deception”, whereas the GKT (guilty knowledge test) uses the extent of variation between responses as an index of deception. In the GKT, overt questions about an event or occurrence are not asked of the individual, but, instead questions in which only a “guilty” individual might see the relevance, in that they possess knowledge about an event or occurrence that they are trying to hide. Of course, a major issue for polygraphy is whether it is actually fear of deception that is being measured, or fear of the methodology and situational characteristics of a polygraph session. Further, knowing the constraints and operational characteristics of the task permits a potential deceiver to utilise an array of strategies to deceive the polygrapher (by the provision of flattened responses and/or sufficient induced variability in response so as to confound the decision process). Kleinmuntz and Szucko (1984) estimated that over 1.7million polygraphs had been administered to employees and prospective employees in 1983 alone. However, in 1983 the US Federal Office of Technology Assessment (OTA) published a report on the validity of polygraph testing, concluding “no overall measure or single, simple judgement of polygraph testing validity can be examined based on available scientific evidence. Validity is the extent to which polygraph testing can accurately detect truthfulness and deception... the available research evidence does not establish the scientific validity of the polygraph test for personnel security screening” (p. 4, 1983). Within 5 years, the federal bill H.R. 1524 (Employee Polygraph Protection Act) was passed which prohibited the use of the polygraph for the purpose of pre-and post-employment screening, albeit with exemption 2006 which excluded the content of the bill from government employees and National defence and security personnel. Lippin, Mendelsohn, and Duffy (1988) estimated that the Act resulted in the reduction of 85% of all polygraph tests in the US. As noted by Dalton and Metzger (1993), it is this near prohibition of polygraph testing which has led to the current widespread use of the paper and pencil integrity test. Of interest perhaps is that at the beginning of year 2001, the U.S. Department of Energy asked the National Academy of Sciences to conduct a new study of the scientific evidence on the polygraph in the context of personnel security screening.

Also included as a form of psychophysiological assessment is that which uses a particular segment of the waveform from an evoked brain potential to form an index of deception. This recent methodology has been called “brain fingerprinting” by Lawrence Farwell, the neuroscientist and director of Brain Wave Science in Iowa (Farwell and Donchin, 1991). The P300 waveform component, shown in Figure 2, is called that because it occurs at around 300 msec or so after a stimulus has been presented to an individual. The classical way of evoking this potential is using what is called the “Oddball paradigm”, which uses two stimuli. Both stimuli are presented in a sequence, but one rarely occurs whilst the other commonly occurs. An individual is required to respond in some way (button press, verbal indication etc.) only to the rare “odd-ball” stimulus. The amplitude of the P300 component is increased as a function of the reduced probability of occurrence of the rare stimulus. It is not thought to reflect specific cognitive decision processes anymore – but simply more generalised “stimulus processing” of uncertain events. What Farwell and others (Rosenfeld, Ellwanger, Nolan, Wu, Bermann, and Sweet, 1999; Rosenfeld, Reinhart, Bhatt, Ellwanger, Gora, Sekera, and Sweet, 1998; Johnson and Rosenfeld, 1992) have done is to utilise the P300 component as an indicator of information processing of “meaningful” information. Typically, a number of words and pictures are flashed across a computer screen in front of an individual (generally a

suspect of a criminal or security charge/breach), most of which are irrelevant to the “offence”. However, some of the stimuli are associated directly with the offence. What is measured is the increase in P300 amplitude and time-shift of the component, as these are indicative of a larger amount of information processing by the individual, over and above the stimulus processing of the “irrelevant” stimuli. In certain respects, this task is similar to the GKT methodology of the polygraph (as noted above). Claimed accuracy is around 87%, although specific published figures are in fact, rather hard to find. An associated technique – again using brain responses, is that of Fabiani and Stadler (2000). These authors rely upon brain lateralisation of previously learned information as an indicator of deception, in that words previously seen and learned as part of a specific task produce recognisable “brain signatures” on recognition, compared to words that have not been learned as part of the task. The relevance of this work is perhaps more in the “false-memory syndrome” area of investigation than the “integrity” area, but, the test technology might have some relevance if developed further.

Finally, the fourth “physiological” assessment that is relevant to pre-employment testing is that associated with general physiological arousal. Raine and Venables (1984a,b), in a longitudinal follow-up study of 101 male adolescents, demonstrated that low levels of psychophysiological arousal found in some of the adolescents when assessed at age 15 predisposed toward later delinquent behaviours at age 24. This “hyporeactivity” (chronic under-arousal) is observed when monitoring the change in heart rate or skin conductance immediately following the presentation of sudden “orienting” stimuli. Raine and Venables demonstrated that the responses given by many adolescents who later went on to commit acts of anti-social delinquency were attenuated in amplitude compared to those adolescents who were not associated with acts of delinquency. An excellent summary of Raine’s work in this area is Raine and Liu (1998), which discusses four lines of evidence demonstrating a biological predisposition to violence in certain individuals, and with explanation as to their causality and biosocial treatment implications. Associated with these findings are those from Hare (1993, 1995, 1996, 1997, 1998) on the construct of psychopathy. Hare describes psychopaths as possessing a sense of entitlement, unremorseful, apathetic to others, unconscionable, blameful of others, manipulative and conning, affectively cold, disparate understanding of behavior and socially acceptable behavior, disregardful of social obligations, nonconforming to social norms, and irresponsible. Psychopaths are remorseless predators who use charm, intimidation and, if necessary, impulsive and cold-blooded violence to attain their ends. Although individuals who possess nearly all of the traits of psychopathy are unlikely to present themselves for employment, it is the case that some who possess some but not all of the defining characteristics, and who have learned how to control the more anti-social aspects of their behaviour from others, can and will seek employment. It is here that the kind of measurement that relies upon distinguishing physiological arousal indicators may be of value. For, as Rice (1993) has hypothesised, psychopaths are expert “cheaters”. That is, they tend to be of above average intelligence and, as Hare has also indicated, are expert users of charm, manipulation, and control. Thus, questionnaire and interview procedures are unlikely to be effective tools of assessment with these individuals. However, this is new research whose implications are only just feeding into the measurement and evaluation domains of investigation. However, as with the P300 and brain hemisphericity research, this kind of sophisticated assessment may soon become standard in the security and government services.

Interview

The most obvious way to assess the integrity and honesty of an individual is to interview them and ask questions that seem relevant to the evaluation of the job applicant's character and integrity. These questions may be of overt character, asking direct questions about past behaviours and misdemeanours etc., or covert in that the purpose of asking the question is disguised from the applicant. Of course, two major problems exist with this apparent simplicity. First, what exactly should be asked of the applicant? Second, how will the interviewer know if the candidate is actually telling the truth? It is here that a structured, organised approach to interviewing is not only desirable (from a legal perspective alone), but is actually required. Terpstra, Mohamed, and Bryan (1999), in a content analysis of 158 US federal court cases involving hiring discrimination, report that the unstructured interview was the most frequently challenged selection methodology. Notably, the structured interview survived 100% of the legal challenges mounted against it, whilst the unstructured interview survived only 59% of challenges. For this reason, if considering using an interview to assess an applicant's honesty and counter-productive attitudes, it is prudent to use a formal structured technique such as the Reid Integrity Interview from Reid Associates Inc. This is a highly structured interview procedure for job applicants. The purpose for the interview is to develop factual information about the applicant's past behavioural patterns and outlook. The following areas are assessed during the interview: employment history, theft and related activities, work-related alcohol use, violations of company policy, use of illicit drugs, and past criminal behaviour. In a recent study reported by Reid Associates, although not yet published, the information developed from Integrity Interviews conducted on police candidates was compared to the information acquired from more traditional background "checking". According to Reid Associates, the congruence between the information acquired from the Integrity Interview and that from traditional checks was 100%, with over one third of the interviews exceeding the information content of the background checks.

Biodata

This refers to the acquisition and use of relevant life-history and employment details concerning a candidate/job applicant. Once again, such information may be explicit and overt in that the information requested concerns acts of counter-productive organizational behaviours along with theft or malicious damage. Alternatively, the data to be acquired may seem unrelated to overt acts of counter-productive behaviours, yet are in fact used in an actuarial model that is predicting "risk" of counter-productivity within any job-applicant. In general, simple checklists suffice for either overt/covert items, and there is overlap with the overt questionnaire measures of integrity discussed below.

Psychometrics

The term "psychometrics" refers to the measurement of psychological attributes according to some set of methodologies that aim to provide estimates of magnitude that are both reliable and valid. Prior to the 1980s, questionnaire measures of integrity and honesty tended to be somewhat esoteric and "private" documents that were used in place or, or in addition to a polygraph, and were marketed by specialist security companies and consultants. There was practically no published research evidence for their utility, except that put forward by the organisations and individuals who sold the tests. Most tests were based around a polygraph procedure, and some, as in the London House series, actually warned candidates that they may have to undergo a polygraph test if deception was suspected. All psychometric tests of honesty and integrity are self-report.

Overt Psychometric Integrity Tests

The term “overt” refers to the fact that these tests ask direct questions about an individual’s honesty, criminal history, and attitudes toward drug abuse, theft by others, and general outlook on issues concerning integrity. The purpose of doing this is generally as part of a pre-employment screen of job applicants, such that those who do not meet the minimal test scores deemed suitable by a company are refused employment. Although many psychologists and test publishers recommend using the test scores as part of a “basket” of selection tools, in practice an “undesirable” score on an integrity test will serve as the sole discriminator as to hire/not hire. The market for these tests was relatively small until the OTA polygraph report in 1983. After this was published, the market for these tests expanded dramatically, and by 1990, it was estimated that over 6,000 organizations administered up to 5 million overt psychometric integrity tests annually (US Congress, 1990). This level of interest and research activity is reflected in the research publications literature. A quick search of all research publications in PsycLit, using the keywords honesty/ integrity/job applicant screening/pre-employment integrity testing/ but NOT children or school, **OR’d** with employment tests/honesty/integrity/job applicant attitudes/job applicant screening/theft/job applicant integrity but NOT children or school or attractiveness shows 11 publications between 1967 and 1983, and 276 between 1984 and 2001. In a series of reviews of the area, Sackett and Decker (1979) cited 8 papers related to integrity testing, Sackett and Harris (1984) cited 46 items, Sackett, Burris, and Callahan (1989) cited 87, and Sackett and Wanek (1996) cited 100 of 200 items found. Table 1 provides a listing of 20 of the major overt integrity tests, including what they purport to measure, and their suppliers.

Overt integrity tests are designed to assess either factual information about theft, criminal history, and other “undesirable” behaviours engaged in by a candidate in previous work positions and/or assess a candidate’s attitudes to a variety of “honesty-integrity” related behaviours and statements and make a comparison between these and some target “dishonest” group such as prisoners/felons. These tests typically consist of two sections. The first is a measure of theft attitudes and includes questions about beliefs concerning the frequency and extent of theft, attitudes about punishing theft, and assessments of the candidate’s own honesty. The second section asks the candidate to describe the amount of theft and counter-productive behaviours they might have engaged in whilst with other employers etc. In 1991, the American Psychological Association (Goldberg, Grenier, Guion, Sechrest, and Wing, 1991) published the results of an investigation into the use of integrity tests as pre-employment screening instruments. After reviewing nearly 300 studies provided by research publication and test publishers, the overall conclusion reached was that “for those few tests for which validity information is available, the preponderance of the evidence is supportive of their predictive validity” (Goldberg et al, 1991, p.26). Wanek (1999), in his review of the utility, reliability, and validity of integrity tests, concluded that they were useful, reliable, and valid. Much of the evidence used in support of these statements was drawn from the large-scale meta analysis of 665 validity coefficients for integrity tests reported by Ones, Viswesvaran, and Schmidt (1993). Essentially, what was being assessed was the average predictive validity of integrity tests in the employment domain. This is discussed in terms of the correlation between the scores on validity tests and a basket of outcome criteria (such as profit and loss figures, shrinkage, costs attributable to workplace dishonesty etc.). The overall validity coefficient (which varies between 0 = none, and 1 = perfect) where supervisor ratings of job performance was used as the main criterion was 0.21, which when corrected for unreliability in the criterion and range restriction of the criterion was 0.34. When looking at the average predictive validity for prediction of a criterion defined by “counter-productive behaviours” (such as theft and theft-related incidents, absenteeism,

tardiness, and violence), the uncorrected average validity over 443 validity coefficients was 0.33, with corrected value of 0.47. These values are as large or larger than those quoted for personality measures. For ability measures, Schmidt and Hunter (1998) have reported the average corrected validity coefficient for ability tests as 0.51. Given the virtually zero correlation between integrity test scores and general ability, it is also not surprising that Schmidt and Hunter (1998) report the highest validities in their meta-analysis between a composite measure of integrity test + ability test and job performance of 0.63. With regard to the reliability of overt integrity tests, a further meta-analysis reported by Ones and Viswesvaran (1998) using 68 estimates of internal consistency reliability yielded a mean reliability of 0.81, with a mean stability (test-retest) coefficient of 0.85 (over 47 individual coefficients).

Covert Psychometric Integrity Tests

The term “covert” refers to the use of tests whose relevance to honesty and integrity is not immediately clear. In fact, personality-oriented trait tests are used exclusively as the indirect measures. These tests aim to predict a broader range of counter-productive work behaviours, using weighted composite measures of personality trait scores. Table 2 provides a listing of the tests currently on the market for which an explicit test score or scores exists for counter-productive behaviour tendencies or attitudes. The stimulus for using personality-based measures was partly associated with trying to understand the psychological attributes that might be said to compose a trait (or trait-complex) of honesty/integrity, as well as trying to devise measures that were less “face-valid” than the overt tests. Ones, Schmidt, and Viswesvaran (1993) published some key results that served to stimulate the market for this form of test. They noted that the Big Five personality trait of Conscientiousness correlated with overt integrity tests at 0.26 (0.39 if corrected for unreliability and range restriction in both instruments). Overt integrity tests correlated 0.25 (0.41 corrected) with job performance, whilst conscientiousness correlated 0.13 (0.23 corrected). Using a composite of personality measures (agreeableness, conscientious, and emotional stability), the correlation between the composite measure and overt integrity tests was 0.25 (0.39 corrected) and with job performance, was also 0.25 (0.41 corrected). Interestingly, when Murphy and Lee (1994) partialled out conscientiousness from the overt integrity-performance relationship, they found this led to only a small decrease in the correlation of 0.25. However, when Ones (1993) partialled integrity from the conscientiousness-performance relationship, the correlation dropped from 0.13 to near zero. What this indicates is that the integrity measures are making broader measurement than the conscientiousness personality trait alone. This has led some researchers (Hogan and Ones, 1997) to investigate the sub-components of conscientiousness in an effort to better explain the psychological components of the global integrity score. However, a recent article by Fallon, Avis, Kudisch, Gornet, and Frost (2000) comparing measures of conscientiousness and integrity measures in 359 sales associates, demonstrated no relationship between conscientiousness and integrity, in contrast to the earlier work. This is an indication that unravelling the psychometric structure of integrity/honesty is not going to be an easy task.

As the list in Table 2 shows, this is a new market area that is only just being explored by the major test publishers (in comparison to the specialist integrity test market). Several companies, such as Psychological Consultancy Ltd. are already developing new “hybrid” versions of established integrity tests (such as the ATH-1) – which combine features of integrity tests and personality-based measures (the forthcoming ATH-2). Of note also is that this broadening of measurement is also reflected in the broadening of the criterion measures. Whereas integrity tests have generally been validated against a narrow range of outcomes

such as theft, shrinkage, absenteeism, and aggression/violent acts, the personality-based measures are predictive of not just these variables, but also of work effectiveness in team environments, sales and customer contact, general day-to-day communication effectiveness, and basic work patterns (accidents, injuries, risk-prone behaviours etc.).

Problems with Integrity Measurement

From the broad review above, the interested reader might feel that the use of integrity testing is relatively straightforward. The legal position regarding their use and subsequent challenge in US courts has been established (Terpstra, Mohamed, and Bryan, 1999), and the plethora of papers that have examined their validity and utility seem to indicate that this is now an accepted area of testing, on a par with ability and personality tests. However, as with much psychological testing in the professional areas of clinical and I/O psychology, the gaps between “quantitative science”, “psychological research” and “business practice” need to be fully explored in order to properly comprehend the congruence between the demands and requirements of each of the three areas. Thus, when a client organization wishes to explore the introduction of integrity testing into its pre-employment screening programs, it should be very clear about the nature of what constitutes evidence for integrity measurement, and very clear about the relevance of this evidence for its own potential usage of such measures. It is an unfortunate fact that few psychologists working in this area properly comprehend the axioms of measurement that they assume in pursuance of their quantitative research. Whilst this has enabled much of the work that has taken place under the banner of “psychometrics” to proceed apace, it does nevertheless place a constraint on the ultimate “accuracy” of this work. Becoming aware of this constraint does not negate the validity of using integrity tests, but it does force the user and the many psychological “consultants and experts” in this area to think rather more carefully about the constituent properties of “evidence” and the strategic organizational use of integrity tests.

The issues in this section will be expanded in detail within the conference presentation, but are listed here for information purposes.

1. The axiomatic basis for quantitative scientific measurement within the natural sciences, and the “measurement” of integrity, honesty, and personality.
2. Reliability, restriction of range, and corrected validities.
3. The nature of the criterion – are supervisor ratings really of any value?
4. The use of self-report of counter-productive behaviours – who is kidding who?
5. What constitutes “accuracy” when using an integrity or personality-based measure, and are validity coefficients of any practical (rather than theoretical) use?
6. The Ethical use of integrity tests – is any employer likely to employ a candidate who scores “acceptably” on personality and ability measures, but who “fails” an integrity test?

Solutions

The issues in this section will be expanded in detail within the conference presentation, but are listed here for information purposes.

The 1991 APA recommendations, listed in Camara and Schneider (1994) are grouped under 5 headings:

1. Construct Validity
2. Cut-Score Use
3. Marketing and Promotional Material
4. Openness of Evaluation
5. Training Issues

By carefully discriminating between a scientific and pragmatic approach to integrity measurement, it is possible to focus solely on #2 above as the critical issue to be resolved for pragmatic business practice. However, the overriding principle is enshrined as Barrett's "First Law" of I/O selection psychology (Barrett, 1999). That is, **all interventions within a business environment must be subject to explicit quantitative evaluation of outcome.** Once this is accepted, the strategy for implementing any assessment methodology within any organization becomes crystal clear (although the details and strategic initiatives required are invariably difficult to structure). However, the principle does immediately clarify the use of integrity testing – and how it is to be evaluated. Certainly, the issue of cut-score decision analysis is critical – and what is also certain is that cost-benefit analysis of each potential cut-score is mandatory. Without this latter analysis, which must be tailored for each individual company and type of position, optimal decision-making is simply not possible. However, as 10 years experience within the violence risk assessment domain of forensic psychiatric and corrections/prisons areas have shown, using actuarial measures is actually far more difficult than merely discussing them in terms of their evidential and "best-practice" features!

References

- Barrett, P.T. (1999) *Beyond Psychometrics: the strategic implications for occupational psychology*. Paper presented at the BPS Millennium conference, Birkbeck College, University of London, UK. Downloadable from: www/liv.ac.uk/~pbarrett/present.htm
- Camara, W.J. and Schneider, D.L. (1994) Integrity Tests: Facts and unresolved issues. *American Psychologist*, 49, 2, 112-119.
- Collins English Dictionary, 3rd Edition. (1991) Glasgow, UK: Harper Collins Publishers
- Dalton, D.R. and Metzger, M.B. (1993) "Integrity Testing" for Personnel Selection: An Unsparing Perspective. *Journal of Business Ethics*, 12, 147-156.
- Fabiani, M. and Stadler, M.A. (2000) True but not false memories produce a sensory signature in human lateralized brain potentials. *Journal of Cognitive Neuroscience*, 12, 6, 941-949.
- Farwell, L.A. and Donchin, E. (1991). The truth will out: Interrogative polygraphy ("lie detection") with event-related brain potentials. *Psychophysiology*, 28, 5, 531-547.
- Fallon, J.D., Avis, J.M., Kudisch, J.D., Gornet, T.P, and Frost, A. (2000) Conscientiousness as a predictor of productive and counterproductive behaviours. *Journal of Business and Psychology*, 15, 2, 339-349.
- Goldberg, L.R., Grenier, J.R., Guion, R.M., Sechrest, L.B., and Wing, H. (1991) *Questionnaires used in the prediction of Trustworthiness in pre-employment selection decisions: An APA task force report*. Washington DC: American Psychological Association.
- Hare, R. D. (1993). *Without Conscience: The Disturbing World of the Psychopaths Among Us*. New York: Simon & Schuster (Pocket Books).
- Hare, R. D. (1995). Psychopaths: New trends in research. *Harvard Mental Health Letter*, 12, 4-5.
- Hare, R. D. (1996). Psychopathy: A clinical construct whose time has come. *Criminal Justice and Behavior*, 23, 25-54.
- Hare, R. D. (1997). The NATO Advanced Study Institute on psychopathy, Alvor 1995. *Journal of Personality Disorders*, 11, 301-303.
- Hare, R. D. (1998). Psychopathy, affect, and behavior. In D. J. Cooke, A. E. Forth, & R. D. Hare (Eds.), *Psychopathy: Theory, Research, and Implications for Society* (pp. 105-137). Dordrecht, The Netherlands: Kluwer.
- Hogan, J. and Hogan, R. (1989) How to measure employee reliability. *Journal of Applied Psychology*, 74, 2, 273-279.
- Hogan, R. and Ones, D.S. (1997) Conscientiousness and Integrity at work. In R. Hogan, J. A. Johnson, and S. Briggs (eds) *Handbook of Personality Psychology*. New York: Academic Press

- Hollinger, R.C. (1986) Acts against the workplace: Social bonding and employee deviance. *Deviant Behavior*, 7, 1, 53-75.
- Johnson, M.M. and Rosenfeld, J. P. (1992) Oddball-evoked P300-based method of deception detection in the laboratory: II. Utilization of non-selective activation of relevant knowledge. *International Journal of Psychophysiology*, 12,3, 289-306.
- Kleinmuntz, B. and Szucko, J.J. (1984) Lie detection in ancient times: a call for contemporary scientific study. *American Psychologist*, 39, 766-776.
- Lippin, M., Mendelsohn, M.R., and Duffy, D.P. (1988) Employee medical and honesty testing. *Personnel*, 65, 11, 38-48.
- Murphy, K.R. and Lee, S.L. (1994) Does conscientiousness explain the relationship between integrity and job performance? *International Journal of Selection and Assessment*, 2, 226-233.
- Ones, D.S. (1993) *The construct validity of integrity tests*. Unpublished PhD dissertation, University of Iowa.
- Ones, D., and Viswesvaran, C. (1998) Integrity testing in organizations. In Griffin, R.W., O'Leary-Kelly, A., and Collins, J.M. (eds). *Dysfunctional behavior in organizations: Violent and deviant behavior*. Monographs in organizational behavior and industrial relations, Vol. 23, Parts A & B. (pp. 243-276). Stamford, CT, USA: Jai Press, Inc.
- Ones, D.S., Viswesvaran, C., and Schmidt, F.L. (1993) Comprehensive Meta-Analysis of Integrity Test Validities: Findings and Implications for Personnel Selection and Theories of Job Performance, *Journal of Applied Psychology*, vol.78 (4) 679-703.
- Ones, D.D., Schmidt, F.L. and Viswesvaran, C. (1993) Nomological net for measures of integrity and conscientiousness. *Paper presented at the 8th annual conference of the Society for Industrial and Organizational Psychology*, San Francisco.
- Raine, A. and Liu, J. (1998) Biological predispositions to violence and their implications for biosocial treatment and prevention. *Psychology Crime & Law*, 4, 2, 107-125.
- Raine, A., and Venables, P. H. (1984a) Tonic heart rate level, social class and antisocial behaviour in adolescents. *Biological Psychology*, 18, 123-132
- Raine, A., and Venables, P. H. (1984b) Electrodermal non-responding, antisocial behavior, and schizoid tendencies in adolescents. *Psychophysiology*, 21, 4, 424-433
- Rice, M.E. (1997) Violent offender research and implications for the criminal justice system. *American Psychologist*, 52, 4, 414-423
- Rosenfeld, J. P., Ellwanger, J.W., Nolan, K., Wu, S.; Bermann, R.G., and Sweet, J. (1999) P300 scalp amplitude distribution as an index of deception in a simulated cognitive deficit model. *International Journal of Psychophysiology*, 33, 1, 3-19.

Rosenfeld, J.P., Reinhart, A.M, Bhatt, M., Ellwanger, J., Gora, K., Sekera, M., and Sweet, J. (1998) P300 correlates of simulated malingered amnesia in a matching-to-sample task: Topographic analyses of deception versus truth-telling responses. *International Journal of Psychophysiology*, 28,3, 233-247.

Sackett, P.R. and Decker, P.J. (1979) Detection of deception in the employment context: a review and critique. *Personnel Psychology*, 32, 487-506.

Sackett, P.R. and Harris, M.M. (1985) Honesty testing for personnel selection. A review and critique. In H.J. Bernadin and D.A. Bownas (Eds) *Personality Assessment in Organizations*. New York: Praeger.

Sackett, P.R. and Wanek, J.E. (1996) New developments in the use of measures of honesty, integrity, conscientiousness, dependability, trustworthiness, and reliability for personnel selection. *Personnel Psychology*, 49, 4, 787-829.

Sackett, P.R. and Burris, L.R., and Callahan, C. (1989) Integrity testing for personnel selection: an update. *Personnel Psychology*, 42, 491-529

Schmidt, F.L., Hunter, J.E. (1998) The Validity and Utility of Selection Methods in Personnel Psychology: practical and theoretical implications of 85 years of research findings. *Psychological Bulletin*, 124, 2, 262-274

Scientific Validity of Polygraph Testing: A research Overview and Evaluation – A Technical Memorandum (Washington, D.C. US Congress, Office of Technology Assessment, OTA-TM-H-15, Nov. 1983). Downloadable from: www.fas.org/sgp/othergov/polygraph/ota/

Shaffer, D.J. and Schmidt, R.A. (1999) *Personality testing in employment*. Legal Briefing, Thelen Reid and Priest, L.L.P (www.thelenreid.com/articles/article/art_58.htm)

Terpstra, D.A., Mohamed, A.A., Kethley, R.B.(1999) An analysis of federal court cases involving nine selection devices. *International Journal of Selection and Assessment*, 7, 1, 26-34.

US Congress, Office of technology Assessment (1990) *The use of integrity tests for pre-employment screening*. (OTA-SET-442) Washington DC: US Government Printing Office.

Wanek, J.E. (1999) Integrity and honesty testing: What do we know? How do we use it? *International Journal of Selection & Assessment*. Vol 7(4), 183-195

Biographical Note

Academia: Paul Barrett completed his first degree in Psychology and Mathematical Statistics at the University of Exeter, in 1978. His PhD, also at Exeter University, was with the late Paul Kline, examining the psychometrics of personality questionnaires, with particular attention focussed on the 16PF and EPQ questionnaires. In 1982, he took up a research position with the late Hans Eysenck at the Institute of Psychiatry, working on the biological correlates of psychometric intelligence and personality, and assisting both Hans and Sybil Eysenck in their cross-cultural assessment of the EPQ. In 1989, the Biosignal laboratory was set up by both Hans and Paul at the Bethlem Royal Hospital. Here five years of substantive research was undertaken into various biological and chronometric correlates of psychometric intelligence and personality scores. These measures ranged from simple and complex reaction times through electroencephalographic indices and peripheral nerve conduction parameters. After the lab closed in early 1994, Paul went to New Zealand for nearly three years as a lecturer in research methods and I/O psychology in the psychology department at the University of Canterbury, Christchurch. He returned to the UK in late 1996, as the Chief Scientist at Ashworth Hospital, Liverpool. In 1997, he left Ashworth and took up his current position as Chief Scientist at the State Hospital, Carstairs. He was appointed an honorary senior research fellow at Liverpool University in 1996 and continues to hold this position. He has published over 80 research articles and book chapters in the areas of personality and intelligence psychometrics, I/O selection and assessment issues, and biosignal measurement techniques and analysis. He is currently writing two books, one with Sean Hammond for Wiley publishers (A Handbook of Forensic Psychological Assessment), and one for Free Association Books (Quantitative Science and Intelligence). He is the co-author with Jake Lyne of the Employee Well-Being Questionnaire currently being marketed by NFER-ASE Ltd. He is a Chartered Psychologist with the British Psychological Society, a member of the American Psychological Society, American Association for the Advancement of Science, and an International Affiliate of American Psychological Association

Consulting: Paul has acted as a specialist psychometrics and selection consultant for organisations such as Psytech International, The PA consulting group, Carter, Holt, Harvey plc (NZ), Mariner7.com, and The European Parliament. He was the author of the ATH-1 (Attitudes to Honesty test) first marketed by Permetric Ltd. in the late 1980s. He is currently working with Psytech International Ltd. on an HR-related statistical software development project and with Mariner7.com on a web-based implementation of a new kind of psychological testing paradigm.