

# The Plethysmograph: A Review of Recent Literature

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There is much research to support the claim that the penile plethysmograph is a reliable and valid method of objectively measuring and assessing the erectile response in male sex offenders. The authors have reviewed some of the most recent literature dealing with this subject. The conclusion is that although the penile plethysmograph is the best objective measure of male sexual arousal and can be useful in the assessment and treatment of sex offenders, caution must be exercised because of the limitations. The limitations include using the plethysmograph as a predictive test, the lack of standards for administration and interpretation, the lack of standardized norms, and the susceptibility to controlling results. Despite these limitations, the plethysmograph is often used as the single most important source of predictive data in some court rooms, boards of pardons, and for prison inmate classification systems. The plethysmograph is most effective in predictive situations when it is used in conjunction with multiple data sources.

The penile plethysmograph is an individually applied physiological test, that measures the flow of blood to and from the genital area. Over the past 20 years the plethysmograph has evolved into a sophisticated computerized instrument capable of measuring slight changes in the circumference of the penis. Despite the sophistication of the current equipment technology, a question remains whether the information emitted is a valid and reliable means of assessing sexual preference.

Much research has accompanied the evolution of the plethysmograph. Generally, the plethysmograph is recognized as the best objective measure of male sexual arousal because blood flow into

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the penis is the only measure of sexual arousal that doesn't seem to be influenced by other factors. The objective ability to measure penile arousal has helped the plethysmograph evolve into one of the important tests in the assessment and treatment of male sex offenders.

Ideally, information obtained from the assessment of known sex offenders should be used to develop treatment programs designed to reduce deviant arousal and increase arousal to more sexually appropriate persons. Unfortunately, sometimes the use of the plethysmograph goes beyond the assessment and treatment of sex offenders. Less reliable and valid applications include using the plethysmograph to determine innocence or guilt, and to predict future recidivism.

The validity of the plethysmograph as a judicial decision-making instrument is not widely accepted by the courts or scientific community. The landmark case that established the criteria for determining whether a scientific test has gained acceptance and credibility within the scientific community and is therefore admissible as court evidence is *Frye v. United States*.<sup>1</sup> This 1923 Court of Appeals decision stated:

Just when a scientific principle crosses the line between the demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and 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 acceptance in the particular field in which it belongs.

According to Travin *et al.*,<sup>2</sup> there isn't sufficient scientific evidence to show absolute correlation between laboratory responses and paraphiliac behaviors. Despite the support of some scientists, there are many who feel that the plethysmograph has not been sufficiently established to have gained acceptance as a predictive instrument (Farral and Card,<sup>3</sup> Earls,<sup>4</sup> and Freund and Blanchard<sup>5</sup>).

One of the reasons for lack of acceptance and support of plethysmograph testing, by some of the scientific community, is due to the lack of test standardization. Usually widely used and accepted psychometric tests have undergone a great deal of standardization within the population norms that the test is intended to be used with. This is not the case for the plethysmograph. The manufacturers publish general operating

instructions, but fail to publish standards for the administration and interpretation of test results. This points out a main failure of research involving the plethysmograph, the lack of testing comparing the sexually deviant population against a normal population. Lack of standardization raises a number of questions surrounding the use of the plethysmograph. Is it a reliable and valid tool for the assessment and treatment of sex offenders? Is it reliable and valid when used as a predictive instrument?

### History

According to Kurt Freund,<sup>6</sup> the plethysmograph has an approximate 80-year history. As far back as 1908, a type of plethysmograph was used by W. M. Baylis to check the effect of certain drugs on the vasomotor reflexes in dogs. By the early 1930s the plethysmograph was being used by J. Hynie to assess erectile difficulties. The method used by Hynie focused on penile and scrotal motility. By the mid 1940s, Ohlmeyer, Brilmayer, and Hullstrung had improved the technology so that erectile response during sleep was being measured by a device using an open ring gauge which acted as a simple on-off switch. This device was able to measure the erectile response but unable to measure the magnitude of change. In 1957, after experimenting with breathing patterns, galvanic skin response, and heart rate, Kurt Freund settled on the phallometric method for measuring penile arousal.<sup>7</sup> Penile volume change was recorded after the presentation of erotic and neutral stimuli.

Measurement of the male penile re-

## The Plethysmograph

sponse has not been the only method attempted to measure sexual arousal. Galvanic skin response, cardiovascular response, respiration, pupil dilation, and electroencephalography (EEG) have all been researched in an effort to find a suitable method of measuring sexual arousal.<sup>6, 8</sup> Although some of these researched methods proved to be good indicators of general arousal, they are either poor indicators of erotic arousal or because of cost or technicality they are impractical.

There has been ample research to indicate that galvanic skin response is a good indicator of general arousal. Lo-iselle and Mollenauer<sup>9</sup> have been able to show general arousal increases to pictures of erotically preferred stimuli versus nonpreferred stimuli. The difficulty appears to be in differentiating between erotic and general arousal. Perhaps the best research showing this differentiation problem is by Craig and Wood.<sup>10</sup> Ninety male undergraduate students were shown slides of female nudes, homicide victims, and neutral slides. Although the response to the neutral slides was lower, there was no differentiation between the response to the nude females and the homicide victims. The conclusion is that galvanic skin response is a good measure of general arousal but not of erotic arousal.

Research of the cardiovascular and respiratory response has concentrated on the measurement of mild erotic arousal, avoiding tactile sexual interaction. Wenger *et al.*<sup>11</sup> assessed blood pressure, heart rate, and finger pulse volume and found that only blood pressure dif-

ferentiated adequately between erotic and neutral stimuli. Adamson *et al.*,<sup>12</sup> when comparing the response to an erotic film versus an unpleasant film, found that the only difference in cardiovascular response was in blood pressure. It seems clear that the primary cardiovascular response to mildly erotic stimuli manifests itself in the form of changes in blood pressure. Studies by Wenger *et al.*<sup>11</sup> and Adamson *et al.*<sup>12</sup> failed to show that respiration differentiates between mild, erotic, nonerotic, and neutral stimuli.

Research by Hess and Polt<sup>13</sup> and Hess *et al.*<sup>14</sup> indicated that the male pupil dilates more than the female pupil to pictures of partially clothed females and that pupillary dilation will differentiate homosexual from heterosexual males. Atwood and Howell<sup>15</sup> were able to show that child molesters' pupils dilated to the sight of children and constrict at the sight of adult females. Despite the initial evidence that pupillary dilation, as a measure of sexual attention and interest, would appear to have some validity, there has not been much research replicating the initial studies.

There has been very little research using EEG to differentiate erotic arousal from general arousal. Two research projects found that there were differences in the evoked potentials between different stimuli (Costell *et al.*<sup>16</sup>, Lifshitz<sup>17</sup>). As in the case of pupillometry, EEG seems to show potential for discriminating between general and erotic arousal. However, perhaps due to the inability to replicate original findings or because of some other experimental difficulties,

this area of research has not proceeded further.

### **Erectile Response**

Basically there are two major methods of measuring penile tumescence. Either the change in penile volume or the change in penile circumference is monitored. Generally the method of measuring change in penile circumference has become the more popular or accepted method. Actual measurement of the penile circumference change is measured by a mercury strain gauge or a Barlow gauge (Rosen and Keefe<sup>18</sup>).

The neural-physiological explanation of the human penile response is described by Weiss<sup>19</sup> as depending on "integration of afferent signals in the thoracolumbar or sacral erection centers, intact autonomic nerves to the penis, normal erectile tissues, and an adequate blood supply to the penis." Cerebral influence is not always necessary to facilitate erection. Reflexogenic erections can occur entirely on the basis of sacral reflex in patients with complete spinal cord transections located well above the sacral cord level.

Penile erection can be the result of psychogenic or reflexogenic stimulus. Examples of psychogenic stimuli would be auditory, visual, olfactory, gustatory, tactile, and imaginative thoughts. Reflexogenic examples would include exteroceptive stimulation such as touch to erotic zones, or interoceptive stimulation arising in the bladder or rectum. Often the psychogenic and reflexogenic stimuli act together to produce or inhibit an erection (Weiss<sup>19</sup>).

### **Measurement Methods**

Normally, when a plethysmograph test is being administered, the person being assessed and the operator are separated in different rooms. Although they are in different rooms, they need to be able to talk with each other and it is best if the operator can monitor the client through a window or one-way mirror. Before the test begins the operator calibrates the gauge to ensure that the gauge and the equipment are working properly. The subject is instructed on how to place the measuring gauge on his penis. With the gauge attached, the plethysmograph is then calibrated to establish the subject's baseline, and depending on the model or type of plethysmograph, a calibration may be needed to establish the ceiling or 100 percent tumescence. Quick arousal to full tumescence can be accomplished by using a video depicting sexual activity that is arousing to the subject. Once the subject has regained the detumescent state, the testing can begin. It should be noted that this brief description of operating procedures is not intended to suggest a standardized set of procedures.

The stimuli used to assess sexual aggressors is one of the most important aspects of the assessment procedure. Without reliable and valid responding, the plethysmograph becomes just another electronic curiosity. As Avery-Clark and Laws<sup>20</sup> and Pithers and Laws<sup>21</sup> pointed out, the plethysmograph is valuable in differentiating or identifying individuals who manifest high levels of arousal to inappropriate sexual activity

## The Plethysmograph

while exhibiting low levels of arousal to appropriate sexual activity.

Most important in the assessment of a sex offender is to attempt to determine the difference in arousal to inappropriate situations as compared with appropriate situations by presenting various erotic stimuli. The final assessment recommendations are usually based upon the ratios between inappropriate and appropriate responses. Emphasis should not just be placed on whether the subject is aroused to inappropriate erotic stimuli.

There are many methods of presenting erotic stimulus material to the subject. It is important to be aware that there are no standards or norms controlling the type or method of presentation of erotic stimuli. Each operator or institution develops or purchases the materials that they feel will provide reliable and valid results. Farral and Card<sup>3</sup> suggest that the lack of standards or control over stimuli is a major flaw in the assessment of sex offenders. Essentially, clinicians design and choose their own stimuli, perhaps without considering some of the potential difficulties. Some of the potential difficulties considered include considering that the subject's mind set at the beginning of the test can affect his response to the stimulus materials, and that sexual response to one set of stimulus material appears to condition a sexual response to the following set of materials. Additionally, some individuals respond almost exclusively to audio materials while others respond almost exclusively to visual materials.

The stimuli are usually administered by audio cassette. Farral and Card<sup>3</sup> supplement the audio presentation by briefly showing three or four sexually related slides at the conclusion of each stimulus scenario. Research by Abel *et al.*<sup>22</sup> indicates that video stimuli produce the highest arousal and that audio stimuli produces lower arousal levels that are more stable and difficult to suppress. Abel and Blanchard<sup>23</sup> indicate that another reason for using audio stimuli over other modes is that audio has the advantage of presenting cues that for technical and ethical reasons cannot be presented through other modalities.

Often the subject cannot or will not always accurately identify the precise stimulus that is erotic to him. To compensate for this, the subject can be exposed to stimuli depicting as many as 12 different sexually stimulating fantasies. A complete set of 12 audio presentations might consist of six consenting and six nonconsenting situations. Additionally, each of these sets of six situations covers the full range scale of child, adolescent, and adult for both genders.

During the entire time that the subject is exposed to the sexual stimulus, the plethysmograph is graphically recording the changes in the subject's penis circumference. It is these recorded measurements that are used to determine whether the subject is overly stimulated to an inappropriate fantasy as compared with an appropriate fantasy. However, as the authors have previously pointed out, a major problem with the interpretation of the results is a lack of standardized norms for interpretation.

## Assessment

The ideal application for the plethysmograph is the assessment and treatment of known sex offenders. Avery-Clark and Laws<sup>20</sup> recommended using the plethysmograph to allow for objective assessment of offenders and to differentiate among sexual offenders in the same group. Use of the plethysmograph enables development and monitoring of treatment and enables sex offenders to change their status as a function of adequate treatment progress. In a later article, Pithers and Laws<sup>21</sup> pointed out that there are numerous advantages to including the plethysmograph in the treatment of sex offenders. The plethysmograph can help in identifying offenders who manifest high levels of arousal to stimuli depicting inappropriate sexual activity, or those showing very low levels of arousal to stimuli that would be considered portraying appropriate sexual activity. The plethysmograph can help determine and enhance specialized behavior therapy for these offenders and evaluate therapeutic efficacy without the normal distortion evident in the subject's self-report.

Blader and Marshall<sup>25</sup> used a more cautious approach in the interpretation of assessment results derived from sexual arousal to laboratory stimuli as indicated by the following conclusions:

1. The assumption of a relationship between a laboratory response to deviant stimulus material and sexually assaultive behavior is unlikely.
2. Arousal to aggressive sexual stimuli in the laboratory doesn't necessarily indicate an assaultive man.
3. Blader and Marshall<sup>24</sup> referring to Quincey<sup>25</sup>

report data showing pretreatment arousal to child stimuli is correlated with postrelease recidivism among child molesters. Additionally, they refer to a report by Marshall and Barbaree<sup>26</sup> that treatment had the effect of normalizing previously deviant sexual preferences in child molesters. However, the conclusion of Blader and Marshall<sup>24</sup> is that changes in erectile response with treatment do not predict outcome and that treatment-induced changes are unrelated to long-term outcome.

Despite its many advantages in the assessment of sex offenders, an overreliance on the objective measures derived from the plethysmograph must be cautioned against. Pithers and Laws<sup>21</sup> found that although the plethysmograph is important in assessing and treating sexual aggressors, it should not be the only procedure used to evaluate these subjects.

## Treatment

According to Abel and Blanchard<sup>23</sup> the most effective and widely used form of treatment with sex offenders is behavior modification. This is because of the objective and precise shaping techniques and measurement strategies, combined with the relatively low cost associated with quicker results. Objective measures provide some fairly conclusive evidence that aversion therapy, exposure, shaping, and systematic desensitization lead to increases in nondeviant arousal. The plethysmograph has the capability of providing an objective and fairly precise measurement method when compared with the complete lack of reliability associated with the client's self-report. Additionally it seems to be able to differentiate some sex offenders from nonoffenders.

## The Plethysmograph

McGuire *et al.*<sup>27</sup> felt that the shaping of deviant behavior can be the result of early life learning experiences. When masturbation and orgasm act as reinforcers of early life sexual fantasies and experiences, the implication is that deviant behaviors can be acquired in this way.

McConaghy<sup>28</sup> recommended that one form of treatment for a disorder acquired through reinforcement of sexual deviancy would be to recondition the subject to nondeviant stimuli (pictures of age-appropriate nude women). Reconditioning to appropriate stimuli would seem to be realistic based on the results of several studies that have demonstrated that it is possible to experimentally condition arousal in males to previously neutral or aversive stimuli.

Conte<sup>29</sup> felt that assessment of the subject's sexual arousal is an important component of community-based treatment. Rosen and Kopel<sup>30</sup> demonstrated a dramatic example of the unreliability of self-report as a treatment outcome measure. The behavior of a transvestite-exhibitionist was gradually eliminated through analogue biofeedback procedures. After two years of apparently successful follow-up, it was learned that the subject had been deceptive during the greater part of the follow-up period. This is an example of how easy it is for the subject to exaggerate, dissimulate, or simply lie to the clinician. In a later article, Rosen and Kopel<sup>31</sup> concluded that perhaps if the authors had used the plethysmograph during the follow-up with the subject instead of self-report, they might have detected the false out-

come reports and been cued to the gradual return of the deviant arousal pattern.

Freund,<sup>6</sup> on the other hand, cautioned that researchers shouldn't be too optimistic about phallometric test methods as a means of validating positive therapeutic effects. The only situation where we can be relatively confident is when the subject claims improvement and the test shows negative results. In support of this view, Harris<sup>32</sup> reported of clinical failure on follow-up despite plethysmograph evidence of cure. He blamed the lack of double-blind studies, a failure to introduce an experimental method of measuring learned treatment compliance.

### Reliability

According to Annon<sup>33</sup> a major stumbling block in the assessment and treatment of sex offenders has been a lack of an objective and reliable measure of sexual arousal. To be considered reliable, a test must display consistency in measurement over time. Theoretically, measures from one source should be comparable to measures from another source, providing the measures are a percentage of full 100 percent arousal. Marshall and Barbaree<sup>26</sup> felt that the plethysmograph had the necessary reliability and wrote:

...essentially, what we do in the laboratory assessment of sexual preference is measuring [sic] changes in the man's erectile response while he watches, listens to, or reads descriptions or depictions of various activities. . . . [W]e have shown these measures to be reliable in the sense that they are stable over time even when measured repeatedly in a short period.

An opposing view is presented by Far-

rall and Card,<sup>3</sup> who pointed out that there is a lack of reliability between the different types and models of plethysmographs being used today. The unreliability may be the result of lack of standards in the interpretation of results, lack of control over how stimuli are selected and presented, and finally, the ability of sophisticated offenders to control their sexual responses. The current argument is not whether the plethysmograph has a role in the assessment of sex offenders, rather the point is one of caution. As Laws and Holmen,<sup>34</sup> and Laws and Osborne<sup>35</sup> point out, despite the possibility of the results being influenced, penile erection is the single best index of sexual arousal.

### Validity

The original uses of the penile plethysmograph were to detect tumescence in the penis. Gradually the uses have been extended to include more and more predictive applications. When the validity of the plethysmograph is to be considered, the specific application must also be considered. For detecting male arousal, the validity is very high. In a predictive application the validity is much lower.

Earls<sup>36</sup> claimed validity in the differentiation of sex offenders from nonoffenders. Freund<sup>8</sup> concluded the plethysmograph has high validity as a test of erotic preference but pointed out it has substantial limitations. One of the limitations is that manipulation of the test responses can be learned or improved on by some subjects and there are no

true means to monitor response suppression or false positives.

Quincey<sup>37, 38</sup> claimed that penile response is the best technology available for the investigation of age preference but not actual sexual preference. McConaghy<sup>39</sup> duplicated research by Freund<sup>7</sup> showing that the sexual orientation of cooperative males could be validly measured.

Many of the research articles have attempted to measure the validity of the plethysmograph by differentiating rapists from nonrapists (Abel *et al.*,<sup>40</sup> Quincey *et al.*,<sup>41</sup> Quincey and Chaplin<sup>42</sup>). Abel *et al.*<sup>43</sup> conducted research concluding that rapists show high arousal to rape stimuli and low responses to consenting scenes. Quincey *et al.*<sup>44</sup> concluded that the amount of violence in the rape descriptions was critical in differentiating rapists from nonrapists. Quincey and Chaplin<sup>45</sup> in a duplication of prior studies by Quincey,<sup>42, 46</sup> Abel *et al.*,<sup>47</sup> and Avery-Clark and Laws<sup>20</sup> found that men who have committed violent rapes tend to be more sexually aroused by violent sexual scenes than other men.

Two recent studies showed that child molesters can be detected by using the plethysmograph and proper stimuli. Murphy *et al.*<sup>48</sup> concluded that pedophiles respond best to slides of children whereas incest offenders respond best to slides of adults. This appears to suggest support for the differences in sexual preference between nonexclusive and exclusive pedophiles. Using audio tapes, both groups responded best to tapes of children over adults, although homosexual pedophiles responded significantly more

## The Plethysmograph

to children. Ten percent of subjects, in the laboratory, could not become sexually aroused regardless of stimulus.

The second study, conducted by Quincey and Chaplin<sup>45</sup> concluded that child molesters preferred stories involving sex with children to sex with adults, and showed marked interest in children of both genders regardless of their history of gender preference. They did not respond to depictions of nonsexual violence involving children. However, they did respond to stories describing sex with children whether passive, coercive, or violent, and responded relatively more to coercive sex with children if they have physically injured their victims in the past.

Freund<sup>49</sup> concluded that pedophilia cannot be explained solely on the basis of preference for or aversion to particular sex-specific stimulus. In a later study, Freund *et al.*<sup>50</sup> used the penile plethysmograph to look at the following issues:

1. Do nondeviant males erotically discriminate among different ages of females? They found that females older than five were more desirable than male children.
2. They also found that males who have no deviant object preferences have clearly positive sexual reactions to six- to eight-year-old females.

The generalization drawn from this study does not imply that every adult male is equally erotically sensitive to little girls; however, the number of people sensitive in this regard may be substantial.

Despite claims pointing out areas where the plethysmograph may have validity, much of the current literature deals with the lack of validity that the

plethysmograph has because of the ability of the subjects to produce false negatives (suppression) and false positives, (Abel *et al.*,<sup>51</sup> Avery-Clark and Laws,<sup>20</sup> Earls,<sup>4, 36</sup> Freund<sup>6, 49</sup> Freund and Blanchard,<sup>5</sup> Hall and Proctor,<sup>52</sup> Kaine *et al.*,<sup>53</sup> Laws and Rubin,<sup>54</sup> Laws and Holmen,<sup>34</sup> Rosen and Kopel,<sup>31</sup> Rosen and Keefe<sup>18</sup>).

Freund *et al.*<sup>55</sup> suggested that there are three types of feigning:

1. "Pumping," which results from voluntary contractions of the stomach and perineal muscles.
2. High responses to sexually neutral stimuli may be an indicator of suppression.
3. Occurrence of a high response to a stimuli category of opposite gender to the category most responded to. This implies an attempt to show preference to the gender opposite to the gender preferred.

The conclusion is that feigning of erotic preference to the age of the partner is easier than feigning preference to the gender of the partner.

One of the validity problems is being sure of what stimulus is causing the aroused response in the subject. Abel and Blanchard<sup>23</sup> pointed out that erectile responses are not necessarily simple reflexive responses to stimuli that were presented but that these erectile responses can be strongly influenced by the individual's thoughts and fantasies. In an attempt to control the thoughts or fantasies of the subject, as well as the subject's ability to control their response, they suggested that the following points should be considered:

1. Use the most powerful stimulus modality and content available. Laws and Osborne<sup>35</sup> agreed that "highly explicit and pornographic material" is preferred.

2. Use continuous measures of both arousal and voluntary inhibition of erection responses to sexual stimuli to establish a baseline of inhibition.

Malcolm *et al.*<sup>56</sup> felt that the ability to suppress ongoing arousal is dependent upon both the content of the stimulus present during the attempt to suppress and the level of presuppress arousal. The cutoff point seems to be approximately 50 percent. When preferred sexual stimuli were presented, control was weaker than when nonpreferred stimuli were presented.

Another problem often encountered in the laboratory that affects the validity of the assessment is the flat response. Farrall and Card<sup>3</sup> noted that 20 percent of known sex offenders show no arousal to any sexual stimuli and some offenders show almost equal response to deviant and nondeviant stimuli. Annon<sup>33</sup> agreed that the "the weakest data are when all the results indicate a flat response or a response of less than 10 percent across the board." In these situations one of three conclusions can be drawn:

1. The individual is not generally aroused to that category of people.
2. The stimuli fail to describe the sexual content or behavior for that person.
3. The person was able to successfully control arousal.

### Conclusion

There is much support in the scientific community for the proper usage of the penile plethysmograph for the assessment and treatment of male sexual offenders. It is generally recognized that the plethysmograph is the best objective measure of male sexual arousal because blood flow to the genital area does not

seem to be influenced by factors other than sexual eroticism. However, as Pithers and Laws<sup>21</sup> pointed out, the plethysmograph has its limitations. Some of the most obvious limitations are overinterpretation of data (i.e., predictions of guilt, innocence, and recidivism), lack of standards for training and interpretation of data, lack of norms and standardization, and susceptibility of the data to false negatives and false positives.

Misuse of the plethysmograph is a major concern. Using the plethysmograph to predict innocence, guilt, or likelihood of reoffending is beyond the scope of the test's validity. In this application the plethysmograph has not "gained the general acceptance" required by *Frye v. United States*<sup>1</sup> to be acceptable in a court of law. Earls<sup>36</sup> concluded that predicting who is at risk to commit a sexual crime and who is likely to recidivate cannot be predicted with even a moderate level of confidence. A person accused of a sexual crime, denying any wrongdoing, cannot have guilt or innocence determined by a psychological evaluation. Travin *et al.*<sup>2</sup> felt the only application of penile measurement in the forensic setting would be as part of an evaluation regarding potential treatment and that the major potential abuse would be its use as evidence for conclusionary purpose.

Along with the misuse of the plethysmograph, there is a complete lack of standards for the equipment, training of operators, administration of the test, choice and method of presenting stimulus material, and interpretation of data. With most psychometric testing there

## The Plethysmograph

are standard instructions for the administration and interpretation of the test. Although there has been research into most of these areas, much more research remains to be conducted. The standards must come as a result of the research. Freund and Blanchard<sup>5</sup> stated that they cannot "condone the use of diagnostic phallometric tests by narrowly informed technical experts or their application in the same manner in which lie detector procedures are sometimes administered."

The best psychometric tests have been meticulously standardized using a large number of subjects representing the population. One of the main difficulties with research using the plethysmograph has been the lack of studies with normal populations. Without comparing test results from sex offenders against those of the normal population, the interpretation of data will continue to lack the validity needed for scientific empirical conclusions.

Much of the recent literature about the plethysmograph acknowledges the ability of test subjects to control their sexual arousal. Some men can exert voluntary control over their erectile response, and for some aggressors the sexual arousal component plays a minimal role (Earls<sup>36</sup>). Until a way can be devised to detect and/or control false negatives and false positives, the validity of the test data will be questionable.

Perhaps Laws and Holmen<sup>34</sup> summarized as well as anyone what the current view of the plethysmograph should be as a psychometric test. They concluded that

We should continue to use penile erection as a primary dependent measure because, despite its amenability to influence, it remains the single best index of sexual arousal. What we should not do is to continue to treat reverently as a truly objective measure.

## References

1. Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923)
2. Travin S, Cullen K, Melella JT: The use and abuse of erection measurements: A forensic perspective. *Bull Am Acad Psychiatry Law* 16:235-50, 1988
3. Farrall WR, Card RD: Advancements in physiological evaluation of assessment and treatment in the sexual aggressor. in *Human Sexual Aggression: Current Perspectives*. Edited by Prentky R, Quinsey VL. New York, New York Academy of Sciences, 1988
4. Earls CM: Clinical issues in the psychological assessment of child molesters. An unpublished manuscript, 1989
5. Freund K, Blanchard R: Phallometric diagnosis of pedophilia. *J Consult Clin Psychol* 57:100-5, 1989
6. Freund K: Assessment of pedophilia, in *Adult Sexual Interest in Children*. Edited by Cook M, Howells K. New York. Academic Press, 1981, pp 139-79
7. Freund K: A laboratory method for diagnosing predominance of homo- or heteroerotic interest in the male. *Behav Res Ther* 1:85-93, 1963
8. Freund K: Psychophysiological assessment of change in erotic preferences. *Behav Res Ther* 15:297-301, 1977
9. Loiselle RH, Mollenauer S: Galvanic skin responses to sexual stimuli in a female population. *J Genet Psychol* 73:273-8, 1965
10. Craig KD, Wood K: Autonomic components of observers' responses to pictures of homicide victims and nude females. *J Exp Res Perspect* 5:304-9, 1971
11. Wenger MA, Averill JR, Smith DDB: Autonomic activity during sexual arousal. *Psychophysiology* 4:468-78, 1968
12. Adamson JD, Romano KR, Burdick JA, Corman CL, Chebib FS: Physiological responses to sexual and unpleasant film stimuli. *J Psychosomat Res* 16:153-62, 1972
13. Hess EH, Polt JM: Pupil size as related to interest value of stimuli. *Science* 132:349-50, 1960
14. Hess EH, Seltzer AL, Shlien JM: Pupil responses to hetero- and homosexual males to

- pictures of men and women: a pilot study. *J Abnorm Psychol* 70:165-8, 1965
15. Atwood RW, Howell RJ: Pupillometric and personality test score differences of female aggressing pedophiles and normals. *Psychonom Sci* 22:115-7, 1971
  16. Costell R, Lunde DT, Kopell BS, Wittner WK: Contingent negative variation as an indicator of sexual object preference. *Science* 177:718-20, 1972
  17. Lifshitz K: The averaged evoked cortical response to complex stimuli. *Psychophysiology* 3:55-68, 1966
  18. Rosen RC, Keefe FJ: The measurement of human penile tumescence. The Society for Psychological Research Inc., 1978, pp 366-76
  19. Weiss HD: The physiology of the human penile erection. *Ann Intern Med* 76:793-9, 1972
  20. Avery-Clark CA, Laws DR: Differential erection response patterns of sexual child abusers to stimuli describing activities with children. *Behav Ther* 15:71-83, 1984
  21. Pithers WD, Laws DR: The penile plethysmograph: uses and abuses in assessment and treatment of sexual aggressors. *Sex Offenders: Issues in Treatment*. Washington DC, National Institute of Corrections, 1988
  22. Abel GG, Barlow DH, Blanchard EB, Mavissakalian M: Measurement of sexual arousal in male homosexuals: effects of instructions and stimulus modality. *Arch Sex Behav* 4:623-9, 1975
  23. Abel GG, Blanchard EB: The measurement and generation of sexual arousal in male sexual deviates. *Prog Behav Modif* 2:99-136, 1976
  24. Blader JC, Marshall WL: Is assessment of sexual arousal in rapists worthwhile? A critique of current methods and the development of a response compatibility approach. *Clin Psychol Rev* 9:569-87, 1989
  25. Quinsey VL: Prediction of recidivism and the evaluation of treatment programs for sex offenders, in *Sexual Aggression and the Law*. Edited by Verdun-Jones SN, Keltner AA. Burnaby, BC, Simon Fraser University, 1983, pp 27-40
  26. Marshall WL, Barbaree HE: A behavioral view of rape. *Int J Law Psychiatry* 7:51-77, 1984
  27. McGuire RJ, Carlise JM, Young BG: Sexual deviation as conditioned behavior: a hypothesis. *Behav Res Ther* 2:185-90, 1965
  28. McConaghy N: Penile response conditioning and its relationship to aversion therapy in homosexuals. *Behav Ther* 1:213-21, 1970
  29. Conte JR: Clinical dimensions of adults sexual abuse of children. *Behav Sci Law* 3:341-54, 1985
  30. Rosen RC, Kopel SA: Penile plethysmograph and biofeedback in the treatment of a transvestite-exhibitionist. *J Consult Clin Psychol* 45:908-16, 1977
  31. Rosen RC, Kopel SA: Role of penile tumescence measurement in the behavioral treatment of sexual deviation: issues and validity. *J Consult Clin Psychol* 46:1519-21, 1978
  32. Harris CG: Abusing the abusers, or, I'm only trying to help you. *The Champion*. Jan/Feb:14-6, 1986
  33. Annon JS: Reliability and validity of penile plethysmograph in rape and child molestation cases. *Am J Forens Psychol* 6(2):11-26, 1988
  34. Laws DR, Holmen ML: Sexual response faking by pedophiles. *Crim Just Behav* 5:343-56, 1978
  35. Laws DR, Osborn CA: How to build and operate a behavioral laboratory to evaluate and treat sexual deviance, in *The Sexual Aggressor: Current Perspectives on Treatment*. Edited by Greer JG, Stuart IR. New York, Van Nostrand, Reinhold, 1983, pp 293-335
  36. Earls CM: Some issues in the assessment of sexual deviance. *Int J Law Psychiatry* 6:431-41, 1983
  37. Quinsey VL: The assessment and treatment of child molesters: a review. *Can Psychol Rev* 18:204-20, 1977
  38. Quinsey VL: Men who have sex with children, in *Law and Mental Health: International Perspectives*. Edited by Weistubb D. New York, Pergamon Press, 1985
  39. McConaghy N: Penile volume change to moving pictures of male and female nudes and heterosexual and homosexual males. *Behav Res Ther* 5:43-8, 1966
  40. Abel GG, Barlow DH, Blanchard EB, Guild D: The components of rapists' sexual arousal. *Arch Gen Psychiatry* 34:895-903, 1977
  41. Quinsey VL, Chaplin TC, Varney G: A comparison of rapists' and non-sex offenders' sexual preferences for mutually consenting sex, rape, and physical abuse of women. *Behav Assessment* 3:127-35, 1981
  42. Quinsey VL, Chaplin TC: Stimulus control of rapists' and non-sex offenders' sexual arousal. *Behav Assess* 6:169-76, 1984
  43. Abel GG, Becker JV, Blanchard EB, Djenderedjian A: Differentiating sexual aggress-

## The Plethysmograph

- sives with penile measures. *Crim Just Behav* 5:316-31, 1978
44. Quinsey VL, Chaplin TC, Upfold D: Sexual arousal to nonsexual violence and sadomasochistic themes among rapists and non-sex-offenders. *J Consult Clin Psychol* 52:651-7, 1984
  45. Quinsey VL, Chaplin TC: Penile responses of child molesters and normals to descriptions of encounters with children involving sex and violence. *J Interpersonal Violence* 3:259-74, 1988
  46. Quinsey VL, Chaplin TC: Penile responses to nonsexual violence among rapists. *Crim Just Behav* 9:372-81, 1982
  47. Abel GG, Becker JV, Murphy WD, Flanagan B: Identifying dangerous child molesters, in *Violent Behavior: Social Learning Approaches to Prediction, Management, and Treatment*. Edited by Stuart R. New York, Brunner/Mazel, 1981, pp 116-37
  48. Murphy WD, Haynes MR, Stalgaitis SJ, Flanagan B: Differential sexual responding among four groups of sexual offenders against children. *J Psychopathol Behav Assessment* 8:339-53, 1986
  49. Freund K: Diagnosing homo or heterosexuality and erotic age-preference by means of a psychophysiological test. *Behav Res Ther* 5:209-28, 1967
  50. Freund K, McKnight CK, Langevin R, Cibiri S: The female child as a surrogate object. *Arch Sex Behav* 2:119-33, 1972
  51. Abel GG, Blanchard EB, Barlow DH: Measurement of sexual arousal in several paraphilias: the effects of stimulus modality, instructional set and stimulus content on the objective. *Behav Res Ther* 19:25-33, 1980
  52. Hall GCN, Proctor WC: The validity of physiological measures of pedophilic sexual arousal in a sexual offender population. *J Consult Clin Psychol* 56:118-22, 1988
  53. Kaine A, Crim M, Mersereau G: Faking sexual preference. *Can J Psychiatry* 33:379-85, 1988
  54. Laws DR, Rubin HB: Instructional control of an autonomic sexual response. *J Appl Behav Anal* 2:93-9, 1969
  55. Freund K, Watson R, Rienzo D: Signs of feigning in the phallometric test. *Behav Res Ther* 26:105-12, 1988
  56. Malcolm PB, Davidson PR, Marshall WL: Control of penile tumescence: the effects of arousal level and stimulus content. *Behav Res Ther* 23:273-80, 1985