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**MEMO**

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**TO:** COMMUNITY SAFETY ADVISORY COMMISSION MEMBERS

**FROM:** VLAD KOGAN

**SUBJECT:** USE OF POLYGRAPH IN PRE-EMPLOYMENT SCREENING

**DATE:** JUNE 27, 2018

**CC:** BRYAN CLARK  
ELON SIMMS

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Dear Fellow Commissioners,

I'm writing to follow up on the polygraph document that Bryan Clark circulated last week. I have asked Bryan and Elon to also share with you a 2003 report by the National Research Council that looks at (and ultimately recommends against) using the polygraph in an employment screening context. I hope you have a chance to review that report — particularly its discussion of “evidence suggesting that truthful members of socially stigmatized groups ... may show emotional and physiological responses in polygraph test situations that mimic the responses that are expected of deceptive individuals” (p. 3). In this memo, I wanted to focus on a different issue addressed in the document that Bryan circulated.

Specifically, the document summarizes the results of a study on the accuracy of polygraphs conducted by Dr. Philip Crewson for the Office of Technology Assessment.<sup>1</sup> Crewson summarizes available studies on the use of polygraph techniques when used for “screening” applications (including pre-employment screening) and concludes that the overall accuracy in such applications is 0.74 (74%).<sup>2</sup> However, we need to be careful about how we interpret this number. You might conclude based on this information that if a polygraph examinee is flagged as being “deceptive,” this classification will be accurate 74% of the time — that is, 74% of those identified as being “deceptive” are in fact deceptive. This interpretation would be incorrect.

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<sup>1</sup> The document also reports accuracy metrics from a separate American Polygraph Association meta-analysis that analyzes different polygraph techniques. However, many of the statistics presented are not from “screening” polygraph applications, which are known to have lower accuracy than other types of polygraph applications, so I focus on Crewson analysis. My main points apply to the APA findings as well, although the precise values may be somewhat different.

<sup>2</sup> He also shows that the accuracy for “diagnostic” applications is somewhat higher, but this is less analogous to polygraph use for pre-employment screening.

The 74% is a combination of two measures, called “sensitivity” and “specificity.” Sensitivity is the probability of correctly detecting deception among polygraph takers who are actually deceptive. Specificity is the probability of correctly *not detecting* deception among honest polygraph takers. Crewson concludes that the sensitivity of the polygraph when used for screening applications is 67% and the specificity is 86%.

Here is an example that puts these numbers in context. Suppose that 100 CPD applicants are screened using a polygraph for a disqualifiable behavior (e.g., child pornography, to use an example from the other presentations). Suppose further that 10 of these applicants are actually “guilty” of engaging in this behavior, while the remaining 90 are “not guilty,” but all deny engaging in it during the polygraph.<sup>3</sup> Crewson’s sensitivity and specificity estimates will lead to the results presented in Table 1 below. With a sensitivity of 0.67, 7 of the 10 “guilty” applicants will be correctly flagged as being deceptive in response to the child pornography questions. With a specificity of 0.86, 13 of the 90 “not guilty” applicants will also be incorrectly flagged as being deceptive. In total, 19 of the 100 applicants will be identified as being deceptive — *even though two-thirds are not guilty* (“false positives”).

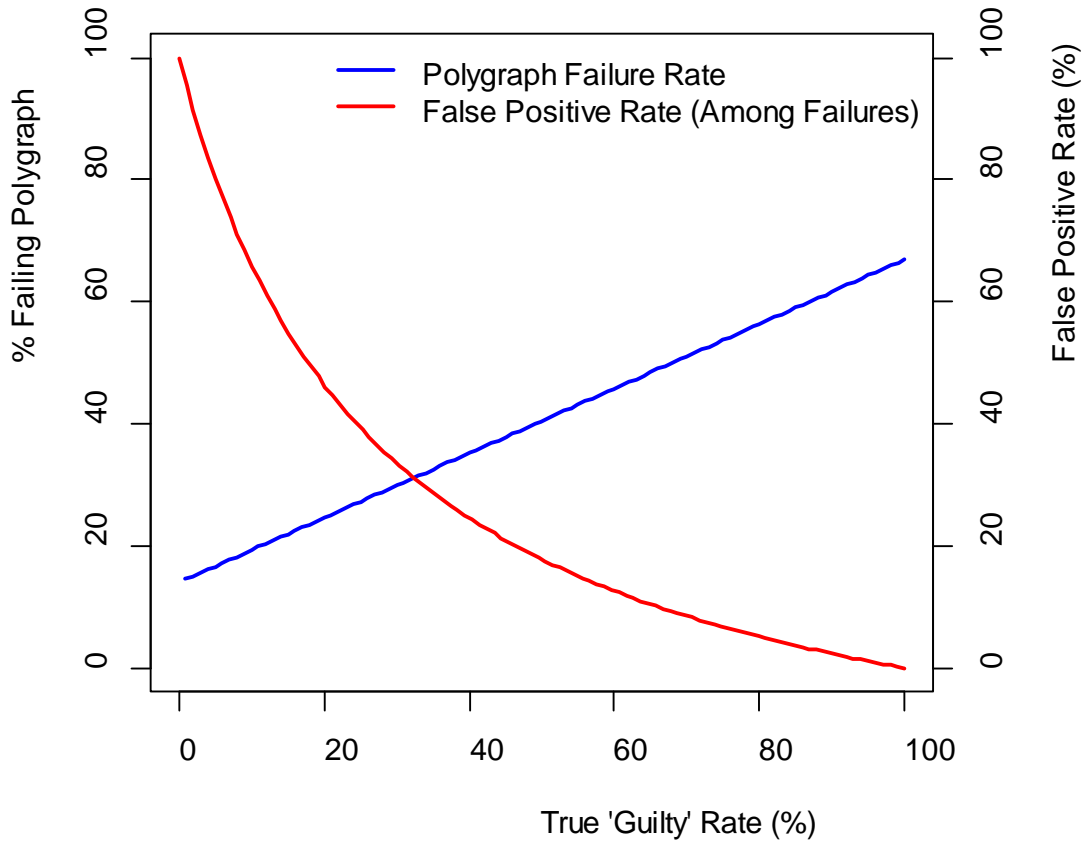
**Table 1. Example Polygraph Results Using Sensivity and Specificity Parameters from Crewson Study**

<i>Polygraph Results</i>	<i>True Status</i>		<i>Total</i>
	<b>Guilty</b>	<b>Not Guilty</b>	
<b>Deceptive</b>	7	13	19
<b>Not Deceptive</b>	3	77	81
<i>Total</i>	10	90	100

The general point is that for behaviors or characteristics that are relatively uncommon in the population, many of those flagged as being deceptive during a polygraph screening will be false positives, even when the overall accuracy of the polygraph is high. Figure 1 below demonstrates this, again using the parameter values from the Crewson study and assuming that all polygraph takers deny engaging in disqualifying behavior. The horizontal (x) axis plots the true “guilty” rate in the population being screened. The blue line plots the percent of examinees who fail the polygraph (left vertical axis). The red line is the share of polygraph failures who are “false positives” — examinees who are actually not guilty, but are flagged as being deceptive in the polygraph (right vertical axis). When the true rate of “guilty” behavior in the population is less than 20%, *the majority of those who fail the polygraph are incorrectly identified as being deceptive* (“false positives”).

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<sup>3</sup> In actual applications, the true “guilty” rate is unknown, of course. Hence the motivation for using the polygraph.



**Figure 1. Polygraph Performance Across Different Scenarios**

As the polygraph document distributed by Bryan notes, many of the concerns about the accuracy and reliability of polygraph screening “could be raised about medical and psychological diagnostic tools” (p. 6). And this analogy is instructive. In the United States, a panel of national experts known as the Preventative Services Task Force makes evidence-based recommendations for medical treatment. In recent years, the Task Force reviewed the evidence surrounding the accuracy of common diagnostic techniques used to screen for both breast and prostate cancer. Although both the sensitivity and specificity of screening tests for these diseases are considerably higher than is the case for polygraph, the Task Force recommended [against routine screening for prostate cancer](#) and [against mammography screening for women under the age of 50](#) for individuals without other risk factors for these diseases. These recommendation were driven by concerns that, even with very accurate diagnostic techniques, the rate of false positives relative to true positives for both types of tests were too high, leading to unnecessary follow-on diagnostics and treatment with their own negative health effects.

I raise these issues to make two general points I hope the commission will consider further: (1) To the extent that pre-employment polygraph screening is a major contributor for why a significant number of CPD applicants do not ultimately receive employment offers, the value-added of this screening deserves to be evaluated more closely. This especially true if non-white applicants fail the polygraph at higher rates than white applicants. (2) For polygraph screening questions or topics that produce failure rates of under 20 percent, the known sensitivity and specificity imply that most of those who fail are in fact being truthful and are incorrectly flagged as being deceptive (i.e., are “false positives”).