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## FIELD SOBRIETY TESTS: CRIMINAL INJUSTICE

Okorie Okorochoa<sup>1</sup>

### I. INTRODUCTION

In the late 1970s, the National Highway Traffic Safety Administration (“NHTSA”) began to commission research conducted by psychologists to develop standardized field sobriety tests (“SFSTs”).<sup>2</sup> Law enforcement officers could use these tests to determine whether a driver was above the legal limit of blood alcohol content (“BAC”).<sup>3</sup> These officers perform these physical tests on the side of the road on an individual suspected of driving under the influence (“DUI”), and the officer uses the driver’s performance to determine whether the driver is too impaired to drive or has a BAC

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<sup>1</sup>Okorie Okorochoa, M.S. (Pharmaceutical Science-Specialization in Forensic Science), J.D., has been held to be an expert in forensic science and toxicology in DUI cases in the Superior Courts of sixteen counties in California. He thanks Stefan Rose, M.D., who inspired this article through his teachings and research.

<sup>2</sup> Nat’l Highway Traffic Safety Ass’n (NHTSA) (last viewed on Mar. 4, 2013,

<http://www.nhtsa.gov/people/injury/alcohol/sfst/introduction.htm>).

<sup>3</sup> *Id.*

above the legal limit.<sup>4</sup> “A formal program of training was developed and is available through the NHTSA to help law enforcement officers become more skillful at detecting [Driving While Intoxicated (“DWI”)] DWI [i.e., DUI] suspects, describe the behavior of these suspects, and present effective testimony in court.”<sup>5</sup> This article argues that these tests have serious flaws that render them invalid and unreliable. Furthermore, a BAC above the legal limit does not correlate to impairment as a general rule, and, in some individuals, no correlation exists to support legal action.<sup>6</sup> Section II discusses Standard Field Sobriety Test Field Studies. Section III explains the administration of and flaws of the three test battery, including horizontal gaze nystagmus test, One-Leg Stand test, Walk and Turn Test. Section IV argues why field sobriety tests are not indicative of impairment or BAC and Section V discusses experimental

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<sup>4</sup> *Id.*

<sup>5</sup> NHTSA, Standardized Field Sobriety Testing, APPENDIX A (last viewed on Mar. 4, 2013, [http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix\\_a.htm](http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix_a.htm)).

<sup>6</sup> Marcelline Burns, *An Overview of Field Sobriety Test Research*, 97 PERCEPTUAL & MOTOR SKILLS 1187 (2003).

evidence of SFST inaccuracy. Section IV concludes that these tests need to be abolished in the interest of justice.

## II. STANDARD FIELD SOBRIETY TESTS (SFST) FIELD STUDIES

The NHTSA-commissioned studies and subsequent reports did not include input from neurophysiological, medical, neurological, ophthalmological, and biomechanical engineering professionals; this input might have shed light on the tests' possible flaws.<sup>7</sup> Likewise, the NHTSA did

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<sup>7</sup> See generally NHTSA, *Standardized Field Sobriety Testing*, APPENDIX A (last viewed on Mar. 4, 2013, [http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix\\_a.htm](http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix_a.htm)); James Roberts, et. al, *Alcohol Levels Do Not Accurately Predict Physical or Mental Impairment in Ethanol-Tolerant Subjects: Relevance to Emergency Medicine and Dram Shop Laws*, 6 J. MED. TOXICOL. 438 (2010); Marcelline Burns, *An Overview of Field Sobriety Test Research*, 97 PERCEPTUAL & MOTOR SKILLS 1187 (2003); Marcelline Burns, *The Robustness of the Horizontal Gaze Nystagmus (HGN) Test*, U.S. Dep't of Transp., No. HS-810 831 (2007); Marcelline Burns, et al, *A Colorado Validation Study of the Standardized Field Sobriety Tests (SFST) Battery*, S. Cal. Res. Inst. (1995); Marcelline Burns, et al. *A Florida Validation Study of the Standardized Field Sobriety Test (SFST) Battery*, Fla. Dep't of Health (1997); Marcelline Burns, et al. *Psychophysiological Tests for DWI Arrest, Final Report*, Dep't of Traffic & Highway Safety, DOT-HS-802-424 (1977); Marcelline Burns., et al, *The Observational Threshold of Horizontal Gaze Nystagmus*, In Proceedings of the 15th

not provide any explanation as to why it chose psychologists to conduct these experiments.<sup>8</sup>

The test battery's development produced assessments of intricate ocular movements, balance, vestibular function, proprioception, vision, and neurological function.<sup>9</sup> Specialists designed these tests for police officers to conduct, despite these police officers having no formal education in these areas except a two- to three-day seminar.<sup>10</sup> For a complete understanding of these tests, this article addresses the above-mentioned neglected

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Annual Conference on Alcohol, Drugs & Traffic Safety (2000); Nat'l Highway Traffic Safety Admin., U.S. Dep't of Transp., *Driving While Intoxicated (DWI) Detection and Standardized Field Sobriety Testing, Instructors Manual*, DOT HS 178 R1/02 (2002); Nat'l Highway Traffic Safety Admin., U.S. Dep't of Transp., *Driving While Intoxicated (DWI) Detection and Standardized Field Sobriety Testing, Instructors Manual*, HS 178 R9/04 (2004); Nat'l Highway Traffic Safety Admin., U.S. Dep't of Transp., *Improved Sobriety Testing*, DOT HS 806 512 (1984); Jack Stuster, et al, *Validation of the Standardized Field Sobriety Test Battery at BACs Below 0.10 Percent, Final Report, Submitted to: U.S. Department of Transportation National Highway Traffic Safety Administration*, Anacapa Sciences, Inc., at 19 (1998). See Clinical Epidemiology & Evidence-Based Medicine Glossary: Clinical Study Design and Methods Terminology (last viewed on Mar. 9, 2013, <http://www.vetmed.wsu.edu/courses-jmgay/glossclinstudy.htm>).

<sup>8</sup> *Id.*

<sup>9</sup> *Id.*

<sup>10</sup> *Id.*

disciplines and their advancements across the last thirty years.

NHTSA does not release raw data from standardization trials or field studies; however, a cursory reading of reports on the studies shows a flawed experimental design and a failure to follow the most rudimentary scientific procedures.<sup>11</sup> For instance, the studies lacked control groups, did not randomize subjects and conditions, lacked prior screening of test subjects to determine whether they were ever able to demonstrate good performance in these exercises, did not undergo peer review, and failed to publish the resulting data with the reports.<sup>12</sup>

Ironically, although the authors asserted that they were developing tests to determine BAC, blood was never tested.<sup>13</sup> Instead, the studies relied on

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<sup>11</sup> *Id.*

<sup>12</sup> *Id.*

<sup>13</sup> See generally NHTSA, *Standardized Field Sobriety Testing*, APPENDIX A (last viewed on Mar. 4, 2013, [http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix\\_a.htm](http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix_a.htm)); James Roberts, et. al, *Alcohol Levels Do Not Accurately Predict Physical or Mental Impairment in Ethanol-Tolerant Subjects: Relevance to Emergency Medicine and Dram Shop Laws*, 6 J. MED. TOXICOL. 438 (2010); Marcelline Burns, *An Overview of Field*

breath tests that are notoriously inaccurate when administered within hours of alcohol consumption.<sup>14</sup> Therefore, since the breath alcohol

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*Sobriety Test Research*, 97 PERCEPTUAL & MOTOR SKILLS 1187 (2003); Marcelline Burns, *The Robustness of the Horizontal Gaze Nystagmus (HGN) Test*, U.S. Dep't of Transp., No. HS-810 831 (2007); Marcelline Burns, et al, *A Colorado Validation Study of the Standardized Field Sobriety Tests (SFST) Battery*, S. Cal. Res. Inst. (1995); Marcelline Burns, et al. *A Florida Validation Study of the Standardized Field Sobriety Test (SFST) Battery*, Fla. Dep't of Health (1997); Marcelline Burns, et al. *Psychophysiological Tests for DWI Arrest, Final Report*, Dep't of Traffic & Highway Safety, DOT-HS-802-424 (1977); Marcelline Burns., et al, *The Observational Threshold of Horizontal Gaze Nystagmus*, In Proceedings of the 15th Annual Conference on Alcohol, Drugs & Traffic Safety (2000); Nat'l Highway Traffic Safety Admin., U.S. Dep't of Transp., *Driving While Intoxicated (DWI) Detection and Standardized Field Sobriety Testing, Instructors Manual*, DOT HS 178 R1/02 (2002); Nat'l Highway Traffic Safety Admin., U.S. Dep't of Transp., *Driving While Intoxicated (DWI) Detection and Standardized Field Sobriety Testing, Instructors Manual*, HS 178 R9/04 (2004); Nat'l Highway Traffic Safety Admin., U.S. Dep't of Transp., *Improved Sobriety Testing*, DOT HS 806 512 (1984); Jack Stuster, et al, *Validation of the Standardized Field Sobriety Test Battery at BACs Below 0.10 Percent, Final Report, Submitted to: U.S. Department of Transportation National Highway Traffic Safety Administration*, Anacapa Sciences, Inc., at 19 (1998). See Clinical Epidemiology & Evidence-Based Medicine Glossary: Clinical Study Design and Methods Terminology (last viewed on Mar. 9, 2013, <http://www.vetmed.wsu.edu/courses-jmgay/glossclinstudy.htm>).

<sup>14</sup> See generally Michael Hlastala, et. al, 35(2) ANNALS OF BIOMEDICAL ENGINEERING 264 (Feb. 2007); Michael Hlastala, 23 DWI J. L. & SCI. 11 (2008); E. Martin, W. Moll, P. Schmid & L. Dettli, *The Pharmacokinetics of Alcohol in Human Breath, Venous and Arterial Blood after Oral Ingestion*, 36 EUR. J. CLIN. PHARMACOL. 619 (1984); Dominic Labianca, *Uncertainty in the Results of Breath-Alcohol Analyses*, 76 J. CHEM. ED. 508 (1999); Michael Hlastala, *Paradigm Shift for the Alcohol Breath Test*, 55 J. FORENSIC SCI. 451 (2010); Okorie Okorochoa, *Commentary on: K. Sterling, The Rate of Dissipation of Mouth Alcohol in Alcohol*

test has a high margin of error, these studies likely produced unreliable results.<sup>15</sup>

### III. THE THREE TEST BATTERY

NHTSA literature determined three tests to be the most reliable—later termed SFSTs: the horizontal gaze nystagmus, walk and turn, and one-leg stand tests.<sup>16</sup>

#### A. Horizontal Gaze Nystagmus Test

According to the NHTSA, involuntary bouncing or jerking of the eyeball, which results when the inner-ear, known as the vestibular system, or oculomotor control are disturbed is termed Nystagmus.<sup>17</sup> Horizontal gaze nystagmus (HGN)

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*Positive Subjects*, \_\_J. Forensic Sci\_\_ (2012) (in press); Okorie Okorochoa, *Alcohol Breath Testing: Is There Reasonable Doubt?*, 27 SYRACUSE SCI. & TECH. L. REP. 124 (2012); Dominic Labianca, *Statistical Analysis of Blood-to-Breath-Alcohol Ratio Data in the Logarithm-Transformed and Non-Transformed Modes*, 34 CLINICAL CHEMISTRY & LABORATORY MED. 111 (1996); G. Simpson, *Accuracy and Precision of Breath Alcohol Measurements for Subjects in the Absorptive State*, 33 CLINICAL CHEMISTRY 753 (1987).

<sup>15</sup> *Id.*

<sup>16</sup> *Id.*

<sup>17</sup> See generally Michael Hlastala, et. al, 35(2) ANNALS OF BIOMEDICAL ENGINEERING 264 (Feb. 2007); Michael Hlastala, 23

occurs when the eye gazes to the side and jerks horizontally or laterally.<sup>18</sup> After an impaired driver consumes certain central nervous system depressants, including alcohol, inhalants, or phencyclidine, the driver's brain is no longer able to properly control eye muscles.<sup>19</sup> The lack of control results in jerking or bouncing associated with HGN, which increases proportionally with impairment.<sup>20</sup> Officers assess this condition using the horizontal gaze nystagmus test.<sup>21</sup>

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DWI J. L. & SCI. 11 (2008); E. Martin, W. Moll, P. Schmid & L. Dettli, *The Pharmacokinetics of Alcohol in Human Breath, Venous and Arterial Blood after Oral Ingestion*, 36 EUR. J. CLIN. PHARMACOL. 619 (1984); Dominic Labianca, *Uncertainty in the Results of Breath-Alcohol Analyses*, 76 J. CHEM. ED. 508 (1999); Michael Hlastala, *Paradigm Shift for the Alcohol Breath Test*, 55 J. FORENSIC SCI. 451 (2010); Okorie Okorochoa, *Commentary on: K. Sterling, The Rate of Dissipation of Mouth Alcohol in Alcohol Positive Subjects*, \_\_J. FORENSIC SCI\_\_ (2012) (in press); Okorie Okorochoa, *Alcohol Breath Testing: Is There Reasonable Doubt?*, 27 SYRACUSE SCI. & TECH. L. REP. 124 (2012); Dominic Labianca, *Statistical Analysis of Blood-to-Breath-Alcohol Ratio Data in the Logarithm-Transformed and Non-Transformed Modes*, 34 CLINICAL CHEMISTRY & LABORATORY MED. 111 (1996); G. Simpson, *Accuracy and Precision of Breath Alcohol Measurements for Subjects in the Absorptive State*, 33 CLINICAL CHEMISTRY 753 (1987).

<sup>18</sup> *Id.*

<sup>19</sup> *Id.*

<sup>20</sup> *Id.*

<sup>21</sup> *Id.*

The HGN test requires a simple administration procedure.<sup>22</sup> To properly administer the test, the subject's eyes must be clearly visible.<sup>23</sup> The officer ensures visibility of the subject's eyes by administering the test using a flashlight or in a well-lit area.<sup>24</sup> Optokinetic nystagmus could be caused if the subject stares into car lights in traffic or on the police cruiser.<sup>25</sup> The subject may sit or stand, but must face away from blinking lights.<sup>26</sup> The law enforcement officer begins the test by informing the subject that "I am now going to check

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<sup>22</sup> *Id.*

<sup>23</sup> See generally Michael Hlastala, et. al, 35(2) ANNALS OF BIOMEDICAL ENGINEERING 264 (Feb. 2007); Michael Hlastala, 23 DWI J. L. & SCI. 11 (2008); E. Martin, W. Moll, P. Schmid & L. Dettli, *The Pharmacokinetics of Alcohol in Human Breath, Venous and Arterial Blood after Oral Ingestion*, 36 EUR. J. CLIN. PHARMACOL. 619 (1984); Dominic Labianca, *Uncertainty in the Results of Breath-Alcohol Analyses*, 76 J. CHEM. ED. 508 (1999); Michael Hlastala, *Paradigm Shift for the Alcohol Breath Test*, 55 J. FORENSIC SCI. 451 (2010); Okorie Okorochoa, *Commentary on: K. Sterling, The Rate of Dissipation of Mouth Alcohol in Alcohol Positive Subjects*, \_\_J. Forensic Sci\_\_ (2012) (in press); Okorie Okorochoa, *Alcohol Breath Testing: Is There Reasonable Doubt?*, 27 SYRACUSE SCI. & TECH. L. REP. 124 (2012); Dominic Labianca, *Statistical Analysis of Blood-to-Breath-Alcohol Ratio Data in the Logarithm-Transformed and Non-Transformed Modes*, 34 CLINICAL CHEMISTRY & LABORATORY MED. 111 (1996); G. Simpson, *Accuracy and Precision of Breath Alcohol Measurements for Subjects in the Absorptive State*, 33 CLINICAL CHEMISTRY 753 (1987).

<sup>24</sup> *Id.*

<sup>25</sup> *Id.*

<sup>26</sup> *Id.*

your eyes."<sup>27</sup> The officer informs the subject that the test will involve following an object with the eyes, but not with the head.<sup>28</sup> The head should remain still.<sup>29</sup> The officer will be observing whether a manifestation of HGN occurs, but the officer is not administering a vision test.<sup>30</sup> Using an object, such as a pen or the tip of a pen light, the officer holds the object slightly above the subject's eye-level about twelve to fifteen inches from the subject's face.<sup>31</sup> The placement of the object is

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<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

<sup>29</sup> See generally Michael Hlastala, et. al, 35(2) ANNALS OF BIOMEDICAL ENGINEERING 264 (Feb. 2007); Michael Hlastala, 23 DWI J. L. & SCI. 11 (2008); E. Martin, W. Moll, P. Schmid & L. Dettli, *The Pharmacokinetics of Alcohol in Human Breath, Venous and Arterial Blood after Oral Ingestion*, 36 EUR. J. CLIN. PHARMACOL. 619 (1984); Dominic Labianca, *Uncertainty in the Results of Breath-Alcohol Analyses*, 76 J. CHEM. ED. 508 (1999); Michael Hlastala, *Paradigm Shift for the Alcohol Breath Test*, 55 J. FORENSIC SCI. 451 (2010); Okorie Okorochoa, *Commentary on: K. Sterling, The Rate of Dissipation of Mouth Alcohol in Alcohol Positive Subjects*, \_\_J. FORENSIC SCI.\_\_ (2012) (in press); Okorie Okorochoa, *Alcohol Breath Testing: Is There Reasonable Doubt?*, 27 SYRACUSE SCI. & TECH. L. REP. 124 (2012); Dominic Labianca, *Statistical Analysis of Blood-to-Breath-Alcohol Ratio Data in the Logarithm-Transformed and Non-Transformed Modes*, 34 CLINICAL CHEMISTRY & LABORATORY MED. 111 (1996); G. Simpson, *Accuracy and Precision of Breath Alcohol Measurements for Subjects in the Absorptive State*, 33 CLINICAL CHEMISTRY 753 (1987).

<sup>30</sup> *Id.*

<sup>31</sup> See generally Michael Hlastala, et. al, 35(2) ANNALS OF BIOMEDICAL ENGINEERING 264 (Feb. 2007); Michael Hlastala, 23

designed to maximize the officer's ability to observe the subject's eyes.<sup>32</sup>

While conducting the test, the officer looks for six "cues" with three in each eye: lack of smooth pursuit, distinct and sustained nystagmus at maximum deviation, and onset of nystagmus prior to 45 degrees.<sup>33</sup> However, healthcare professionals, including neurologists, neuro-ophthalmologists, and ophthalmologists, assert that understanding eyes' physiology requires a more detailed analysis of eye movements.<sup>34</sup> None of these professionals have recommended a cursory roadside test performed in

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DWI J. L. & SCI. 11 (2008); E. Martin, W. Moll, P. Schmid & L. Dettli, *The Pharmacokinetics of Alcohol in Human Breath, Venous and Arterial Blood after Oral Ingestion*, 36 EUR. J. CLIN. PHARMACOL. 619 (1984); Dominic Labianca, *Uncertainty in the Results of Breath-Alcohol Analyses*, 76 J. CHEM. ED. 508 (1999); Michael Hlastala, *Paradigm Shift for the Alcohol Breath Test*, 55 J. FORENSIC SCI. 451 (2010); Okorie Okorochoa, *Commentary on: K. Sterling, The Rate of Dissipation of Mouth Alcohol in Alcohol Positive Subjects*, \_\_J. FORENSIC SCI.\_\_ (2012) (in press); Okorie Okorochoa, *Alcohol Breath Testing: Is There Reasonable Doubt?*, 27 SYRACUSE SCI. & TECH. L. REP. 124 (2012); Dominic Labianca, *Statistical Analysis of Blood-to-Breath-Alcohol Ratio Data in the Logarithm-Transformed and Non-Transformed Modes*, 34 CLINICAL CHEMISTRY & LABORATORY MED. 111 (1996); G. Simpson, *Accuracy and Precision of Breath Alcohol Measurements for Subjects in the Absorptive State*, 33 CLINICAL CHEMISTRY 753 (1987).

<sup>32</sup> *Id.*

<sup>33</sup> *Id.*

<sup>34</sup> *Id.*

darkness with a flashlight by a police officer who has taken a three-day course.<sup>35</sup>

Renowned scholars in the area, all of whom have received more training than police officers' three-day weekend of lectures, recommend using video-oculography ("VOG") to evaluate the occurrence and type of nystagmus.<sup>36</sup> Furthermore, they assert that videos of the examination require review to confirm the results in certain cases.<sup>37</sup>

VOG and nystagmeters improved the earlier technology of electronystagmography, which relied on digital video cameras to record positive and negative discharges of the eye (i.e., corneal retinal potential).<sup>38</sup> VOG technology uses infrared cameras to detect the original position of the eye and any changes in its position.<sup>39</sup> As the computer

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<sup>35</sup> Jennifer Y. Luu, et. al, *Sensitivity to Synchronicity of Biological Motion in Normal and Amblyopic Vision*, VISION RES. (in press), last viewed online Mar. 6 2013, <http://www.sciencedirect.com/science/journal/aip/00426989>; Hilla Levo, *Nystagmus Measured with Video-Oculography: Methodological Aspects and Normative Data*, 66 J. OTOLARYNGOLOGY HEAD & NECK SURGERY 101 (2004).

<sup>36</sup> *Id.*

<sup>37</sup> *Id.*

<sup>38</sup> *Id.*

<sup>39</sup> *Id.*

cannot determine eye movements by itself, the examination requires a physician or clinician who is an expert in ocular motility's anatomy and physiology.<sup>40</sup>

Medical literature, including the leading ophthalmological textbook, criticized the NHTSA's HGN test. The "roadside sobriety" test results from the fact that the consumption of certain depressants can cause horizontal gaze-evoked nystagmus even though<sup>41</sup> normal subjects can commonly have physiologic end-point nystagmus.<sup>42</sup> Unfortunately, at low doses, tranquilizers, which do not interfere with driving ability, may also produce nystagmus.<sup>43</sup> Furthermore, nystagmus may result from neurologic disease or may be congenital.<sup>44</sup> Pathology cannot be determined by a roadside test, but instead must be evaluated using sophisticated neuro-ophthalmologist or oculographer.<sup>45</sup>

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<sup>40</sup> *Id.*

<sup>41</sup> DUANE'S OPHTHALMOLOGY (William Tasman & Edward A. Jaeger, eds., 2007).

<sup>42</sup> *Id.*

<sup>43</sup> *Id.*

<sup>44</sup> *Id.*

<sup>45</sup> *Id.*

It seems unreasonable that such judgments should be the domain of cursorily trained law officers, no matter how intelligent, perceptive, and well-meaning they might be. [M]eticulous history-taking and drug-screening blood studies are often essential in evaluating patients with nystagmus.<sup>46</sup>

The NHTSA protocols appear to view nystagmus simply, indicating that intoxication likely causes any present nystagmus.<sup>47</sup> To the contrary, sophisticated equipment to evaluate and record eye movements has led to the discovery of forty-nine types of nystagmus and their causes.<sup>48</sup> Ophthalmologists and other medical professionals use infrared technology, magnetic search coils, and/or specialized video recording systems to conduct precise evaluations.<sup>49</sup> Ocular movements are highly complex, often involving the potential

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<sup>46</sup> DUANE'S OPHTHALMOLOGY (William Tasman & Edward A. Jaeger, eds., 2007).

<sup>47</sup> *Id.*

<sup>48</sup> *Id.*; Luu, et. al, *Sensitivity to Synchronicity of Biological Motion in Normal and Amblyopic Vision*. Hilla Levo, *Nystagmus Measured with Video-Oculography: Methodological Aspects and Normative Data*, 66 J. OTOLARYNGOLOGY HEAD & NECK SURGERY 101 (2004).

<sup>49</sup> *Id.*

combinations of different kinds of nystagmus.<sup>50</sup> Therefore, the examinations' recordings help provide accurate and reproducible results.<sup>51</sup>

Thus, highly-qualified physicians and scholars require specialized equipment, including nystagmeters, VOG, and infrared science, to conduct nystagmus tests properly and record eye movements for later review to ensure accuracy.<sup>52</sup> An individual with no medical background and only a three-day course on field sobriety tests cannot reasonably accomplish the same task.<sup>53</sup> Furthermore, police lack any specialized equipment, administer tests on the side of the road with only a flashlight as a light source, and report and testify regarding the results' scientific validity in order to obtain convictions.<sup>54</sup>

In 2001, researchers determined that more than ninety-five percent of police officers

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<sup>50</sup> *Id.*

<sup>51</sup> *Id.*

<sup>52</sup> *Id.*

<sup>53</sup> NHTSA, *Standardized Field Sobriety Testing*, APPENDIX A (last viewed on Mar. 4, 2013,

[http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix\\_a.htm](http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix_a.htm)).

<sup>54</sup> *Id.*

improperly conducted the HGN test to use as a criterion for placing drivers under arrest.<sup>55</sup> Researchers paid by the NHTSA's Department of Transportation Subdivision admit that these tests are only accurate when performed according to the manual's protocols.<sup>56</sup> Assuming that the test can be

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<sup>55</sup> JL Booker, *End Position Nystagmus as an indicator of Ethanol Intoxication*, 41 SCI. & JUST. 113 (2001).

<sup>56</sup> See generally NHTSA, *Standardized Field Sobriety Testing*, APPENDIX A, last viewed on Mar. 4, 2013, [http://www.nhtsa.gov/people/injury/alccohol/sfst/appendix\\_a.htm](http://www.nhtsa.gov/people/injury/alccohol/sfst/appendix_a.htm); James Roberts, et. al, *Alcohol Levels Do Not Accurately Predict Physical or Mental Impairment in Ethanol-Tolerant Subjects: Relevance to Emergency Medicine and Dram Shop Laws*, 6 J. MED. TOXICOL. 438 (2010); Marcelline Burns, *An Overview of Field Sobriety Test Research*, 97 PERCEPTUAL & MOTOR SKILLS 1187 (2003); Marcelline Burns, *The Robustness of the Horizontal Gaze Nystagmus (HGN) Test*, U.S. Dep't of Transp., No. HS-810 831 (2007); Marcelline Burns., et al, *A Colorado Validation Study of the Standardized Field Sobriety Tests (SFST) Battery*, S. Cal. Res. Inst. (1995); Marcelline Burns., et al. *A Florida Validation Study of the Standardized Field Sobriety Test (SFST) Battery*, Fla. Dep't of Health (1997); Marcelline Burns., et al. *Psychophysiological Tests for DWI Arrest, Final Report*, Dep't of Traffic & Highway Safety, DOT-HS-802-424 (1977); Marcelline Burns., et al, *The Observational Threshold of Horizontal Gaze Nystagmus*, In Proceedings of the 15th Annual Conference on Alcohol, Drugs & Traffic Safety (2000); Nat'l Highway Traffic Safety Admin., U.S. Dep't of Transp., *Driving While Intoxicated (DWI) Detection and Standardized Field Sobriety Testing, Instructors Manual*, DOT HS 178 R1/02 (2002); Nat'l Highway Traffic Safety Admin., U.S. Dep't of Transp., *Driving While Intoxicated (DWI) Detection and Standardized Field Sobriety Testing, Instructors Manual*, HS 178 R9/04 (2004); Nat'l Highway Traffic Safety Admin., U.S. Dep't of Transp., *Improved Sobriety Testing*, DOT HS 806 512 (1984); Jack Stuster, et al, *Validation of the Standardized Field Sobriety Test Battery at BACs Below 0.10 Percent, Final Report, Submitted to: U.S. Dep't of Transp. Nat'l*

conducted accurately, the test's improperly execution provides more evidence of the test's unreliability.<sup>57</sup>

## B. The One-LEG Stand Test

According to the NHTSA, During the One-Leg Stand test, an officer instructs a suspect to stand with one foot approximately six inches off the ground.<sup>58</sup> The One-Leg test requires the suspect to count aloud by adding one to one thousand, i.e. one thousand-one, one thousand-two, etc., while staring at the raised foot for 30 seconds.<sup>59</sup> The suspect cannot lower the foot until instructed to do so by the officer, who is timing the test.<sup>60</sup> While administering the One-Leg test, the officer must observe swaying while balancing, the subject's use

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*Highway Traffic Safety Admin.*, Anacapa Sciences, Inc., (1998) at 19. See Clinical Epidemiology & Evidence-Based Medicine Glossary: Clinical Study Design and Methods Terminology (last viewed on Mar.9,2013,

<http://www.vetmed.wsu.edu/courses-jmgay/glossclinstudy.htm>.)

<sup>57</sup> *Id.*

<sup>58</sup> NHTSA, *Standardized Field Sobriety Testing*, APPENDIX A (last viewed on Mar. 4, 2013,

[http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix\\_a.htm](http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix_a.htm)).

<sup>59</sup> *Id.*

<sup>60</sup> *Id.*

of arms and hopping to balance, and putting the foot down.<sup>61</sup> These four behaviors ostensibly indicate impairment.<sup>62</sup> NHTSA research indicates that 83 percent of individuals who exhibit two or more such indicators in the performance of the test will have a BAC of 0.08 or greater.<sup>63</sup>

A person's brain has three primary mechanisms that help maintain balance.<sup>64</sup> First, the visual perception of the horizon supports

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<sup>61</sup> *Id.*

<sup>62</sup> *Id.*

<sup>63</sup> NHTSA, *Standardized Field Sobriety Testing*, APPENDIX A (last viewed on Mar. 4, 2013, [http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix\\_a.htm](http://www.nhtsa.gov/people/injury/alcohol/sfst/appendix_a.htm)).

<sup>64</sup> See generally David Winter, et. al. *Human Balance and Posture Control During Standing & Walking*, 3 *GAIT & POSTURE* 193 (1995); Shu Morioka, et. al. *Changes in the Equilibrium of Standing on One Leg at Various Life Stages*, *CURRENT GERONTOLOGY & GERIATRICS RES.* (2012); Diane Manchester, et al., *Visual, Vestibular and Somatosensory Contributions to Balance Control in the Older Adult*, 44 *J. GERONTOLOGY* 118 (1989); Stephen R. Lord, *Vision and Falls in Older People: Risk Factors and Intervention Strategies*, 26 *CLINICS IN GERIATRIC MED.* 559 (2010); J.H.J. Allum, et. al. *Interactions Between Vestibular and Proprioceptive Inputs Triggering and Modulating Human Balance-Correcting Responses Differ Across Muscles*, 121 *EXPERIMENTAL BRAIN RES.* 478 (1998); Ann Bacsí, et. al., *Evidence for Reflex and Perceptual Vestibular Contributions to Postural Control*, 160 *EXPERIMENTAL BRAIN RES.* 22 (2005); Eva Hansson, *Effect of Vision, Proprioception, and the Position of the Vestibular Organ on Postural Sway*, 130 *ACTA OTOLARYNGOLOGICA* 1358 (2010); Gary Jacobson, *Handbook of Balance Function Testing*, Singular Pub. Group (1997); Carl Luchies, et. al. *Effects of Age on Balance Assessment Using Voluntary and Involuntary Step Tasks*. 53 *J. GERONTOLOGY SERIES A: BIO. SCI. & MED. SCI.* M140-M144 (1999).

orientation.<sup>65</sup> Second, when standing, the brain receives feedback from the feeling of the feet's location to determine a person's center of gravity (i.e., proprioception), and the brain sends impulses through the muscles and nerves to adjust and maintain balance.<sup>66</sup> Third, the vestibular, or "inner ear," mechanism also aids in maintaining balance.<sup>67</sup> Individuals normally use all three mechanisms in tandem to balance rather than using only one of three functional mechanisms.<sup>68</sup>

Requiring an individual to raise one leg off the ground removes his or her proprioceptive ability.<sup>69</sup> This action further eliminates the horizontal perspective required for orientation and balance by telling the individual to stare at his or her foot.<sup>70</sup> Thus, the individual loses the synergistic effect of all three mechanisms by asking the

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<sup>65</sup> *Id.*

<sup>66</sup> *Id.*

<sup>67</sup> *Id.*

<sup>68</sup> *Id.*

<sup>69</sup> *Id.*

<sup>70</sup> *Id.*

individual to use only one of three regular faculties.<sup>71</sup>

### C. The Walk And Turn Test

The NHTSA instructs subjects to keep the left foot on the roadside line or an imaginary line, and place the right foot directly in front of the left foot so that the right heel touches the left toe.<sup>72</sup> The suspect must remain standing still in that position

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<sup>71</sup> See generally David Winter, et.al . *Human Balance and Posture Control During Standing & Walking*, 3 GAIT & POSTURE 193 (1995). Shu Morioka, et. al, *Changes in the Equilibrium of Standing on One Leg at Various Life Stages*, CURRENT GERONTOLOGY & GERIATRICS RES. (2012); Diane Manchester, et al., *Visual, Vestibular and Somatosensory Contributions to Balance Control in the Older Adult*, 44 J. GERONTOLOGY 118 (1989); Stephen R. Lord, *Vision and Falls in Older People: Risk Factors and Intervention Strategies*, 26 CLINICS IN GERIATRIC MED. (2010); J.H.J. Allum, et. al, *Interactions Between Vestibular and Proprioceptive Inputs Triggering and Modulating Human Balance-Correcting Responses Differ Across Muscles*, 121 EXPERIMENTAL BRAIN RES. 478 (1998); Ann Bacsí, et. al., *Evidence for Reflex and Perceptual Vestibular Contributions to Postural Control*, 160 EXPERIMENTAL BRAIN RES. 22 (2005); Eva Hansson, *Effect of Vision, Proprioception, and the Position of the Vestibular Organ on Postural Sway*, 130 ACTA OTO-LARYNGOLOGICA 1358 (2010); Gary Jacobson, *Handbook of Balance Function Testing*, Singular Pub. Group (1997); Carl Luchies, et. al, *Effects of Age on Balance Assessment Using Voluntary and Involuntary Step Tasks*. 53 J. GERONTOLOGY SERIES A: BIO. SCI. & MED. SCI. M140-M144 (1999).

<sup>72</sup> Carl Luchies, et. al, *Effects of Age on Balance Assessment Using Voluntary and Involuntary Step Tasks*. 53 J. GERONTOLOGY SERIES A: BIO. SCI. & MED. SCI. M140-M144 (1999).

until instructed to move.<sup>73</sup> Suspects are told to walk nine paces in the heel-to-toe fashion, then turn and take nine paces in the original direction while remaining on the line.<sup>74</sup> Subjects are instructed to count the steps aloud while keeping hands at the side of the body and watching the feet at all times.<sup>75</sup> It is impermissible for suspects to stop during the procedure.<sup>76</sup>

The officer notes the following signs of Impairment:

*A. The subject starts too soon;*

*B. During instructions, the subject cannot maintain balance with one foot directly in front of the other standing heel to toe without moving;*

*C. During the walking phase, the subject misses heel to toe by half-inch or more;*

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<sup>73</sup> *Id.*

<sup>74</sup> *Id.*

<sup>75</sup> *Id.*

<sup>76</sup> Carl Luchies, et. al, *Effects of Age on Balance Assessment Using Voluntary and Involuntary Step Tasks*. 53 J. GERONTOLOGY SERIES A: BIO. SCI. & MED. SCI. M140-M144 (1999).

*D. The subject uses his or her arms for balance by the raising of an arm for balance by six inches or more.*

*E. The subject steps off the line;*

*F. The subject turns incorrectly;*

*G. The subject takes the wrong number of steps.<sup>77</sup>*

This test's required performance is inconsistent with known human abilities and balance.<sup>78</sup> Human stability and balance, which has a

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<sup>77</sup> E. Martin, W. Moll, P. Schmid, & L. Dettli, *The Pharmacokinetics of Alcohol in Human Breath, Venous and Arterial Blood after Oral Ingestion*, 36 EUR. J. CLIN. PHARMACOL. 619 (1984).

<sup>78</sup> See generally David Winter, et.al. *Human Balance and Posture Control During Standing & Walking*, 3 GAIT & POSTURE 193 (1995); Shu Morioka, et. al, *Changes in the Equilibrium of Standing on One Leg at Various Life Stages*, CURRENT GERONTOLOGY & GERIATRICS RES. (2012); Diane Manchester, et al., *Visual, Vestibular and Somatosensory Contributions to Balance Control in the Older Adult*, 44 J. GERONTOLOGY 118 (1989); Stephen R. Lord, *Vision and Falls in Older People: Risk Factors and Intervention Strategies*, 26 CLINICS IN GERIATRIC MED. (2010); J.H.J. Allum, et. al, *Interactions Between Vestibular and Proprioceptive Inputs Triggering and Modulating Human Balance-Correcting Responses Differ Across Muscles*, 121 EXPERIMENTAL BRAIN RES. 478 (1998); Ann Bacsí, et. al., *Evidence for Reflex and Perceptual Vestibular Contributions to Postural Control*, 160 EXPERIMENTAL BRAIN RES. 22 (2005); Eva Hansson, *Effect of Vision, Proprioception, and the Position of the Vestibular Organ on Postural Sway*, 130 ACTA OTO-LARYNGOLOGICA 1358

complex relationship with center of gravity, depend on the person's height and the lateral spacing of his or her feet when standing.<sup>79</sup> A seventy-inch tall person usually places his or her feet four inches apart.<sup>80</sup> For taller individuals, more space is likely needed to achieve the same balance.<sup>81</sup> Furthermore, walking or motion causes many falls or loss of balance.<sup>82</sup> Therefore, this test does not evaluate impairment due to alcohol use, and, moreover, NHTSA publications have never explained its scientific basis.<sup>83</sup>

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(2010); Gary Jacobson, *Handbook of Balance Function Testing*, Singular Pub. Group (1997); Carl Luchies, et. al, *Effects of Age on Balance Assessment Using Voluntary and Involuntary Step Tasks*. 53 J. GERONTOLOGY SERIES A: BIO. SCI. & MED. SCI. M140-M144 (1999).

<sup>79</sup> Carl Luchies, et. al, *Effects of Age on Balance Assessment Using Voluntary and Involuntary Step Tasks*. 53 J. GERONTOLOGY SERIES A: BIO. SCI. & MED. SCI. M140-M144 (1999). Gary Jacobson, *Handbook of Balance Function Testing*, Singular Pub. Group (1997).

<sup>80</sup> David Winter, et. al, *Human Balance and Posture Control During Standing & Walking*, 3 GAIT & POSTURE 193 (1995).

<sup>81</sup> Carl Luchies, et. al, *Effects of Age on Balance Assessment Using Voluntary and Involuntary Step Tasks*. 53 J. GERONTOLOGY SERIES A: BIO. SCI. & MED. SCI. M140-M144 (1999). Gary Jacobson, *Handbook of Balance Function Testing*, Singular Pub. Group (1997).

<sup>82</sup> Winter, et.al . *Human Balance and Posture Control During Standing & Walking*.

<sup>83</sup> See e.g. Carl Luchies, et. al, *Effects of Age on Balance Assessment Using Voluntary and Involuntary Step Tasks*. 53 J. GERONTOLOGY SERIES A: BIO. SCI. & MED. SCI. M140-M144 (1999).

#### IV. FIELD SOBRIETY TESTS ARE NOT INDICATIVE OF IMPAIRMENT OR BAC

Fundamental cornerstones of pharmacology, including drug adaptation, drug tolerance, receptor functionality—which varies across individuals and with exposure to drugs—and numerous other physiological factors, can make SFSTs unreliable in certain individuals.<sup>84</sup>

Medical literature and case reports demonstrate that certain individuals can have BACs ranging from the legal limit of 0.08 g/ml to as high as 0.500 g/ml while showing no signs of mental or physical impairment.<sup>85</sup> Therefore, some individuals can have a BAC more than six times the legal limit and still show no signs of impairment, intoxication,

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<sup>84</sup> James Roberts, et. al, *Alcohol Levels Do Not Accurately Predict Physical or Mental Impairment in Ethanol-Tolerant Subjects: Relevance to Emergency Medicine and Dram Shop Laws*, 6 J. MED. TOXICOL. 438 (2010); Marc Schuckit, Chapter 23, “Ethanol and Methanol,” in Goodman & Gilman's *The Pharmacological Basis of Therapeutics* (12<sup>th</sup> ed.) (2011) (last viewed on Oct. 22, 2012, <http://www.accessmedicine.com/content.aspx?aID=16666094>).

<sup>85</sup> Roberts, et. al, *Alcohol Levels Do Not Accurately Predict Physical or Mental Impairment in Ethanol-Tolerant Subjects: Relevance to Emergency Medicine and Dram Shop Laws*, 6 J. MED. TOXICOL. 438 (2010).

or consumption of alcohol.<sup>86</sup> Any SFST must address this fact; otherwise, police officers may allow drivers with high BACs to return to the road.<sup>87</sup> Furthermore, NHTSA instructions do not include any evaluation to rule out any other causes of perceived impairment other than the intoxication observed by officers, such as vertigo, neurological pathology, medical issues, and/or a psychiatric disorder.<sup>88</sup>

## V. EXPERIMENTAL EVIDENCE OF SFST INACCURACY

Cole and Nowaczyk conducted a well-designed blind experiment to test SFSTs' effectiveness in identifying individuals who are too impaired to drive and/or with BACs over the legal limit.<sup>89</sup> Fourteen police officers of varying experience rated twenty-one individuals' performances as they underwent a battery of SFSTs

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<sup>86</sup> *Id.*

<sup>87</sup> *Id.*

<sup>88</sup> *Supra* notes 2-13.

<sup>89</sup> Spurgeon Cole, *Field Sobriety Tests: Are They Designed for Failure?*, 79 PERCEPT. MOTOR SKILLS 99 (1994).

and other tests of normal ability.<sup>90</sup> Some officers had seventeen years of experience in DUI enforcement, and all officers were certified by the state academy of police officers.<sup>91</sup> Additionally, they were field officers who were fully trained and in active duty.<sup>92</sup>

The individuals tested ranged in age from twenty-one to fifty-five years, were not overweight, and had no disabilities.<sup>93</sup> The experimenters randomly assigned officers either a SFST or normal abilities test.<sup>94</sup> All subjects were completely sober with no drugs or alcohol in their systems.<sup>95</sup> The subjects performed the “walk and turn” test, the “one-leg stand” test, and other tests.<sup>96</sup> The HGN test was not included because it required officers to monitor subjects' eye movements, which would have been difficult to videotape in a controlled

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<sup>90</sup> *Id.*

<sup>91</sup> *Id.*

<sup>92</sup> *Id.*

<sup>93</sup> *Id.*

<sup>94</sup> *Id.*

<sup>95</sup> *Id.*

<sup>96</sup> *Id.*

fashion.<sup>97</sup> The experimenters implemented the NHTSA procedures and gave subjects an opportunity to hear officers re-read the instructions.<sup>98</sup>

The officers reviewed video of twenty-one subjects and the experimenters asked the officers answer “yes” or “no” as to whether they considered the individuals too impaired to drive.<sup>99</sup> Regardless that no subjects were intoxicated, the officers believed that half of the subjects were too impaired to drive.<sup>100</sup> In a real-world situation, therefore, SFSTs may be as likely to lead to sober individuals’ arrest as those individuals who are too impaired to drive.<sup>101</sup>

## VI. CONCLUSION

The NHSTA unconscionably promotes and propagates the SFSTs’ use. These tests constitute a

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<sup>97</sup> Cole, *Field Sobriety Tests: Are They Designed for Failure?*, 79 PERCEPT. MOTOR SKILLS 99 (1994).

<sup>98</sup> *Id.*

<sup>99</sup> *Id.*

<sup>100</sup> *Id.*

<sup>101</sup> *Id.*

useless exercise for both the subject of investigation and the officer, as the tests are based on scientifically incorrect and implausible ideas. These tests' research foundation is fraught with error, and, moreover, the testers are not qualified to conduct these tests, making SFSTs potentially invalid and unreliable.<sup>102</sup> Further, these tests are no better than guessing, as proven by Cole and Nowaczyk.<sup>103</sup> These tests need to be abolished. Unfortunately, these tests carry the aura of credibility because the U.S. Department of Transportation, National Highway Traffic Safety Administration granted its seal of approval because these tests are "standardized" and verified by field studies.<sup>104</sup>

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<sup>102</sup> Spurgeon Cole, *Field Sobriety Tests: Are They Designed for Failure?*, 79 PERCEPT. MOTOR SKILLS 99 (1994).

<sup>103</sup> *Id.*

<sup>104</sup> Nat'l Highway Traffic Safety Ass'n (NHTSA) (last viewed on Mar. 4, 2013, <http://www.nhtsa.gov/people/injury/alcohol/sfst/introduction.htm>).