

IN THE MISSOURI SUPREME COURT

STATE OF MISSOURI,

Appellant,

vs.

No. SC 91850

TYLER G. McNEELY,

Respondent.

Appeal from the Circuit Court of Cape Girardeau County

Honorable Benjamin F. Lewis - Division II

APPELLANT’S SUBSTITUTE REPLY BRIEF

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TABLE OF CONTENTS

TABLE OF CONTENTS	2
TABLE OF AUTHORITIES	3
ARGUMENT	5
CONCLUSION	14
CERTIFICATE OF COMPLIANCE AND SERVICE	15

TABLE OF AUTHORITIES

Cases

<i>Bagheri v. State</i> , 119 S.W.3d 755 (Tex.Crim.App.2003)	11-12
<i>Commonwealth v. Wirth</i> , 936 S.W.2d 78 (Ky.1996)	11
<i>Frye v. U.S.</i> , 293 F. 1013 (App.D.C. 1923)	6
<i>Mata v. State</i> , 46 S.W.3d 902 (Tex.Crim.App.2001)	11-12
<i>People v. Thompson</i> , 38 Cal.4 th 811, 135 P.3d 3 (2006)	13
<i>State v. Biddle</i> , 599 S.W.2d 182 (Mo. 1980)	6
<i>State v. Daniels</i> , 179 S.W.3d 273 (Mo.App. W.D. 2005)	6
<i>State v. Downey</i> , 145 N.M. 232, 195 P.3d 1244 (2008)	12-13
<i>State v. Endicott</i> , 732 S.W.2d 239 (Mo.Ct.App. S.D. 1987)	6
<i>State v. Ervin</i> , 848 S.W.2d 476 (Mo. 1993)	6
<i>State v. Johnson</i> , 744 N.W.2d 340 (Iowa 2008)	13-14
<i>Welch v. State</i> , 326 S.W.2d 916 (Mo.App.W.D. 2010)	5

Other Authorities

- Alan Jones, *Peak Blood Ethanol Concentration and the Time of its Occurrence After Rapid Drinking on an Empty Stomach*, 36 J. OF FORENSIC SCIENCE 376 (1991) 8-9
- A.W. Jones, Ph.D., *Problems and Pitfalls with Back-Tracking BAC to the Time of Driving* 3 DWI Journal: Law and Science 6 (June 1988) 8-9
- Al Lanqawi *Ethanol Kinetics: Extent of Error in Back Extrapolation Procedures*, 34 BRITISH J. OF CLINICAL PHARMACOLOGY 316, 321 (1992) 10
- Dubowski, K.M. *Absorption, Distribution and Elimination of Alcohol: Highway Safety Aspects*. Suppl. 10 Journal of Studies on Alcohol 98, 106 (1985) 9-10
- Edward Fitzgerald & Dr. David Hume, *The Single Chemical Test for Intoxication: A Challenge to Admissibility*, 66 Mass. L. Rev. 28-36 (1981) 7, 10
- Lawrence Taylor, *Drunk Driving Defense*, Section 5.2.1 (5th ed. 2000) 6
- Mark Montgomery & Mark Reasor, *Retrograde Extrapolation of Blood Alcohol Data: An Applied Approach*, 36 J. OF TOXICOLOGY AND ENVTL. HEALTH H281-292 (1992) 7-8

ARGUMENT

“Retrograde extrapolation” does not reduce the level of exigency.

Both Respondent and the American Civil Liberties Union (hereinafter “ACLU,” as *Amici Curiae*) argue that the level of exigency is greatly reduced because of a process known as “retrograde extrapolation.” (Respondent’s Substitute Brief, p. 24-25; ACLU *Amici Curiae* Brief, p. 20-22.) Respondent asserts that “a qualified witness through a process of extrapolation, applying the standard dissipation rate, can easily estimate the blood alcohol level at the time of operation of the motor vehicle.” (Respondent’s Substitute Brief, p. 24.) Respondent concludes that, because of the possibility of applying this process, exigent circumstances are not existent.

To support this argument, both Respondent and the ACLU rely upon a single case, *Welch v. State*, 326 S.W.3d 916 (Mo.App. W.D. 2010). This reliance is misplaced. *Welch* was an appeal of the circuit court’s denial of post-conviction relief following a guilty plea. After pleading guilty to involuntary manslaughter, Movant Welch alleged his plea counsel rendered ineffective assistance of counsel by giving him erroneous advice concerning parole eligibility. The Western District Court of Appeals affirmed the circuit court’s denial of post-conviction relief, holding that Movant Welch failed to establish prejudice. In a footnote, the Court mentioned that a State chemist had extrapolated that Welch’s blood alcohol content at the time of the collision was over .08. *Id.* at 919, FN3. The Court did not elaborate upon, or even discuss, the scientific process that was apparently utilized. Contrary to Respondent’s assertion, *Welch* hardly supports the

proposition that “retrograde extrapolation” represents a scientifically reliable and generally accepted method of computing a suspect’s blood alcohol content at the time of driving.

No Missouri case has ever addressed the reliability or admissibility of the scientific process known as “retrograde extrapolation.” In determining whether to admit expert scientific testimony in criminal cases, Missouri follows a version of the rule first set out in *Frye v. U.S.*, 293 F. 1013 (App.D.C. 1923). Under this rule, where an expert’s testimony is based on scientific or technical principles, there must be widespread or general acceptance of those principles in the relevant scientific community. *State v. Ervin*, 848 S.W.2d 476, 480 (Mo. 1993); *State v. Biddle*, 599 S.W.2d 182, 191 (Mo. 1980); *State v. Daniels*, 179 S.W.3d 273, 281 (Mo.App. W.D. 2005). Where there is doubt whether a particular procedure is generally accepted in the scientific community, the burden of showing that a test is generally accepted and reliable is on the party offering it in evidence, and a *Frye* hearing must be held outside the presence of the jury. *Daniels*, at 281-86; *State v. Endicott*, 732 S.W.2d 239, 241 (Mo.Ct.App. S.D. 1987).

Review of the scientific literature on retrograde extrapolation reveals there is widespread concern over its reliability. Retrograde extrapolation is the scientific process of “working backward” from the BAC test to estimate the individual’s BAC at the time of the relevant incident and relies upon the fundamental premises associated with the blood alcohol level curve (“BAC curve”). Lawrence Taylor, *Drunk Driving Defense*, Section 5.2.1 (5th ed. 2000). The intoxicating effects of alcohol are not experienced until

the alcohol is absorbed into the blood stream and transported to the brain and nervous system. After a person stops drinking, the blood alcohol level reaches a peak when the most alcohol has been absorbed into the blood and the least amount of alcohol has been eliminated from the body. This peak level serves as the top of the curve and is when the individual experiences the highest level of disorienting effects from alcohol. Once the individual stops drinking and the body begins to eliminate alcohol from the body, the BAC level begins to fall from the peak level. This elimination level of BAC is when the intoxicating effects of alcohol begin to wear off. Edward Fitzgerald & Dr. David Hume, *The Single Chemical Test for Intoxication: A Challenge to Admissibility*, 66 Mass. L. Rev. 28-36 (1981).

The retrograde extrapolation expert's job would be to start with the BAC test result and attempt to determine where the individual would have been on the BAC curve at the time of the traffic stop. If an individual is tested while in the "absorption phase," his BAC at the time of the test could be higher than his BAC at the time of the traffic stop. Alternatively, if the individual is tested while in the "elimination phase," his BAC at the time of the test could be lower than at the time of the traffic stop. As a result, a single blood or breath test fails to reveal whether the individual is on the upward portion of the BAC curve (the absorption phase), the peak, or the downward portion of the BAC curve (the elimination phase). *Id.*

The scientific community is, at best, divided on the issue of whether retrograde extrapolation is reliable. Even proponents of the process concede that, in order to

accomplish a reliable extrapolation, the expert must know the length of time in which the drinking occurred, exactly how much alcohol was consumed, and the time that drinking stopped. Mark Montgomery & Mark Reasor, *Retrograde Extrapolation of Blood Alcohol Data: An Applied Approach*, 36 J. OF TOXICOLOGY AND ENVTL. HEALTH H281-292 (1992).

Well-known scientific experts have openly criticized the reliability of retrograde extrapolation. Alan Jones, Ph.D., Associate Professor in the Department of Alcohol Toxicology at the University Hospital in Sweden, is a widely published expert in the area of alcohol extrapolation. Dr. Jones describes back extrapolation of BAC as a “dubious practice.” Alan Jones, *Peak Blood Ethanol Concentration and the Time of its Occurrence After Rapid Drinking on an Empty Stomach*, 36 J. OF FORENSIC SCIENCE 376 (1991). A major shortcoming of retrograde extrapolation, as Dr. Jones points out, is that alcohol absorption varies widely among individuals:

...the absorption profile of ethanol differs widely among individuals, and the peak BAC and the time of its occurrence depends on numerous factors. Among other factors, the drinking pattern, the type of beverage consumed, the fed or fasted state, the nature and composition of foodstuff in the stomach, the anatomy of the gastrointestinal canal, and the mental state of the subject are considered to play a role. *Id.* at 381.

According to Dr. Jones, yet another major shortcoming with retrograde extrapolation of BAC stems from the fact that one cannot be absolutely certain whether

the individual had reached the post absorptive state at the time of the incident in question. A.W. Jones, Ph.D., *Problems and Pitfalls with Back-Tracking BAC to the Time of Driving* 3 DWI Journal: Law and Science 6, June 1988. This is because it is impossible to determine exactly where an individual is on the BAC curve based upon a single BAC test. Not only is Dr. Jones critical of calculations based upon a single BAC test, but he also finds calculations based upon *two* separate BAC tests to be insufficient. “The pitfall of relying on rates of alcohol metabolism derived from only two single measurements of BAC is strikingly obvious, and it is impossible to give an estimate of statistical confidence in the result.” *Id.* at 11. This means that a DWI suspect would have to be subjected to three separate blood tests for any meaningful estimation.

Kurt M. Dubowski, Ph.D., Department of Medicine and Toxicology Laboratories at the University of Oklahoma Health Sciences Center, is also critical of retrograde extrapolation. “Extrapolation of a later alcohol test result to the time of the alleged offense is always of uncertain validity and therefore forensically unacceptable.” Dubowski, K.M. *Absorption, Distribution and Elimination of Alcohol: Highway Safety Aspects*. Suppl. 10 Journal of Studies on Alcohol 98, 106 (1985). Dr. Dubowski writes:

Among the major reasons for the infeasibility of retrograde extrapolation, three stand out: (1) lack of knowledge, usually, about the timing of the alcohol concentration peak and absorption – postabsorption status; (2) ignorance about the mathematical characteristics and the mean rate of change of the individual’s blood or breath alcohol elimination curve; and

(3) unpredictable irregularities of the curve, especially short-term fluctuations from the best-fit trend line of the blood or breath alcohol curve. *Id.* at 103.

Y. Al-Lanqawi of the Department of Pharmacology and Clinical Pharmacology at the University of Dundee Medical School wrote about the complicating factors involved in the process, writing that “individuals vary with respect to age, sex, body weight and lean body mass, all of which may affect the disposition of ethanol. In addition, the absorption of ethanol into the body may be variable and may continue over a long period of time.” Al Lanqawi *Ethanol Kinetics: Extent of Error in Back Extrapolation Procedures*, 34 BRITISH J. OF CLINICAL PHARMACOLOGY 316, 321 (1992). Al-Lanqawi found that the potential rate of error increased as time went on, concluding that this “variability was particularly large” when extrapolation back one hour or more was attempted. *Id.* at 320.

Edward Fitzgerald, an attorney from Massachusetts, and Dr. David Hume, a professor of analytical chemistry at M.I.T., write that there are “serious questions about the reliability of any later single test as an indicator of an earlier BAC.” Edward Fitzgerald & Dr. David Hume, *The Single Chemical Test for Intoxication: A Challenge to Admissibility*, 66 Mass. L. Rev. 28-36 (1981). They conclude that the attempt to engage in retrograde extrapolation is “fraught with difficulties.” *Id.* at 32.

While Missouri courts have not addressed the reliability or admissibility of retrograde extrapolation, other States have expressed concern over limitations in its

practical application. One of the most notable flaws in the application of retrograde extrapolation in the context of a driving while intoxicated prosecution is that most of the information necessary to accurately extrapolate blood alcohol content results is solely within the knowledge of the accused. The Supreme Court of Kentucky noted that, without the defendant's cooperation, no valid extrapolation can occur because a number of facts known only to the defendant are essential to the process. *Commonwealth v. Wirth*, 936 S.W.2d 78, at 83-84 (Ky. 1996). These critical facts include information regarding food consumption, duration of alcoholic beverage consumption, the quantity of alcohol consumed, and the time alcohol consumption ceased. *Id.*

The Texas Court of Criminal Appeals thoroughly discussed the science of retrograde extrapolation and its limitations in *Mata v. State*, 46 S.W.3d 902 (Tex.Crim.App.2001). There, the Court reversed a conviction for driving while intoxicated, holding that the trial court abused its discretion in allowing the State to present expert testimony regarding retrograde extrapolation. The Court weighed various factors and concluded that the retrograde extrapolation conducted by the State's expert was not reliable. The Court based its holding, in part, on the fact that the State's expert was unfamiliar with the personal characteristics of the defendant. The Court noted that the expert did not know how much the defendant had eaten that night, how much he had to drink, what he had to drink, the time of his last drink, or the length of the drinking spree. *Id.* at 917. The Court also expressed concern that the extrapolation was based upon a single BAC test conducted over two hours after the time of driving, stating "there

was only one test of Mata's BAC, and it occurred over two hours after the alleged offense. This is a significant length of time and seriously affects the reliability of the extrapolation." *Id.* (See also *Bagheri v. State*, 119 S.W.3d 755 (Tex.Crim.App.2003)).

In a concurring opinion, JOHNSON, J., was even more critical of retrograde extrapolation:

Extrapolation back from the BAC at the time of testing to the BAC at the time of driving is an endeavor fraught with the danger of inappropriately bamboozling the jury into thinking that such an extrapolation can be anything close to accurate. The information which is usually available to the expert doing the extrapolation is woefully inadequate to make even an educated guess about a range of possible BACs. *Mata* at 929.

The majority chooses not to go so far as to call attempted extrapolation from a single BAC sample back to the time of driving "junk science." I do not feel so constrained, and junk science has no place in a courtroom where the standard of proof is beyond a reasonable doubt. *Mata* at 932.

The Supreme Court of New Mexico likewise recognized the flaws in retrograde extrapolation in *State v. Downey*, 145 N.M. 232, 195 P.3d 1244 (2008). The Court reversed a vehicular homicide conviction, holding that it was an abuse of discretion for the trial court to allow the State's expert to use retrograde extrapolation to estimate the defendant's BAC at the time of an accident occurring six hours prior to the BAC test.

The Court held the testimony was unreliable because the State's expert "did not know when the defendant had consumed his last drink and, therefore, whether defendant was pre-absorptive, post-absorptive, or at the peak of alcohol absorption, either at the time of the collision, or at the time his BAC test was administered." *Id.* at 240, 1252. The Court held this information is critical in order to perform retrograde extrapolations. *Id.* Since the State's expert "did not have the facts necessary to plot the defendant's placement on the BAC curve, he could not express a reasonably accurate conclusion regarding the fact in issue: whether defendant was under the influence of intoxicating liquor at the time of the collision." *Id.*

Other States have flatly rejected the argument that the possibility of applying retrograde extrapolation reduces the exigency in quickly securing blood alcohol evidence. The Supreme Court of California, upholding a conviction for driving with a blood alcohol content of .08 or greater, held, "We are likewise unpersuaded by defendant's claim that any exigency is eliminated because of the possibility an expert could testify about the defendant's blood alcohol level at an earlier point 'by extrapolating backward from the later-taken results.'" *People v. Thompson*, 135 P.3d 3, 12 (2006). The Court recognized that such extrapolations can be speculative, noting that numerous variables affect the rate at which the alcohol dissipates. *Id.*

The Supreme Court of Iowa likewise concluded that the possibility of an extrapolated blood-alcohol percentage did not remove the exigency underlying the need for prompt blood testing. *State v. Johnson*, 744 N.W.2d 340 (Iowa 2008). The Court

stated “that this is far from an exact science,” noting that even the defendant’s own expert conceded that the accuracy of the method is subject to variables, such as the type of drink consumed and the contents of the person’s stomach. *Id.* at 346.

CONCLUSION

The possibility of applying the process known as “retrograde extrapolation” certainly does not reduce or diminish the exigency involved in quickly securing blood alcohol evidence.

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CERTIFICATE OF COMPLIANCE AND SERVICE

I, John N. Koester, Jr., hereby certify the following. The original and nine copies of this brief (Appellant's Substitute Reply Brief) have been mailed this date to the Missouri Supreme Court. The brief complies with the limitations contained in Rule 84.06(b). The brief was completed using Microsoft Word, Office 2007, in Times New Roman size 13 point font. Excluding the cover page, the signature block, this certificate of compliance and service, and appendix, the brief contains 2699 words, which does not exceed the words allowed for an appellant's reply brief.

The CD filed with this brief, containing a copy of this brief, has been scanned for viruses and is virus - free.

Two true and accurate copies of the attached brief and a disk containing a copy of the brief were mailed, postage prepaid, this 19th day of August, 2011, to the attorney for Respondent:

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