

19 P.3d 42 (2001)

95 Hawai`i 94

STATE of Hawai`i, Plaintiff-Appellee,

v.

James L. VLIET, also known as Spiderman, Defendant-Appellant.

No. 22827.

Supreme Court of Hawai`i.

March 15, 2001.

43 *43 Linda C.R. Jameson, Deputy Public Defender, on the briefs, for defendant-appellant.

Richard K. Minatoya, Deputy Prosecuting Attorney, County of Maui, on the briefs, for plaintiff-appellee.

MOON, C.J., LEVINSON, NAKAYAMA, RAMIL, and ACOBA, JJ.

Opinion of the Court by ACOBA, J.

We hold that, in the absence of a designated culpable **state** of mind in Hawaii Revised Statutes (HRS) § 291-4.5 (Supp.1998), which pertains to driving after suspension or revocation of a driver's license, and HRS § 291-4.4 (Supp.1998), which concerns habitually driving under the influence of alcohol or *44 drugs, the offenses described therein are committed if the defendant acted with an intentional, knowing, or reckless **state** of mind, as provided by HRS § 702-204 (1993). Contrary to the contention of Defendant-Appellant James L. **Vliet** (Defendant), we conclude the second circuit court (the court) properly so instructed the jury.

Additionally, we hold that plain error was not committed by the court in admitting, pursuant to Hawaii Rules of Evidence (HRE) Rule 702 (1993), expert evidence of the "Widmark^[1] formula" for the purpose of ascertaining Defendant's blood alcohol concentration (BAC) level at the time of his arrest. In doing so, we review the relevancy of expert evidence under the right/wrong standard and its reliability under the abuse of discretion standard.

There being no reversible error, we affirm Defendant's September 9, 1999 judgment of conviction and sentence for habitually driving under the influence of intoxicating liquor or drugs, in violation of HRS § 291-4.4, as charged in Count I of the Complaint (the habitual DUI offense), and of driving after license suspended or revoked for driving under the influence of intoxicating liquor or drugs pursuant to Part XIV of chapter 286, HRS §§ 291-4 (Supp.1998) or 291-7 (1993), or HRS § 291-4.5, as charged in Count IV^[2] (the license revocation offense).

I.

A.

Defendant's jury trial began on June 14, 1999 and continued through June 17, 1999. Evidence was adduced as set forth herein. On October 16, 1998, Sergeant Clarence Kenui of the Maui Police Department (MPD) was driving on Maunaloa Highway, on the island of Molokai, when he saw an orange pickup truck "weaving in the entire roadway." Kenui stopped the vehicle at around 11:00 p.m., approached Defendant, who was driving, and asked him "what the problem was." Defendant answered that he had taken medication and had also been "drinking." Kenui observed that Defendant's eyes were bloodshot, his speech was slurred, and he fumbled when looking for his driver's license.

"Backup" officer, Wade Maneda, continued the investigation upon his arrival at the scene. As he approached the scene,

Maneda saw that the truck's left front tire was flat. Kenui related the circumstances of the stop to Maneda, after which Kenui left the scene. Maneda personally made the same observations of Defendant as had Kenui. Another officer called for a license check and was informed that Defendant's license was on "revoked status." When asked if he had been drinking, Defendant replied, "I had three beers, brah." Maneda then asked Defendant to perform "some field sobriety maneuvers."

As he exited the vehicle, Defendant told Maneda that he was intoxicated because he had ingested beer and taken the drugs clonazepam and phenobarbital as medication. In Maneda's opinion, Defendant's inability to keep his balance and "unusually slow" responses in the walk-and-turn and the one-leg stand demonstrated that Defendant was "impaired" and could not operate a vehicle safely on the roadway. As a result, Maneda arrested Defendant for driving under the influence of intoxicating liquor.

45 After being taken to the Molokai Police Station, Defendant was reportedly agitated and had to be handcuffed and placed in a cell. *45 Maneda informed Defendant that he could take a breath test, a blood test, or both tests to determine his blood alcohol content, or refuse to take any test.

At about 11:39 or 11:40 p.m., approximately forty minutes after he was stopped by Officer Kenui, Defendant voluntarily chose to take a breath test on an Intoxilyzer machine.^[3] The parties stipulated to certification of the Intoxilyzer personnel and the Intoxilyzer, and to the accuracy of the Intoxilyzer test records. Defendant did not eat, drink, smoke, or vomit between the time of the arrest and time of the test. The Intoxilyzer indicated Defendant had a BAC of .079 grams of alcohol per 210 liters of breath, expressed according to the percentage of weight per volume.

Grant Schule, a paramedic, testified that he was called to treat a contusion on Defendant's lip. While Schule was in Defendant's cell tending to Defendant's injury, Defendant told Schule he was on anti-seizure medication called klonopin.

Clifford Wong, a forensic toxicology and laboratory director of Clinical Laboratories of Hawaii, was qualified without objection as an expert in toxicology^[4] and "in particular. . . rendering [an] opinion as to the effect of common and other drugs on the human body." Using a formula devised by Dr. Eric Widmark in the 1920s, Wong calculated the BAC levels of Defendant to have been .094 grams per 210 liters of breath at 10:52 p.m. and .090 grams per 210 liters of breath at 11:00 p.m., the time of the traffic stop. Wong also opined that the combined effect of taking clonazepam, phenobarbital, and alcohol would impair a person to a greater extent than would be the case if he or she had ingested only one of the substances. Wong testified, further, that neither clonazepam nor phenobarbital should be taken while operating a motor vehicle.

A MPD fingerprint identification specialist matched fingerprints in three previous arrest reports with Defendant's fingerprints taken in the instant case. Certified copies of the fingerprint and arrest records in each of these three cases and district court calendars indicating Defendant's convictions in each case of driving under the influence of intoxicating liquor (dated December 19, 1988, November 16, 1990, and September 29, 1998, respectively) were admitted into evidence.

A clerk from the Maui driver's license department determined that Defendant's driver's license had been placed on "revoked status" by the Administrative Driver's License Revocation Office for a period of one year, commencing June 18, 1998 and ending June 17, 1999. The revocation was granted due to "driving under the influence."

In the defense's case, Tad Camara, the person from whom Defendant rented the truck he drove, testified about steering problems Camara had experienced with the vehicle. He said that the truck's steering was "uncontrollable" and described its operating condition as "all over the road" and difficult to control. Kevin Lee testified he had been with Defendant on a "diving" trip earlier on the day of the arrest. On the morning after Defendant's arrest, Lee drove the same vehicle as Defendant had driven. Lee found that the truck was "very loose" on the road. The right front tire blew out, and Camara was
46 *46 called to drop off a spare. When Lee returned the vehicle, Camara did not demand payment for the rental.

B.

Jury instructions were settled on June 16, 1999. In Instruction No. 21, the court instructed the jury as to the elements of the habitual DUI offense, including the culpable **state** of mind thereof and in Instruction No. 27, did the same with respect to the license revocation offense.

On June 17, 1999, the jury found Defendant guilty of Counts I and IV and acquitted him of Count III, reckless driving. Defendant was sentenced to concurrent prison terms of five years on Count I and thirty days on Count IV, to run consecutively to a term being served by Defendant on other offenses.

Defendant filed his notice of appeal on September 20, 1999. On appeal, Defendant argues (1) that Instruction No. 21 regarding the habitual DUI offense and Instruction No. 27 regarding the license revocation offense were erroneous because each failed to "clearly instruct the jury that the states of mind [(intentionally, knowingly, or recklessly)] applied to all the elements of the offense," and (2) that the court committed plain error by allowing Wong to testify, using the Widmark formula, as to Defendant's BAC at the time he was stopped by the police.

II.

With respect to Defendant's challenge of Instructions Nos. 21 and 27, the prosecution contends (1) the defense did not object to the instructions and should not benefit from the plain error rule, as the instruction on the habitual DUI offense was almost entirely drafted by the defense; (2) although the required states of mind were listed last in the instructions, they clearly modified all of the preceding elements for each count; and (3) if read as a whole, the instructions designated how each **state** of mind applied to conduct, result of conduct, and attendant circumstances.^[5] According to the prosecution, Defendant, therefore, failed to show that the jury instructions were "prejudicial[.]" *State v. Horswill*, 75 Haw. 152, 155, 857 P.2d 579, 581 (1993) (citing *State v. Kelekolio*, 74 Haw. 479, 514-15, 849 P.2d 58, 74 (1993)).

III.

In connection with Instruction No. 27, Count IV charged the following:

That on or about the 16th day of October, 1998, in the County of Maui, **State** of Hawaii, JAMES L. **VLIET**, whose driver's license had been revoked, suspended or otherwise restricted pursuant to Part XIV of Chapter 286 or Section 291-4 or 291-7 of the Hawaii Revised Statutes, did operate a motor vehicle upon the highways of this **State** while such license remained suspended, revoked, or in violation of the restrictions placed on the license, *thereby committing the offense of Driving After License Suspended or Revoked for Driving Under the Influence of Intoxicating Liquor or Drugs in violation of Section 291-4.5 of the Hawaii Revised Statutes.*

(Emphases added.)

In that regard, HRS § 291-4.5 provides:

(a) *No person whose driver's license has been revoked, suspended, or otherwise restricted pursuant to chapter 286 or § 291-4^[6] or 291-7^[7] shall operate a motor vehicle *47 upon the highways of this **State** either while the person's license remains suspended or revoked or in violation of the restrictions placed on the person's license. The period of suspension or revocation shall commence upon the release of the person from the period of imprisonment imposed pursuant to this section.*

(Emphasis added.) As is evident, HRS § 291-4.5 does not designate the culpable **state** of mind to be proven for the license revocation offense. The statute is subject to the HPC, however. See *State v. Chow*, 77 Hawai'i 241, 248-49, 883 P.2d 663, 670-71 (App.1994) (stating that "the offenses of driving with a revoked license and illegal turn, although defined outside of the [HPC] in HRS chapter 291C and chapter 291, would be covered by the [penal code] provisions of HRS chapter 706").

If no **state** of mind element for an offense is specified by a statute, as in the instant case, HRS § 702-204 (1993) provides in relevant part that

a person is not guilty of an offense unless the person acted intentionally, knowingly, recklessly, or negligently, as the law specifies, with respect to each element of the offense. *When the **state** of mind required to establish an element of an offense is not specified by the law, that element is established if, with respect thereto, a person acts intentionally, knowingly, or recklessly.*

(Emphasis added.) As Defendant maintains, when applying the HPC, "a **state** of mind with which the defendant acts applies to all elements of the offense, unless otherwise specified in the statute defining the offense." State v. Kalama, 94 Hawai`i 60, 65, 8 P.3d 1224, 1229 (2000) (referring to HRS § 702-207, *see supra* note 5). Accordingly, an intentional, knowing, or reckless **state** of mind applies to all elements of HRS § 291-4. See HRS § 702-204 ("When the **state** of mind required to establish an element of an offense is not specified by the law, that element is established if, with respect thereto, a person acts intentionally, knowingly, or recklessly.")^[8]

In Instruction No. 27, the court instructed the jury as to the elements of HRS § 291-4.5 as follows:

In count [Four] of the Complaint, the Defendant, JAMES L. **VLIET**, is charged with Driving After License Suspended or Revoked for Driving Under the Influence of Intoxicating Liquor.

A person commits the offense of Driving After License Suspended or Revoked for Driving Under the Influence of Intoxicating Liquor if he [or she] operates a motor vehicle upon the highways of this **State** while his [or her] license has been revoked, suspended, or otherwise restricted pursuant to Part XIV of Chapter 286 or Section 291-4 of the Hawaii Revised Statutes.^[9]

There are six material elements of Driving After License Suspended or Revoked for Driving Under the Influence of Intoxicating Liquor, each of which the prosecution must prove beyond a reasonable doubt.

These six elements are:

- 48 *48 1. That on or about October 16, 1998;
2. In the County of Maui, **State** of Hawaii;
 3. JAMES L. **VLIET**;
 4. Did operate a motor vehicle upon a public highway;
 5. While his license had been revoked, suspended, or otherwise restricted pursuant to Part XIV or Chapter 286 or Section 291-4 of the Hawaii Revised Statutes.
 6. *The Defendant did so intentionally, knowingly, or recklessly.*

(Emphasis added.)

While we do not necessarily endorse the form of this instruction, we cannot say it was defective. The states of mind designated in Instruction No. 27 for the license revocation offense were correctly stated as directed by HRS § 702-204 as, "intentionally, knowingly, or recklessly." Instructions Nos. 15 through 17 defined each such **state** of mind.^[10] The words "did so" and "or" used in element six of Instruction No. 27 indicate that one of the three states of mind must be proven with respect to the preceding enumerated elements of the offense.

IV.

The same rationale holds true for HRS § 291-4.4, which provides in relevant part as follows:

Habitually driving under the influence of intoxicating liquor or drugs. (a) A person commits the offense of habitually driving under the influence of intoxicating liquor or drugs if, during a ten-year period the person has been convicted three or more times for a driving under the influence offense; and

(1) The person operates or assumes actual physical control of the operation of any vehicle while under the influence of intoxicating liquor, meaning that the person is under the influence of intoxicating liquor in an amount sufficient to impair the person's normal mental faculties or ability to care for oneself and guard against casualty;

(2) The person operates or assumes actual physical control of the operation of any vehicle with .08 or more grams of alcohol per one hundred milliliters or cubic centimeters of blood or .08 or more grams of alcohol per two hundred ten liters of breath;^[11] or

49 *49 (3) A person operates or assumes actual control of the operation of any vehicle while under the influence of any drug which impairs such person's ability to operate the vehicle in a careful and prudent manner. The term "drug" as used in this section shall mean any controlled substance as defined and enumerated on schedules I through IV of chapter 329.

Since there is no **state** of mind element specified in that statute itself, in applying HRS § 702-204, the prosecution must prove an intentional, knowing, or reckless **state** of mind as to each element of the habitual DUI offense. The prosecution properly so charged in Count I of the complaint and the court properly so instructed in Instruction No. 21.^[12]

V.

On his second point, Defendant argues that the court committed plain error in allowing Wong to opine that Defendant's BAC was .090 as of 11:00 p.m., in the absence of a foundation establishing that the formula used by Wong "met with the standards pertaining to the admission of expert evidence" under Daubert v. Merrell Dow Pharmaceuticals, 509 U.S. 579, 589-90, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993). As a result, Defendant maintains that the jury should have considered only Defendant's .079 BAC intoxilyzer reading.

50 In response, the prosecution argues (1) because Defendant did not object to Wong's testimony, he waived any right to object on appeal, (2) the plain error rule should be applied with caution, because a party must look to his or her counsel for protection and bear the cost of counsel's mistakes, (3) even if Wong's testimony involves scientific knowledge, this court has not adopted the *Daubert* test, (4) Wong's extrapolation of Defendant's BAC was a "mere application" of Widmark's *50 "well-established" alcohol elimination formula and, thus, under State v. Fukusaku, 85 Hawai'i 462, 946 P.2d 32, reconsideration denied, 85 Hawai'i 462, 946 P.2d 32 (1997), it involved technical, rather than scientific, knowledge, and (5) even if Wong's opinion was improperly admitted, Defendant's conviction was independently established under either HRS § 291-4.4(a)(1) or (3).

As to this last contention, the absence of an appropriate interrogatory to the jury makes it impossible to conclude that the jury, or some members of it, did not rely on Wong's BAC opinion as the basis for rendering its verdict as to Count I;^[13] correlatively, then, we cannot dismiss out of hand Defendant's plain error claim, as the prosecution asserts in its first and second counter contentions. Consequently, we must determine whether Wong's opinion, based as it was on the Widmark formula, was properly admitted. We decide that it was, employing judicial notice of what we believe to be general acceptance of the Widmark formula in the scientific community and by the courts. See State v. Montalbo, 73 Haw. 130, 136, 828 P.2d 1274, 1279 (1992) (adding "general acceptance" to factors assessing whether scientific evidence should be admitted). In doing so, we consider the prosecution's third and fourth assertions.

VI.

We examine, first, Wong's application of the Widmark formula to this case. Wong testified that Widmark's work was widely

respected and used extensively for retrograde^[14] calculations of the presence of alcohol in the body:

[PROSECUTOR] Q. Doctor, what studies have been done with respect to the elimination of alcohol from the human body?

[WONG] A. Since the turn of the century, alcohol being the first major drug of abuse that most people have known about—it's been probably the most widely studied.

And throughout the 20th century there's been numerous publications on its effects, how it's eliminated[,] what it does to the body.

In the 1920s Eric Widmark ... was a man who devised a formula using conventional pharmacologic situations to calculate the concentrations based on the theoretical doze [sic].

Q. I'm sorry.

A. —if equivalent blood concentration would be given of a certain drug, and it's a standard equation

Q. Now, doctor, you mentioned Dr. Widmark's case—is there any scientific formula to determine alcohol concentration?

A. Yes, it [sic] is... .

Q. Now, Doctor, is there any scientifically accepted formula to back calculate alcohol concentration given a known BAC or blood alcohol content?

A. There's a known elimination rate for the backwards retrograde calculation for alcohol.^[15] There are a number of assumptions made—that must be made when you do such calculations.

One, is that the body is on a post absorptive **state**. And then secondly that it is at the zero or elimination rate.

51 *51 Let [sic] backtrack. There was [sic] two stages of—stages in the entrance of alcohol in the body. The pre-absorptive **state** is where the alcohol has just started to diffuse throughout the body and blood. That's called the pre-absorptive **state**.

That's when blood alcohol starts to go—rise up. That's where you [sic] euphoria starts to occur in those early stages. And after the peak it's called the post-absorptive stage.

That's where the Widmark formula comes in, in calculating the elimination rate. And what it says prior concentration may be an hour or two earlier, may have been.

(Emphases added.) Using Widmark's formula, Wong determined Defendant's BAC level at 10:52 p.m., an hour before the Intoxilyzer test was administered, as .094 BAC.

Q. I see. Now, Doctor, did you have an opportunity to review the materials in this case?

A. Yes, sir.

Q. Before I get into that[,] the elimination rate, is that a constant rate?

A. Yes. It is a—the zero order that means it's independent of concentration that occurs. It's called the elimination rate and that occurs after the post-absorptive stage is reached.

Q. Was that elimination rate—was that determined by Dr. Widmark?

A. One of many. He was the first and then after him a number of people have also verified his rates of

elimination.

Q. *Is that a scientifically accepted rate of elimination of alcohol?*

A. *.015 is what we generally use in the forensic filed [sic] for back calculations.^[16] However, it's been shown that the elimination rate[s] sometimes are higher [for] chronic alcoholics. Is much higher and women. [sic] Tends to eliminate a little faster than men.^[17]*

Q. Doctor, given the height and weight of an individual, would that have any effect on the rate of elimination?

A. Not on the rate of elimination, but on the overall concentration—the maximum concentration in the body. And that would be based on the water content. Alcohol is hydrophilic.

It likes to stay in the water parts of your body. So roughly in men, it's 80 percent of your body weight is water. So that's where the alcohol would be estimated on based on that body distribution.

Q. I see. Doctor, if a person was .079 percent blood alcohol content at 11:43 p.m., would you be able to determine what the person's blood alcohol content was an hour prior at 10:52 p.m.?

A. Given the descriptions that I mentioned earlier about the post-absorptive condition as you're following the elimination curve, can you give an estimate on *52 what the—what the concentration would be?

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Q. Yes. *Did you make a calculation in that—from this particular case?*

A. One hour prior, yes. To do so you would add a .015 to the—oh, let me also— breath alcohol.

We did find .079, that's grams per 210 liters of air. And that correlates to—an average value of the conversation factors is called 2100—and that correlates to the equivalent of 100 milliliters of blood.

But the reality is that actually the conversion factor is generally higher up to 2300. What it does is it gives a benefit of doubt to the defendant in that the equivalent concentration and blood is actually a little bit higher than what the blood concentrations are.

Q. Okay Doctor—

A. But anyway based on that—

Q. Yes.

A. —.079 I would add .015 and that would come out to about .094, I believe, as one hour before....

Q. And that would be .094 grams per 210 milliliters of breathe? [sic]

A. 210 liters of air.

Q. Would that also convert to .094 percent blood alcohol content?

A. They made a distinct [sic] between the two to prevent any problems of conversions. Generally when you talk about breath alcohol, it is strictly based on 210 liters of air.

There is a rough correlation to the blood alcohol, as I mentioned. The equivalent blood alcohol concentration is generally a little higher, and they have done studies how well they correlate it, and they are fairly close.

(Emphases added.) Using the same calculation, Wong determined Defendant's BAC at 11:00 p.m. as .090:

Q. Now, Doctor, that's 10:42 p.m. How about at approximately 11:00 p.m.? What would a person's blood alcohol content if a person—let me ask you this:

If a person's blood alcohol content was .079, and it's a male, and it was—that he had that blood alcohol at 11:42 p.m., would you be able to determine what the person's blood alcohol content would be at 11:00 p.m.?

A. Yes, that's 42 minutes prior.

Q. Yes.

A. *That would be a fraction of that .015 rate that I mentioned. So roughly three quarters of that would be the—would be the added effect of the—that you added to the .079.*

Q. *So were you able to calculate that under these circumstances?*

A. *Let's see. I believe it was .090.*

Q. Okay. That would be .090 grams of alcohol per 210 liters of air?

A. In this case, yeah.

(Emphases added.)

According to Wong, combining clonazepam, phenobarbital, and alcohol "would impair [a person] to a higher extent ... [b]ecause of the synergistic^[18] effects . . . [of] adding three [central nervous system] depressants together." The defense did not object to Wong's conclusions.

On cross-examination, Wong confirmed that he was not provided a sample of Defendant's blood and had no personal knowledge about the October 16, 1998 events. As to medications, Wong admitted that he did not personally know whether Defendant did in fact take medication, and if Defendant did, the time at which such medication was ingested, the quantities involved, or the amount of drugs in his blood stream on October 16, 1998. In response to a question on redirect examination regarding whether clonazepam and phenobarbital are "taken when a seizure is felt to be coming on, or . . . on a daily basis as a preventative," Wong responded that patients who experience continual, *53 repetitive seizures should take the medication on a periodic basis.^[19]

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VII.

The prosecution is correct in contending that this court has not adopted the *Daubert* test, see *Acoba v. General Tire, Inc.*, 92 Hawai'i 1, 13 n. 6, 986 P.2d 288, 300 n. 6 (1999), and we expressly refrain from doing so. However, because the HRE are patterned on the Federal Rules of Evidence (FRE), construction of the federal counterparts of the HRE by the federal courts is instructive, see *Nielsen v. American Honda Motor Co., Inc.*, 92 Hawai'i 180, 191 n. 12, 989 P.2d 264, 275 n. 12 (App.), cert. dismissed, 92 Hawai'i 180, 989 P.2d 264 (1999) (stating that "HRE covering admission of scientific and technical evidence are patterned after [FRE Rules] 702 and 703") (quoting *State v. Ito*, 90 Hawai'i 225, 236 n. 7, 978 P.2d 191, 202 n. 7 (App.1999)), but obviously not binding on our courts. See *Ito*, 90 Hawai'i at 236 n. 7, 978 P.2d at 202 n. 7. HRE Rule 702, modeled on FRE Rule 702,^[20] pertains to admission of expert evidence:

Testimony by experts. *If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify thereto in the form of an opinion or otherwise. In determining the issue of assistance to the trier of fact, the court may consider the trustworthiness and validity of the scientific technique or mode of analysis employed by the proffered expert.*

(Emphases added). *Daubert* required a preliminary assessment by the trial court as to whether the "reasoning" or

54 "methodology" underlying proffered expert testimony was scientifically valid and could be applied properly to the facts in issue. See 509 U.S. at 593-94, 113 S.Ct. 2786. The four^[21] *Daubert* *54 factors bearing on the inquiry are (1) whether the "theory" or "technique" can be and has been empirically tested, (2) whether the theory or technique has been subjected to peer review and publication, (3) the potential rates of error and the existence and maintenance of standards controlling the theory or technique's application, and (4) general acceptance of the theory or technique within a scientific community. See *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 149-50, 119 S.Ct. 1167, 143 L.Ed.2d 238 (1999).

In *Fukusaku*, this court, construing HRE Rule 702, established that "expert testimony must be (1) relevant and (2) reliable." 85 Hawaii at 473, 946 P.2d at 43 (internal citations omitted). *Fukusaku* maintained that "'[s]cientific knowledge' must be distinguished from 'technical knowledge'[:] ... 'technical knowledge' ... involves the mere technical application of well-established scientific principles and procedures." *Id.* Subsequently, in *Kumho Tire*, the United States Supreme Court determined, within the meaning of the FRE, that there was no relevant distinction between scientific and technical knowledge for purposes of admitting expert evidence. 526 U.S. at 147, 119 S.Ct. 1167.

In *Ito*, Judge Watanabe, writing for the Intermediate Court of Appeals (ICA), noted that "it is possible, in light of *Kumho Tire, supra*, that the Hawaii Supreme Court will revisit its ruling in *Fukusaku* that calls for disparate treatment to be accorded to 'scientific' versus 'technical' evidence under HRE Rules 702 and 703." 90 Hawai'i at 236 n. 7, 978 P.2d at 202 n. 7. According to the ICA, however, *Fukusaku* could otherwise be viewed as consistent with *Kumho Tire* because *Fukusaku's* reference to technical knowledge "amounted to taking judicial notice that the underlying scientific principles and methodology employed in procuring the 'technical' hair and fiber evidence were indeed reliable." *Id.*

VIII.

We reaffirm that the touchstones of admissibility for expert testimony under HRE Rule 702 are relevance and reliability. *Fukusaku*, 85 Hawai'i at 473, 946 P.2d at 43. The relevance requirement "primarily" stems from the precondition in FRE Rule 702 that the "evidence or testimony 'assist the trier of fact to understand the evidence or to determine a fact in issue.'" *Daubert*, 509 U.S. at 591, 113 S.Ct. 2786 (quoting FRE Rule 702). The trial judge must determine, then, whether the proffered expert evidence will indeed accomplish that purpose. The reliability requirement refers to "evidentiary reliability—that is trustworthiness." *Id.* at 590 n. 9, 113 S.Ct. 2786 (emphasis added). Under this prong, admission of expert evidence "is premised on an assumption that the expert's opinion will have a reliable basis in the knowledge and experience of his [or her] discipline." *Id.* at 592, 113 S.Ct. 2786. In this context, the trial court is "'assign[ed]... the task of ensuring that an expert's testimony both rests on a reliable foundation and is relevant to the task at hand.'" *Kumho Tire*, 526 U.S. at 141, 119 S.Ct. 1167 (quoting *Daubert*, 509 U.S. at 597, 113 S.Ct. 2786). Thus, in affirming the "*Daubert* gatekeeping requirement" in *Kumho Tire, id.* at 152, 119 S.Ct. 1167, the Court reiterated that "[t]he objective of that requirement is to ensure the reliability and relevancy of expert testimony." *Id.*

A.

55 In determining the relevancy issue, the trial courts' function is akin to the relevancy analysis adopted in applying HRE Rules 401 (1993)^[22] and 402 (1993).^[23] Because *55 the court's inquiry under HRE Rule 702 is like that involved in deciding the relevancy of evidence under HRE Rules 401 and 402, we employ the right/wrong standard in reviewing challenges to a court's relevancy decision under HRE Rule 702. See *State v. Staley*, 91 Hawaii 275, 281, 982 P.2d 904, 910 (1999) (stating that "[w]hen application of a particular evidentiary rule can yield only one correct result, the proper standard for appellate review is the right/wrong standard [and that] under [HRE] Rules 401 and 402, the proper standard of appellate review is the right/ wrong standard") (internal quotation marks and citations omitted).

B.

In determining the reliability of expert evidence within the context of the FRE, we believe that the United States Supreme

Court, in *Kumho Tire*, dispelled any impression that *Daubert* established definitive factors to be applied in all cases. 526 U.S. at 151, 119 S.Ct. 1167. According to *Kumho Tire*, *Daubert's* four "consider[ations]" to be applied by the trial courts, see *id.* at 149-50, 119 S.Ct. 1167, were presented in "the scientific context because that [was] the nature of the expertise" at issue in that case. *Id.* at 164, 119 S.Ct. 1167 (citing *Daubert*, 509 U.S. at 590, 113 S.Ct. 2786). The *Daubert* majority did "not presume to set out a definitive checklist or test." 509 U.S. at 593, 113 S.Ct. 2786. Indeed, it "emphasize[d]" that "[t]he inquiry envisioned by Rule 702 is ... a flexible one." *Id.* at 594, 113 S.Ct. 2786. Accordingly, *Kumho Tire* held that a trial court's decision regarding the reliability of expert testimony would be reviewed for abuse of discretion.

[T]he trial judge must have considerable leeway in deciding in a particular case how to go about determining whether particular expert testimony is reliable....

....

The trial court must have the same kind of latitude in deciding *how* to test an expert's reliability, and to decide whether or when special briefing or other proceedings are needed to investigate reliability, as it enjoys when it decides *whether or not* that expert's relevant testimony is reliable [A] court of appeals is to apply an abuse-of-discretion standard when it "reviews a trial court's decision to admit or exclude expert testimony." [*General Electric Company v. Joiner*], 522 U.S. [136], 138-39 [118 S.Ct. 512, 139 L.Ed.2d 508 (1997)]. *That standard applies as much to the trial court's decisions about how to determine reliability as to its ultimate conclusion.*^[24] Otherwise, the trial judge would lack the discretionary authority needed both to avoid unnecessary "reliability" proceedings in ordinary cases where the reliability of an expert's methods is properly taken for granted, and to require appropriate proceedings in the less usual or more complex cases where cause for questioning the expert's reliability arises. Indeed, the Rules seek to avoid "unjustifiable expense and delay" as part of their search for "truth" and the "just determination" of proceedings. Fed. Rule Evid. 102.

526 U.S. at 152-53, 119 S.Ct. 1167 (italicized emphases in original) (underscored emphasis added) (brackets omitted). Thus, "[i]n sum, Rule 702 grants the [trial] judge the discretionary authority, reviewable for its abuse, to determine reliability in light of the particular facts and circumstances of the particular case." *Id.* at 158, 119 S.Ct. 1167.

We believe such a standard of review is eminently suited to evaluate questions of "evidentiary reliability," that is to say, "trustworthiness" of expert opinions, *Daubert*, 509 U.S. at 590 n. 9, 113 S.Ct. 2786, within the framework of an advocacy-based legal system that is (to emphasize a phrase used in another context) "designed not for the exhaustive search for cosmic understanding but for the particularized resolution of *56 legal disputes." *Id.* at 597, 113 S.Ct. 2786. Therefore, we apply an abuse of discretion standard when reviewing a trial court's decision regarding the reliability of expert testimony. "An abuse of discretion occurs when the decisionmaker `exceeds the bounds of reason or disregards rules or principles of law or practice to the substantial detriment of a party.'" *In re Water Use Permit Applications*, 94 Hawai`i 97, 183, 9 P.3d 409, 495 (2000) (quoting *Bank of Hawai`i v. Kunimoto*, 91 Hawai`i 372, 387, 984 P.2d 1198, 1213 (1999)).

C.

We adopt, then, a two-pronged standard of review for challenges to expert evidence proffered under HRE Rule 702. Of course, judges will be aided in administering proffers of expert evidence by the limiting principles embodied in HRE Rules 703^[25] and 403 (1993).^[26] As *Daubert* pointed out with respect to parallel provisions in the federal rules,

Rule 703 provides that expert opinions based on otherwise inadmissible hearsay are to be admitted only if the facts or data are "of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject."... Rule 403 permits the exclusion of relevant evidence "if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury" Judge Weinstein has explained: "Expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it. Because of this risk, the judge in weighing possible prejudice against probative force under Rule 403 of the present rules exercises more control over experts than over lay

witnesses." [J.B.] Weinstein, [*Rule 702 of the Federal Rules of Evidence is Sound; it Should Not be Amended*], 138 [F.R.D. 631], 632 (1991).

509 U.S. at 595, 113 S.Ct. 2786. Established trial mechanisms further serve to guard against potentially untoward effects of admitted expert evidence:

Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence.... [T]he court remains free to direct a judgment, [Federal Rules of Civil Procedure (Fed. Rule Civ. Proc.)] 50(a), and likewise to grant summary judgment, Fed. Rule Civ. Proc. 56.... These conventional devices... are the appropriate safeguards where the basis of [expert] testimony meets the standards of Rule 702.

Id. at 596, 113 S.Ct. 2786 (citations omitted).

Within this framework, we do not consider it essential or necessary that a trial court embark upon a preliminary determination of whether the proffered expert testimony should be characterized as scientific, technical, or otherwise specialized knowledge. In the textual context of HRE Rule 702, a plain reading of the phrase "*or other specialized knowledge*" (emphasis added) distinguishes the HRE Rule 702 requirements from those relating to lay testimony described in HRE Rule 701 and is broadly inclusive of the examples of specialized knowledge, *i.e.*, scientific and technical, which precede it. Such a construction is consistent with the approach sensibly adopted in *Kumho Tire*. Although, in *Fukusaku*, this court distinguished scientific from technical knowledge, that decision *57 essentially hinged on the conclusion that "the principle and procedures underlying hair and fiber evidence are overwhelmingly accepted as reliable." [27] 85 Hawaii at 473, 946 P.2d at 43.

Discrete factors have been developed in our case law in aid of evaluating the reliability of expert evidence in specific areas of the law. See *id.* (holding that hair and fiber evidence have been overwhelmingly accepted by the courts); *State v. Samonte*, 83 Hawaii 507, 533, 928 P.2d 1, 27 (1996) (holding that reliability of expert testimony involving test firing and operability of weapons involved a determination of "whether the scientific evidence is generally accepted in the relevant scientific community"); *State v. Maelega*, 80 Hawaii 172, 182, 907 P.2d 758, 768 (1995) (stating that "a trial court may disallow expert testimony [of a domestic violence dispute project manager] if it concludes that the proffer of specialized knowledge is based on a mode of analysis that lacks trustworthiness"); *Montalbo*, 73 Haw. at 136, 828 P.2d at 1279 (holding that the reliability of DNA profiling evidence depends on three factors—the validity of the underlying principle, the validity of the technique applying that principle, and the proper application of the technique on the particular occasion); *In re Doe*, 91 Hawai'i 166, 176, 981 P.2d 723, 733 (App. 1999) (concluding that social workers could provide expert testimony in a child protection proceeding because "any inferences or opinions [they made were] the product of an explicable and reliable system of analysis") (internal quotation marks and citations omitted); *Ito*, 90 Hawai'i at 237-41, 978 P.2d at 203-07 (applying fourteen factors outlined in *United States v. Williams*, 583 F.2d 1194 (2d Cir.1978), cert. denied, 439 U.S. 1117, 99 S.Ct. 1025, 59 L.Ed.2d 77 (1979), and *United States v. Jakobetz*, 747 F.Supp. 250 (D.Vt. 1990), aff'd, 955 F.2d 786 (2d Cir.), cert. denied, 506 U.S. 834, 113 S.Ct. 104, 121 L.Ed.2d 63 (1992), to determine the reliability of the horizontal gaze nystagmus (HGN) test, principles, and procedures and stating that "it was appropriate for the [trial] court to take judicial notice of the validity of the principles underlying the HGN testing and the reliability of HGN test results"). [28]

We note that, subsequent to *Daubert* and *Kumho Tire*, FRE Rule 702 was amended to "require[] that the testimony must be the product of reliable principles and methods that are reliably applied to the facts of the case." Fed.R.Evid. Rule 702, Advisory Committee Notes to 2000 Amendments. The present FRE Rule 702 states:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

58 *58 (Emphasis added.) The amendment was "in response to *Daubert*, *supra*, and to the many cases applying *Daubert*,

including *Kumho Tire*, *supra*." Fed.R.Evid. Rule 702, Advisory Committee Notes to 2000 Amendments. It "affirms the trial court's role as gatekeeper and provides some general standards that the trial court must use to assess the reliability and helpfulness of proffered expert testimony." *Id.*^[29] The three reliability standards newly adopted in FRE 702 are similar to the three factors set out in this court's 1992 decision in *Montalbo*.^[30] While HRE 702 has not been amended to incorporate the new FRE 702 factors,^[31] the discretion afforded our trial courts would not preclude them from employing such factors in light of the rational basis underlying the factors, and the broad standard adopted in the last sentence of HRE 702.^[32]

Nevertheless, we are hesitant to establish categories of factors that unnecessarily limit the scope of discretion exercised by the trial courts. As explained in *Kumho Tire*,

it would prove difficult, if not impossible, for judges to administer evidentiary rules under which a gatekeeping obligation depended upon a distinction between "scientific" knowledge and "technical" or "other specialized" knowledge. There is no clear line that divides the one from the others.

....

[W]e can neither rule out, nor rule in, for all cases and for all time[,] the applicability of the factors mentioned in *Daubert*, nor can we now do so for subsets of cases categorized by category of expert or by kind of evidence. Too much depends upon the particular circumstances of the particular case at issue.

....

We do not believe that Rule 702 creates a schematism that segregates expertise by type while mapping certain kinds of questions to certain kinds of experts. Life and the legal cases that it generates are too complex to warrant so definitive a match.

526 U.S. at 148, 150, 151, 119 S.Ct. 1167. What we endorse is a "broad latitude," *id.* at 153, 119 S.Ct. 1167, granted the trial judge "in deciding in a particular case how to go about determining whether particular expert testimony is reliable." *Id.* at 152, 119 S.Ct. 1167.

IX.

Under the abuse of discretion standard to be applied to reliability determinations, the court has discretion "to avoid 'unnecessary reliability' proceedings[.]" *Id.* at 153, 119 S.Ct. 1167. Thus, where no objection is made to expert testimony, the trial court may normally dispense with a reliability proceeding. At trial, Defendant did not object to Wong's testimony about the Widmark formula. The court did not, of its own initiative, conduct a HRE Rule 104 (1993)^[33] *59 hearing to determine the reliability (or the relevance) of the formula to the facts of the case. Ordinarily, under such circumstances, there would be no reason to consider an objection raised on appeal for the first time to such testimony, for it is "where such testimony's factual bas[e]s, data, principles, methods, or their application are called *sufficiently into question*, . . . [that] the trial judge must determine whether the testimony has 'a reliable basis in the knowledge and experience of the relevant discipline.'" *Id.* at 149, 119 S.Ct. 1167 (quoting *Daubert*, 509 U.S. at 592, 113 S.Ct. 2786) (emphasis added) (brackets omitted).

However, there may be instances where a Rule 104 reliability hearing may be warranted, even in the absence of a request for one. Of course, "this [c]ourt will apply the plain error standard of review to correct errors which seriously affect the fairness, integrity, or public reputation of judicial proceedings, to serve the ends of justice, and to prevent the denial of fundamental rights." *State v. Friedman*, 93 Hawaii 63, 68, 996 P.2d 268, 273 (2000) (internal quotation marks and citations omitted). Based on the considerations discussed in Part XI, *infra*, we conclude that admission of Wong's BAC opinion did not implicate the plain error standard.

X.

The trial court's inquiry as to the relevancy requirement is "whether the untrained layman would be qualified to determine intelligently and to the best possible degree the particular issue without enlightenment from those having a specialized understanding of the subject involved in the dispute." Commentary to HRE Rule 702 (quoting Fed.R.Evid. Rule 702, Advisory Committee Notes). The dispute concerning Defendant's BAC at the time of his traffic stop was a matter on which laypersons would be "enlightened" by witnesses, such as Wong, who had "specialized understanding" on such a subject. See Fukusaku, 85 Hawaii at 472, 946 P.2d at 42 (stating that, under HRE Rule 702, "[t]he critical inquiry with respect to expert testimony ... is whether such testimony will assist the trier of fact to understand the evidence or determine a fact in issue")^[34] (internal quotation marks and citations omitted); Samonte, 83 Hawai'i at 533, 928 P.2d at 27 (stating that admissibility of scientific evidence at trial depends on whether "the evidence will add to the common understanding of the jury")^[35] (citations omitted); Lai v. St. Peter, 10 Haw.App. 298, 314-15, 869 P.2d 1352, 1361 (1994) (stating that "doubts about whether an expert's testimony will be useful should generally be resolved in favor of admissibility unless there are strong factors such as time or surprise favoring exclusions"), *overruled on other grounds by* Richardson v. Sport Shinko, 76 Hawaii 494, 880 P.2d 169 (1994). We believe Wong's testimony was relevant, because his opinion as to the extrapolation of Defendant's .079 BAC, forty-two minutes after the traffic stop, would assist the trier of fact in determining a fact in issue, that is, whether Defendant's BAC at the time of the traffic stop was .08 or greater and, hence, indicative of legal intoxication.

Applying HRE 403, there is nothing in the record demonstrating that Wong's testimony was "outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence." On its face, HRE Rule 704 allows an expert to render an opinion on the "ultimate issue to be decided by the trier of fact." See Aga v. Hundahl, 78 Hawai'i 230, 239 n. 3, 891 P.2d 1022, 1031 n. 3 (1995) ("Our rules of evidence... countenance the reception of expert testimony . . . embracing an ultimate *60 issue to be decided by the trier of fact") (Quoting State v. Pinero, 70 Haw. 509, 519, 778 P.2d 704, 711 (1989).) (Some ellipsis points added and some in original.). Here, Wong's ultimate opinion that, at the time of the traffic stop, Defendant's BAC would have been .090 grams of alcohol per 210 liters of breath, was relevant under HRE Rule 702, admissible under HRE Rule 704, and permissible under HRE Rule 403. Thus, the trial court was right in treating Wong's testimony as relevant.

XI.

In his testimony, Wong provided a foundation establishing the reliability of Widmark's formula. He reported that Widmark was the first "one of many" who developed the alcohol elimination formula, that a "number of people" had verified the formula, that the .015 elimination rate factor in the formula was scientifically accepted, and that Widmark's alcohol elimination formula was reasonably relied upon by experts in the field.

A.

We take judicial notice that Widmark's formula is widely viewed as reliable. In *Ito*, the ICA stated that "[t]he fact that the reliability of [a scientific principle such as] the HGN test does not constitute an adjudicative fact under HRE Rule 201^[36] or a matter of law that can be judicially noticed under HRE Rule 202^[37] (1993) ... does not mean that judicial notice cannot be taken of such matter." 90 Hawaii at 242, 978 P.2d at 208 (citing 21 C. Wright & K. Graham, *Federal Practice and Procedure: Evidence* § 5103, at 481 (1977)). Consequently, with respect to FRE Rule 202, upon which HRE Rule 202 is modeled, "one must look to the decisional law to determine the limits of this kind of judicial notice." *Id.* (quoting Wright and Graham, *supra*, § 5102, at 463-64).

In that regard, our appellate courts have "not hesitated in the past to take judicial notice [on appeal] of the validity of underlying scientific principles and the reliability of scientific techniques." *Id.* at 243, 978 P.2d at 209 (citing Montalbo, 73 Haw. at 141-43, 828 P.2d at 1281-82 and Fukusaku, 85 Hawai'i at 473-74, 946 P.2d at 34-44). Thus, we may consider persuasive authorities and, as stated in *Ito*, "case law from other jurisdictions to determine the reliability of a particular scientific test." *Id.*

61 The United States National Highway Traffic Safety Administration considers Widmark's formula "the basic formula for estimating a person's blood alcohol concentration."^[38] U.S. Department of Transportation, *61 National Highway Traffic Safety Administration, Office of Program Development and Evaluation, *Computing a BAC Estimate*, at 2 (1994). Other authorities acknowledge "Widmark's `seminal' work that established a mean elimination rate" and that the Widmark formula "remains a valid and realistic value for male moderate drinkers." *Alcohol-Related Offenses*, 79 Mich. B.J. at 671 (footnotes omitted). Furthermore, "[e]xperts in criminal trials continue to use Widmark's value of .015 for the rate of elimination." J.L. Pariser, *In Vino Veritas: the Truth About Blood Alcohol Presumptions in State Drunk Driving Law*, 64 N.Y.U. L.Rev. 141, 152 (1989) [hereinafter *In Vino Veritas*] (footnote omitted).

It has been held that experts are permitted to testify about back calculations using the Widmark formula as long as there is sufficient evidence in the record about variables such as the type of alcohol consumed, the time of last alcohol intake, and the kind of food ingested. See *State v. Wolf*, 592 N.W.2d 866, 869 (Minn.App.1999) (stating that an expert must have sufficient information about variables for expert testimony based on the Widmark formula to be admissible) (citation omitted); *State v. Ingraham*, 290 Mont. 18, 966 P.2d 103, 119-20 (1998) (noting that an expert who testified as to the defendant's BAC at the time of the accident based on the Widmark formula relied on facts such as the number and type of alcoholic beverages and description of the food consumed by the defendant and his weight).

62 Testimony of experts using their own shorthand versions of the Widmark formula^[39] have been accepted by courts, especially *62 if the experts explain their versions or if the experts were subjected to cross-examination. See *id.* (holding that expert was entitled to rely on a shortened version of the Widmark formula where "a number of professionals in [the expert]'s field rely upon the same formula[.]... [the expert] offered an in-depth explanation of his formula for the jury's consideration, and ... [the defendant]'s counsel extensively cross-examined [the expert] on his shortened formula").

An expert's application of the Widmark formula to assess the defendant's BAC goes to the weight the jury should assign such testimony, rather than to the admissibility of the testimony itself. See *State v. Tibbetts*, 604 A.2d 20, 22 (Me.1992) (holding that a trial court properly determined that expert testimony based on the Widmark formula was relevant and admissible and that it was for the jury to decide what weight to accord it). It may be error for a trial court to exclude expert testimony involving a Widmark calculation. See *Quinto v. City and Borough of Juneau*, 664 P.2d 630, 634 (Alaska App.1983) (stating that the defendant's testimony as to the amount of alcohol he had consumed upon which the expert based his testimony "is plainly a matter of credibility that should properly have been decided by the jury ... [and] certainly not so inherently confusing or obscure as to justify excluding [the expert's] testimony applying Widmark's formula out of fear that the jury might be misled"), *overruled on other grounds by* *City & Borough of Juneau v. Quinto*, 684 P.2d 127 (Alaska 1984).^[40] However, expert testimony of retrograde calculations based on Widmark's formula has been excluded on the bases both of unfair prejudice and insufficient information about variables used in the formula. See *State v. Wolf*, 605 N.W.2d 381, 385 (Minn.2000) (excluding expert testimony because "[t]he record, as stipulated to by both parties at trial, does not contain such basic information as when Wolf last consumed alcoholic beverages, the amount and type of alcohol consumed, or even his accurate height and weight at the time of the arrest").

B.

63 Wong testified that he had an opportunity to review the materials in this case. He applied the Widmark formula, widely accepted as reliable, in this context. Consequently, *63 the decision to admit Wong's expert testimony, based on the Widmark formula, was well within the court's discretion to determine the reliability of expert testimony.

XII.

For the foregoing reasons, we affirm the court's September 9, 1999 judgment of conviction and sentence.

[1] The trial transcripts incorrectly refer to chemist Peter Widmark as "Peter Whitmarc."

[2] The November 23, 1998 complaint filed against Defendant also charged him with the offenses of driving under the influence of drugs,

in violation of HRS § 291-7 (Count II), reckless driving, in violation of HRS § 291-2 (Supp.1998) (Count III), and promoting detrimental drugs in the third degree, in violation of HRS § 712-1249(a) (1993) (Count V).

Prior to the commencement of trial on June 14, 1999, the prosecution filed a motion to dismiss Count II, driving under the influence, and Count V, promoting a detrimental drug in the third degree, with prejudice, which the court granted. As a result, the remaining counts were renumbered as two and three. The parties proceeded to trial on original Counts I, III, and IV (which were subsequently referred to as Counts I, II, and III). Although the court renumbered the counts, we shall refer to the counts as originally charged, inasmuch as that approach was used by both parties in their appellate briefs.

[3] Intoxilyzer is a machine that measures the concentration of alcohol in a breath sample (BrAC). 2 R. Erwin, *Defense of Drunk Driving Cases* § 21.01, at 21-2 to 21-3 (3d ed.1999) [hereinafter *Defense of Drunk Driving*]; see also *State v. Gates*, 7 Haw.App. 440, 777 P.2d 717 (1989). The Intoxilyzer ... reports either an assumed [BAC] (which is achieved by multiplying the individual's BrAC by a conversion factor, a partition ratio of 2100 to 1), [*id.*] at 443, 777 P.2d at 719, or a BrAC which is "usually in terms of grams of alcohol per 210 liters of breath, such as 0.10g/210L." 2 *Defense of Drunk Driving*, [*supra*]. "The assumption is that a BrAC of 0.10g/210L is equivalent to a BAC of 0.10 percent." *Id.* at 21-3. Strictly speaking, expressing BAC as a percentage is not truly accurate because what is being expressed as a percentage is really a comparison of weight to volume. *City of Monroe v. Robinson*, 316 So.2d 119, 121 n. 1 (La. 1975); 2 *Defense of Drunk Driving*, [*supra*], § 15.02[3], at 15-9.

State v. Ito, 90 Hawai'i 225, 228 n. 2, 978 P.2d 191, 194 n. 2 (App.1999) (some brackets added and some omitted).

[4] Wong said, "Toxicology literally means the study of poisons. Drugs are considered a drug class of poisons, so[,] hence[,] one who studies drugs is a toxicologists [sic] as well."

[5] HRS § 702-207 (1993), part of the Hawaii Penal Code (HPC), explains that the **state** of mind requirement applies to all elements of a crime:

When the definition of an offense specifies the **state** of mind sufficient for the commission of that offense, without distinguishing among the elements thereof, the specified **state** of mind shall apply to all elements of the offense, unless a contrary purpose plainly appears.

[6] HRS § 291-4 provides in pertinent part as follows:

Driving under the influence of intoxicating liquor. (a) A person commits the offense of driving under the influence of intoxicating liquor if:

(1) The person operates or assumes actual or physical control of the operation of any vehicle while under the influence of intoxicating liquor, meaning that the person concerned is under the influence of intoxicating liquor in an amount sufficient to impair the person's normal mental faculties or ability to care for oneself and guard against casualty; *or*

(2) The person operates or assumes actual physical control of the operation of any vehicle with .08 or more grams of alcohol per one hundred milliliters of cubic centimeters of blood or .08 or more grams of alcohol per two hundred ten liters of breath.

(Emphasis added.)

[7] HRS § 291-7 indicates in relevant part:

Driving under the influence of drugs. (a) A person commits the offense of driving under the influence of drugs if the person operates or assumes actual physical control of the operation of any vehicle while under the influence of any drug which impairs such person's ability to operate the vehicle in a careful and prudent manner. The term "drug" as used in this section shall mean any controlled substance as defined and enumerated on schedules I through IV of chapter 329.

[8] We believe the "all elements" rule in HRS § 702-207 would apply where, in the absence of a specified "**state** of mind," HRS § 702-204 designates the applicable states of mind.

[9] Instruction No. 28 provided explanations of Part XIV of chapter 286 and of HRS § 291-4:

Part XIV of Chapter 286 of the Hawaii Revised Statutes provides for the Administrative Revocation of Driver's Licenses in the **State** of Hawaii.

Section 291-4 of the Hawaii Revised Statutes is the statute which prohibits Driving Under the Influence of Intoxicating Liquor.

[10] Instructions Nos. 15 through 17 stated:

A person acts intentionally with respect to his [or her] conduct when it is his [or her] conscious object to engage in such conduct.

A person acts intentionally with respect to attendant circumstances when he [or she] is aware of the existence of such circumstances or believes or hopes that they will exist.

A person acts intentionally with respect to the result of his [or her] conduct when it is his [or her] conscious object to cause such a result.

Instruction No. 15

A person acts knowingly with respect to his [or her] conduct, when he [or she] is aware that his [or her] conduct is of that nature. A person acts knowingly with respect to attendant circumstances when he [or she] is aware that such circumstances exist.

A person acts knowingly with respect to a result of his [or her] conduct when he [or she] is aware that it is practically certain that his [or her] conduct will cause such a result.

Instruction No. 16

A person acts recklessly with respect to his [or her] conduct when he [or she] conscientiously disregards a substantial and unjustifiable risk that the person's conduct is of the specified nature.

A person acts recklessly with respect to attendant circumstances when he [or she] conscientiously disregards a substantial and unjustifiable risk that such circumstances exist.

A person acts recklessly with respect to a result of his [or her] conduct when he [or she] conscientiously disregards a substantial and unjustifiable risk that his [or her] conduct will cause such a result.

A risk is substantial and unjustifiable if, considering the nature and purpose of the person's conduct and the circumstances known to him [or her], the disregard of the risk involves a gross deviation from the standard of conduct that a law abiding person would observe in the same situation.

Instruction No. 17.

[11] In conjunction with HRS § 291-4.4(a)(2), HRS § 291-5 (Supp.1998) states in relevant part:

Evidence of intoxication. (a) In any criminal prosecution for a violation of section 291-4,.08 or more grams of alcohol per one hundred milliliters or cubic centimeters of the defendant's blood or *.08 or more grams of alcohol per two hundred ten liters of the defendant's breath within three hours after the time of the alleged violation* as shown by chemical analysis or other approved analytical techniques of the defendant's blood or breath *shall be competent evidence that the defendant was under the influence of intoxicating liquor at the time of the alleged violation.*

(b) In any criminal prosecution for a violation of section 291-4, the amount of alcohol found in the defendant's blood within three hours after the time of the alleged violation as shown by chemical analysis or other approved analytical techniques of the defendant's blood or breath shall be competent evidence that the defendant was under the influence of intoxicating liquor at the time of the alleged violation and shall give rise to the following presumptions:

(1) If there were .05 or less grams of alcohol per one hundred milliliters or cubic centimeters of blood or .05 or less grams of alcohol per two hundred ten liters of defendant's breath, it shall be presumed that the defendant was not under the influence of intoxicating liquor at the time of the alleged violation; and

(2) If there were in excess of .05 grams of alcohol per one hundred milliliters or cubic centimeters of defendant's blood or *.05 grams of alcohol per two hundred ten liters of defendant's breath, but less than .08 grams of alcohol per one hundred milliliters or cubic centimeters of defendant's blood or .08 grams of alcohol per two hundred ten liters of defendant's breath, that fact may be considered with other competent evidence* in determining whether or not the defendant was at the time of the alleged violation under the influence of intoxicating liquor but *shall not of itself give rise to any presumption.*

(Emphases added.) Defendant's intoxilyzer reading was .079. He apparently contends that while his BAC means that he might have been under the influence of intoxicating liquor, he could not be presumed to have been so influenced. Instruction No. 23 to the jury was based on HRS § 291-5:

In Count One of the Complaint, if you find beyond a reasonable doubt that the amount of alcohol found in the breath of Defendant, JAMES L. **VLIET**, to be in excess of .05 grams, but less than .08 grams of alcohol per 210 liters of breath within three hours after the time of the alleged violation, as shown by chemical analysis or other approved analytical techniques of the Defendant's breath, that fact may be considered with other competent evidence in determining whether or not the Defendant was, at the time of the violation, under the influence of intoxicating liquor.

[12] Instruction No. 21 on the elements of the offense read:

In Count One of the complaint, Defendant JAMES L. **VLIET**, is charged with the offense of Habitually Driving Under the Influence of Intoxicating Liquor and/or Drugs.

....

There are seven material elements of the offense of Habitually Driving Under the Influence of Intoxicating Liquor and/or Drugs[,] each of which the prosecution must prove beyond a reasonable doubt.

These seven elements are:

....

7. That Defendant did so intentionally, knowingly, or recklessly.

[13] Hence, the prosecution's contention that other evidence adduced at trial supported Defendant's conviction of habitually driving under the influence of intoxicating liquor or drugs would not establish an independent basis for sustaining the verdict.

[14] "Retrograde" is defined as "backward, reversely." *Webster's Third International Dictionary* at 1940 (3d ed.1961). "Retro" means "back; backward; behind." *Black's Law Dictionary* at 1317 (6th ed.1990).

[15] Many drunk driving or "per se" laws (statutes defining an offense in terms of a specific BAC) refer to BAC at the time of the offense, rather than at the time of the test. "Typically, the **State** is not required to perform an extrapolation to estimate the BAC at the time of the offense, the assumption being that the BAC at the time of the offense was at least as high as at the time of the test." *2 Defense of Drunk Driving, supra*, § 14.03(5), at 14-24. The defendant, though, can usually offer testimony that the BAC at the time of the offense was less than at the time of the test (i.e. that there was at least a reasonable likelihood that BAC was increasing at the time of the incident). *See id.*

[16] One authoritative source that recognizes .015 as the accepted elimination rate states:

[B]lood alcohol content assuming no elimination has occurred ... may be regarded as the concentration of alcohol that would occur if... all the alcohol were absorbed instantly into the bloodstream and distributed throughout the [total body water]. Because elimination does occur from the moment of the first absorption of alcohol, however, any value obtained for [blood alcohol content assuming no elimination has occurred] must be corrected by subtracting the alcohol lost through elimination. Widmark estimated an average ["rate B"] elimination [(referring to blood alcohol elimination for subjects who have just eaten a meal of potatoes, as opposed to a "rate A" elimination based on using subjects with empty stomachs)] of .015% per hour, with most people having an elimination rate of .01-.02% per hour.

2 Defense of Drunk Driving, supra, § 15.05[1] at 15-24-25, § 15.04[1][b][i], Figure 15-5.

[17] Wong may be referring here to Widmark's positing of a slightly faster elimination rate for women than for men, in part because he expressed results dissimilar from the standard to account for the different ratio in women of fat to lean tissue. When adjusted for this difference, however, there appears to be no statistically significant difference in elimination rates between men and women. *See J.N. Bostic, Alcohol Related Offenses: Retrograde Extrapolations After Wager*, 79 Mich. B.J. 668, 671 (2000) [hereinafter *Alcohol-Related Offenses*] ("A study of three men who drank 50g of alcohol on 10 separate occasions concluded that elimination rates varied as much with the subject as between them. All results, however, fell within the range published by Widmark in 1932, i.e. .011 to .024g/100g/h with a mean of .015 g/g/h.")

[18] Wong explained "synergistic" as "an effect that is greater than the normal effects of each drug considered individually. Say if each one had a value of one and all three normally would be—say if you added them all up, the activity would be—synergistic would possibly bring it up to five. It would enhance the impairing affects of the drugs."

[19] During a second round of questions on redirect examination, Defendant's objection to the prosecution's question regarding how Defendant's seizure medications would affect the reading of the intoxilyzer was sustained:

[PROSECUTOR] Q. To your knowledge, would those drugs ... effect [sic] the reading of an intoxilyzer instrument? ... [W]ould these drugs being in a person's blood stream[,] would that effect [sic] in any way the reading of an—

[DEFENSE COUNSEL]: Your Honor, I'm going to object. This is beyond the scope of cross.

THE COURT: Sustained.

In response to a juror's question about the effect of the seizure medications on blood pressure, Wong stated:

Usually [the drugs] will last for one to two hours, sometimes three. You'll see most prescriptions are generally dosed so they will wear out in about four hours [P]henobarbital is a fairly long—acting drug so ... it would depend ... if it was taken maybe four, five, six hours ago. You may not see-if you took just phenobarbital by itself or clonazepam by itself, you may not necessarily see a blood pressure drop....

[20] Prior to December 1, 2000, FRE Rule 702 stated:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify thereto in the form of an opinion or otherwise.

The "assist[ance]" reference in FRE Rule 702 "goes primarily to relevance." *Daubert*, 509 U.S. at 591, 113 S.Ct. 2786. The underlying premise of FRE Rule 702's reference to knowledge, skill, experience, training, and education apparently is that "the expert's opinion will have a *reliable* basis in the knowledge and experience of his discipline." *Id.* at 592, 113 S.Ct. 2786 (emphasis added).

The last sentence of HRE Rule 702, added in 1992, made express the reliability requirement underlying an expert's opinion. 1992 Haw. Sess. L. Act 191 § 7, at 410. "The criterion of Rule 702, that expert testimony 'assist the trier of fact to understand the evidence,' necessarily incorporates a reliability factor," and "[t]his is the holding of [*Montalbo, supra*] (DNA profiling evidence admissible), [which] observ[ed] that Rule 702's assistance requirement contemplates expert testimony based upon ... an explicable and reliable system of analysis[.]" A. Bowman, *Hawaii Rules of Evidence Manual*, Commentary to Rule 702, at 90 (Supp.1995). Hence, "*Montalbo* . . . anticipated the [1992 HRE] Rule 702 amendment" and "the amendment makes explicit what was... implicit in the assistance criterion [before 1992]." *Id.* Accordingly, federal case law on FRE Rule 702 may be instructive regarding our construction of HRE Rule 702.

[21] Whether *Daubert* established four factors or five depends on whether the "rate of error" and "standards controlling operations" factors are characterized as one or two factors. The Court in *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 149-50, 119 S.Ct. 1167, 143 L.Ed.2d 238 (1999), characterized them as a single factor, thus making the final factor count as the fourth, rather than the fifth factor.

[22] HRE Rule 401 provides as follows:

Rule 401 Definition of "relevant evidence." "Relevant evidence" means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence.

[23] HRE Rule 402 provides as follows:

Rule 402 Relevant evidence generally admissible; irrelevant evidence inadmissible. All relevant evidence is admissible, except as otherwise provided by the Constitutions of the United States and the **State** of Hawaii, by statute, by these rules, or by other rules adopted by the supreme court. Evidence which is not relevant is not admissible.

[24] Because we believe the relevance of expert testimony should be subject to a right/wrong standard of review, we differ with the Supreme Court's paradigm insofar as review of the "ultimate conclusion" reached by the trial court is concerned. We concur, however, in the view that a trial court's decision as to the reliability of expert evidence should be subjected to an abuse of discretion standard.

[25] HRE Rule 703 provides as follows:

Bases of opinion testimony by experts. The facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by or made known to the expert at or before the hearing. If of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject, the facts or data need not be admissible in evidence. The court may, however, disallow testimony in the form of an opinion or inference if the underlying facts or data indicate lack of trustworthiness.

[26] HRE Rule 403 provides as follows:

Exclusion of relevant evidence on grounds of prejudice, confusion, or waste of time. Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence.

[27] We do not read *Fukusaku* as establishing a separate category of "technical knowledge" for which a reliability determination need not be required in every case. See 85 Hawai'i at 474, 946 P.2d at 44.

[28] The fourteen "other indicators of suitability" include:

(1) the potential rate of error, (2) the existence and maintenance of standards, (3) the care with which the scientific technique has been employed and whether it is susceptible to abuse, (4) whether there are analogous relationships with other types of scientific techniques that are routinely admitted into evidence, (5) the presence of failsafe characteristics, (6) the expert's qualifications and stature, (7) the

existence of specialized literature, (8) the novelty of the technique and its relationship to more established areas of scientific analysis, (9) whether the technique has been generally accepted by experts in the field, (10) the nature and breadth of the inference adduced, (11) the clarity with which the technique may be explained, (12) the extent to which basic data may be verified by court and jury, (13) the availability of other experts to evaluate the technique, and (14) the probative significance of the evidence.

Itō, 90 Hawaii at 237, 978 P.2d at 203 (citing Montalbo, 73 Haw. at 139 n. 5, 828 P.2d at 1280 n. 5). While the ICA chose to employ fourteen factors in determining the reliability of the HGN test, we do not believe Montalbo indicated, nor do we require that this approach for determining reliability be followed.

[29] While such standards are unquestionably helpful, in requiring that the trial court "must use" these three standards, the Advisory Committee's Notes seem somewhat inconsistent with the broad discretion given federal trial courts by Kumho Tire.

[30] In Montalbo, this court said with respect to the reliability of proffered "scientific evidence," that the factors to be applied were that: "3) the underlying theory is generally accepted as valid; 4) the procedures used are generally accepted as reliable of performed properly; [and] 5) the procedures were applied and conducted properly in the present instance." 73 Haw. at 140, 828 P.2d at 1281.

[31] We do not mean to intimate any opinion on whether HRE 702 should be amended.

[32] However, we need not reach the question in this case of whether or to what extent we agree with the views expressed in the commentary to the revised 2000 version of FRE Rule 702.

[33] HRE Rule 104 states in pertinent part as follows:

Preliminary questions. (a) Questions of admissibility generally. Preliminary questions concerning ... the admissibility of evidence shall be determined by the court, subject to the provisions of subsection (b). In making its determination the court is not bound by the rules of evidence except those with respect to privileges.

(b) Relevancy conditioned on fact. When the relevancy of evidence depends upon the fulfillment of a condition of fact, the court shall admit it upon, or subject to, the introduction of evidence sufficient to support a finding of the fulfillment of the condition.

....

(e) Weight and credibility. This rule does not limit the right of a party to introduce before the jury evidence relevant to weight or credibility.

[34] See also Samonte, 83 Hawaii at 533, 928 P.2d at 27; Montalbo, 73 Haw. at 140, 828 P.2d at 1280; State v. Castro, 69 Haw. 633, 647, 756 P.2d 1033, 1043 (1988); State v. Kim, 64 Haw. 598, 605, 645 P.2d 1330, 1336 (1982); In re Doe, 91 Hawaii at 176, 981 P.2d at 733.

[35] See also Maelega, 80 Hawaii at 181, 907 P.2d at 767; Montalvo v. Lapez, 77 Hawaii 282, 302, 884 P.2d 345, 365 (1994); Montalbo, 73 Haw. at 140, 828 P.2d at 1281; Itō, 90 Hawaii at 236, 978 P.2d at 201.

[36] HRE Rule 201 states in relevant part:

Judicial notice of adjudicative facts. (a) Scope of rule. This rule governs only judicial notice of adjudicative facts.

(b) Kinds of facts. A judicially noticed fact must be one not subject to reasonable dispute in that it is either (1) generally known within the territorial jurisdiction of the trial court, or (2) capable of accurate and ready determination by resort to sources whose accuracy cannot be reasonably questioned.

(c) When discretionary. A court may take judicial notice, whether requested or not.

[37] HRE Rule 202 provides in relevant part:

Judicial notice of law. (a) Scope of rule. This rule governs only judicial notice of law.

(b) Mandatory judicial notice of law. The court shall take judicial notice of (1) the common law, (2) the constitutions and statutes of the United States and of every **state**, territory, and other jurisdiction of the United States, (3) all rules adopted by the United States Supreme Court or by the Hawaii Supreme Court, and (4) all duly enacted ordinances of cities or counties of this **State**.

(c) Optional judicial notice of law. Upon reasonable notice to adverse parties, ... the court may take, judicial notice of (1) all duly adopted federal and **state** rules of court....

[38] The U.S. Department of Transportation states that advancements have led to refinements in Widmark's basic formula:

The basis for the calculations are the established physiological facts that alcohol distributes itself in the total water of the body, and that it is disposed of primarily by metabolism in the liver. The procedure takes into account the amount of body water in males and females, and the range of metabolic rates to be found in the population.... The procedure by which one calculates how to convert a dose of alcohol into a probable blood alcohol concentration proceeds in several steps:

1) After absorption, alcohol is eventually distributed in the total water in the body. Begin by calculating the amount of water in the subject. On average, males have 58 percent of their body weight as water and females have 49 percent of their weight as water. To find the amount of water in an individual of given weight, one multiplies the body weight in kilograms by the gender percentage and obtains the amount of weight of the water in kilograms (one kilogram equals 2.2046 pounds). A kilogram of water occupies one liter, one can easily convert from weight to volume of water. For example, consider a 128 pound male of age 25. One hundred and twenty eight pounds divided by 2.2046 converts pounds into 58.06 kilograms, which is his kilogram weight. (The BAC Estimator program makes the conversion automatically.)

2) To find the total body water, multiply the 58.06 kilograms times .58 (58% of body weight). This equals 33.675 kilograms of water, which occupies a volume of 33.675 liters or 33,675 milliliters.

3) The next step is to inquire what concentration in water will occur when a given dose of alcohol is administered. Assume that the dose is one ounce of pure alcohol (i.e. 200 proof). One ounce of alcohol equals 29.57 milliliters. Since alcohol has a specific gravity of .79, the 29.57 milliliters will weigh 23.36 grams.

One ounce of alcohol (i.e., 23.36 grams), absorbed into a 128-pound male's total body water, produces an alcohol concentration in water of 23.36 grams divided by 33,675 milliliters, i.e., .0006937 grams alcohol per milliliter of body water.

4) We now find the alcohol concentration in the blood. On average, blood is composed of 80.6 percent water. Therefore, the .0006937 grams alcohol per milliliter of water is multiplied by .806. This results in .000559 grams alcohol per milliliter of blood (this is because each milliliter of blood only has .806 milliliters of water).

5) The result, 0.000559 grams alcohol per milliliter blood equals 0.0559 grams alcohol per 100 milliliters blood. This is also described as grams per deciliter (i.e. per 1/10 liter of blood), or also as .0559. It should be noted that our calculations are based on average characteristics for individuals....

Water body weight percentage is the percentage of total body weight composed of water. This is not the same as Widmark's "R" factor. The "R" factor is a complex empirical measure that takes into account both body water percentage and water concentration in blood.

(6) We have calculated the theoretical instantaneous BAC for one ounce of alcohol. To adjust this calculation for the actual content of alcohol in a drink, one multiplies the number of ounces of alcohol in the drink by the figure for BAC per one ounce alcohol....

(7) The final factor to take into account is the metabolism or burnoff. Alcohol is metabolized from the time that ingestion begins. It takes but a few seconds for alcohol to reach the liver and for metabolism to commence after drinking. Thus, metabolism is occurring during the period that alcohol is being absorbed and distributed throughout the body. To determine the actual blood alcohol level at any given time, we must decrease the theoretical instantaneous peak BAC by the amount of alcohol metabolized from the beginning of drinking....

U.S. Department of Transportation, National Highway Traffic Safety Administration, Office of Program Development and Evaluation, *Computing a BAC Estimate*, at 2-3 (1994).

[39] One authority states that

[r]esearchers have settled on a rough formula to estimate a person's BAC from body weight and amount of alcohol consumed:

$150/A \times B/50 \times C \times .025 = D$ [where A = subject's body weight, B = percent of alcohol in beverage, C = total amount of ounces in beverage, and D = BAC]

In Vino Veritas, 64 N.Y.U. L.Rev. at 181 n. 29 (citing S. Brent & S. Stiller, *Handling Drunk Driving Cases* § 3:9, 36 (1995)).

Variations of the Widmark formula have been used to determine the number of drinks the defendant consumed. An example of such a variation is as follows:

$(\text{BAC})(\text{body weight})(r)(0.184) = \text{fluid ounces of ethyl alcohol}$. The resulting value for fluid ounces of ethyl alcohol is then divided by a numerical value for the type of alcohol consumed. For example:

1 shot = 0.43 fluid ounces of ethyl alcohol

1 beer = 0.54 fluid ounces of ethyl alcohol

1 glass of wine = 0.48 fluid ounces of ethyl alcohol

[where values assume one shot of liquor to be one ounce at 86 proof, one beer to be 12 ounces at 4.5% alcohol, and one glass of wine to be four ounces at 12% alcohol].

C.M. James, III, *Driving Under the Influence: the Tactical Considerations in Sobriety Checkpoint Cases*, 59 Am.Jur. Trials 79, § 10 (Supp.1996).

[40] It has been suggested that more than one BAC test would result in a more accurate BAC reading.

[T]ypically [a BAC reading is] based on a single BAC test. Without additional tests, it is impossible to know whether that test was taken while the driver's BAC was increasing or decreasing. If the driver's BAC was increasing between the time he was stopped and the time he was tested, his BAC at the time of the stop would be lower than his BAC at the time of the test. Most states, however, presume that a defendant's BAC is always decreasing. Thus, any extrapolation done in the case of a defendant whose BAC increased from the time of arrest until the time of the BAC test will overestimate that defendant's BAC while driving.

In Vino Veritas, 64 N.Y.U. L.Rev. at 152 (citing Watson, Watson, & Batt, *Prediction of Blood Alcohol Concentrations in Human Subjects: Updating the Widmark Equation*, 42 J. Stud. Alcohol 54m, 547 (1981) (arguing for slight shift in Widmark's equation, while affirming that the calculation is still basically correct)). There is no claim in this case that Defendant's BAC was increasing at the time of the arrest.

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