IN THE SUPREME COURT OF THE
STATE OF OREGON

STATE OF OREGON,
Petitioner on Review,
v.
JOHN CHARLES HEDGPETH,
Respondent on Review.
(CC 14CR1014) (CA A158196) (SC S065921)

On review from the Court of Appeals.*

Argued and submitted March 1, 2019, at Willamette College of Law, Salem, Oregon.

Paul L. Smith, Deputy Solicitor General, Salem, argued the cause and filed the briefs for petitioner on review. Also on the briefs were Ellen F. Rosenblum, Attorney General, and Benjamin Gutman, Solicitor General.

Emily P. Seltzer, Deputy Public Defender, Office of Public Defense Services, Salem, argued the cause and filed the brief for the respondent on review. Also on the brief was Ernest G. Lannet, Chief Deputy Defender.

Before Walters, Chief Justice, and Balmer, Nakamoto, Flynn, Duncan, and Nelson, Justices, and Baldwin, Senior Justice pro tempore.**

FLYNN, J.

The decision of the Court of Appeals is affirmed. The judgment of the circuit court is reversed, and the case is remanded to that court for further proceedings.

Balmer, J., dissented and filed an opinion, in which Baldwin, S. J., joined.

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* Appeal from Coos County Circuit Court, Richard L. Barron, Judge. 290 Or App 399, 415 P3d 1080 (2018).

** Garrett, J., did not participate in the consideration or decision of this case.

FLYNN, J.

This case arises out of defendant's challenge to his conviction for driving under the influence of intoxicants (DUII) by driving with a blood alcohol concentration (BAC) of at least .08 percent. The record consisted solely of evidence that a breathalyzer test measured defendant's BAC as .09 percent nearly two hours after he drove and that defendant had consumed no additional alcohol in the interim. The Court of Appeals agreed with defendant that the state's evidence was insufficient to demonstrate that defendant drove with a BAC of at least .08 percent. *State v. Hedgpeth,* 290 Or App 399, 415 P3d 1080, *rev allowed*, 363 Or 119 (2018). We allowed the state's petition for review to consider whether "common knowledge" of the proposition that blood alcohol levels dissipate over time permits a factfinder reasonably to infer that defendant drove with a blood alcohol level above the legal limit from evidence that defendant's blood alcohol level two hours later was .09 percent, with no consumption in the interim. On those bare facts, we conclude that something more than the generic proposition that blood alcohol levels dissipate over time is needed to permit a nonspeculative inference that the defendant drove with a blood alcohol level above the legal limit.

I. BACKGROUND

A. *DUII Laws Generally*

Oregon has had laws prohibiting driving under the influence of intoxicants for more than 100 years. *See State v. Miller*, 309 Or 362, 368, 788 P2d 974 (1990) (citing Or Laws 1917, ch 29, § 1). The crime is currently codified at ORS 813.010, which provides,

> "(1) A person commits the offense of driving while under the influence of intoxicants if the person drives a vehicle while the person:
>
> "(a) Has 0.08 percent or more by weight of alcohol in the blood of the person as shown by chemical analysis of the breath or blood of the person made under ORS 813.100, 813.140 or 813.150;
>
> "(b) Is under the influence of intoxicating liquor, cannabis, a controlled substance or an inhalant; or

> "(c) Is under the influence of any combination of intoxicating liquor, cannabis, a controlled substance and an inhalant."[1]

As we have explained, the statute describes alternative methods for proving that a person drove while under the influence of intoxicants:

> "The state can establish that the defendant's BAC was .08 percent or more, ORS 813.010(1)(a), regardless of observable symptoms, or the state can prove that *** the defendant was adversely affected by intoxicants to a perceptible degree, ORS 813.010(1)(b), (c)."

State v. Eumana-Moranchel, 352 Or 1, 7-8, 277 P3d 549 (2012); *see also State v. King*, 316 Or 437, 446, 852 P2d 190 (1993) (ORS 813.010(1)(a) and (b) describe a "single offense" with two elements—that the accused drove a motor vehicle, and that the accused was under the influence of intoxicants—and jurors did not need to agree on whether the state had proven the latter element by way of test results or otherwise). We have emphasized that the first method, which we have referred to as the *per se* method of proving DUII, reflects the legislature's apparent assumption,

> "based upon scientific studies and accepted medical knowledge, that the physical and mental condition of a driver with such a level of blood alcohol is impaired to such a degree as to make it unsafe for him to drive a motor vehicle, regardless of observable physical symptoms."

State v. Clark, 286 Or 33, 39, 593 P2d 123 (1979).

We also have emphasized two features of the statute that complicate the state's burden of proof. First, under either method of proof, "the state must prove that the driver had the proscribed BAC or was perceptibly impaired *at the time that he or she was driving*." *Eumana-Moranchel*, 352 Or at 8 (emphasis in original). Second, proof of a *per se* violation based on blood alcohol concentration must be "shown by chemical analysis of the breath or blood." *State v. O'Key*, 321 Or 285, 308, 899 P2d 663 (1995) (explaining that state

[1] The current version of ORS 813.010(1) reflects 2017 amendments to address cannabis but is otherwise identical to the 2015 provision that governs defendant's conviction. Or Laws 2017, ch 21, § 80.

could not rely solely on results of horizontal gaze nystagmus test (HGN) to prove *per se* violation under ORS 813.010(1)(a) because "HGN test does not involve a chemical analysis of breath or blood").

Those requirements present a challenge when the state seeks to prove that a person has committed DUII based only on evidence from a chemical analysis of blood alcohol concentrations because, as we observed in *Eumana-Moranchel*, "it is virtually always the case that the chemical test of the breath or blood is administered some time *after* the person has stopped driving." 352 Or at 9 (emphasis in original). From that premise and the additional premise that "a person's BAC changes during the time between being stopped and undergoing a breath test[,] *** [i]t follows that a chemical test result alone never 'shows' the actual BAC of the driver at the time of driving." *Id.* Thus, as we emphasized, "[s]omething more is necessary to connect the breath test result to the statutory requirement of a BAC of .08 percent or more at the time of driving." *Id.* at 9-10.

B. *Procedural History of the Case*

For reasons of strategy that have no bearing on this appeal, the state chose to prove that defendant committed the crime of DUII only under the *per se* method of proof—proving that he drove with a BAC of at least .08.[2] The evidence at trial consisted exclusively of testimony from the arresting officer that (1) he had stopped defendant for riding a motorcycle without a helmet; (2) he subsequently took defendant into custody for DUII;[3] (3) he took defendant to the police station where a breathalyzer test was administered one hour and 55 minutes after the stop; (4) defendant did not consume alcohol between the time of the stop and the administration of the breathalyzer test, and (5) the breathalyzer result showed a BAC of 0.09. Defendant

[2] Before trial, defendant had notified the state that he intended to offer evidence that the ratio of breath alcohol to blood alcohol—the so-called "partition ratio"—varies among individuals. The state believed that the evidence would be irrelevant if it pursued only a *per se* theory of DUII under ORS 813.010(1)(a), so it chose to proceed only under that theory. The trial court ultimately agreed with the state's assessment and refused to admit defendant's evidence.

[3] For reasons not relevant to this appeal, the trial court excluded evidence of the officer's observations that led the officer to arrest defendant for DUII.

argued to the trial court that the evidence was insufficient to permit a nonspeculative inference that his BAC was over the legal limit at the time he drove, but the court disagreed. Sitting as factfinder, the court explained: "I will find him guilty because the only evidence before me is what he blew, and I don't have evidence at all that suggests one way or the other what you do with the—with that to equate it with time of driving. But that's the evidence I have."

On appeal, defendant renewed his challenge to the sufficiency of the evidence, and the state responded by arguing that the "common knowledge" that alcohol rates dissipate over time permitted the factfinder to draw a reasonable inference that defendant's BAC was at least .08 at the time of driving. The Court of Appeals agreed with defendant and reversed the conviction. The court reasoned that "the factfinder cannot, at least on this record, apply the common knowledge that blood alcohol goes up and down over time to make a reasonable inference about *when* defendant's BAC likely reached .08 or above and whether that occurred while defendant was driving." *Hedgpeth*, 290 Or App at 406. The Court of Appeals identified three possible inferences that could be drawn: That defendant's BAC was above .08 when he drove; that it was at .08 when he drove; or that it was under .08 when he drove. *Id.* at 407. Because the state did not present "*any* evidence bearing on the movement of alcohol through defendant's body or the presence of alcohol in defendant's body at the time or shortly before defendant drove," the court concluded that "there is nothing but speculation that guides a factfinder to select from one of those three possible inferences." *Id.* at 406, 407 (emphasis in original).

This court allowed review to address the role of inferences and "common knowledge" when a court tests the sufficiency of evidence to permit a criminal conviction. As we explain below, we agree with the conclusion of the Court of Appeals that "common knowledge" is not enough on this record to supply the "[s]omething more" that is "necessary to connect the breath test result to the statutory requirement of a BAC of .08 percent or more at the time of driving." *See Eumana-Moranchel*, 352 Or at 9-10.

II. ANALYSIS

A. *The Standard of Review for an MJOA*

We turn to a preliminary dispute regarding the legal standard for granting a motion for judgment of acquittal.[4] We have repeatedly explained that our standard for reviewing the denial of a motion for judgment of acquittal involves viewing the evidence in the "light most favorable to the state" to determine if the "state presented sufficient evidence from which a rational trier of fact, making reasonable inferences," could find the essential elements of the crime beyond a reasonable doubt. *State v. Clemente-Perez*, 357 Or 748, 756, 762, 359 P3d 232 (2015); *see also State v. Lupoli*, 348 Or 346, 366, 234 P3d 117 (2010) (same).

According to the state, the trial court's finding that defendant had a BAC of at least .08 at the time that he was driving was a reasonable inference from the evidence of three predicate facts: 1) the trooper placed defendant under arrest for DUII shortly after he observed defendant driving; 2) a chemical test performed nearly two hours later measured defendant's BAC at .09 percent; and 3) defendant did not drink in the interim.

However, defendant proposes that a "reasonable inference" requires more precision. According to defendant, "in order to make an inference, a factfinder must be able to logically deduce a probable conclusion from the underlying facts" through a "logical syllogism." Defendant acknowledges that a factfinder could infer, based on common experience, that people intoxicated by alcohol become less so over time. But the factfinder could not, defendant asserts, infer from that general knowledge and evidence of the later blood alcohol test that defendant's BAC would have been at least 0.08 at the time he drove. Defendant argues that, while it

[4] Defendant did not expressly move for judgment of acquittal. Instead, he argued to the trial court in closing argument that the evidence was insufficient to permit a finding of guilt. Under the circumstances, defendant raised the issue in a way that is equivalent to making a motion for judgment of acquittal. *See State v. Gonzalez-Valenzuela*, 358 Or 451, 454 n 1, 365 P3d 116 (2015) (agreeing "with the long-standing case law from the Court of Appeals that," when a defendant opts for a bench trial, a challenge to the legal sufficiency of the state's evidence during closing argument can be "the equivalent of a motion for judgment of acquittal" for purposes of preserving the issue).

is possible that his BAC declined between the time of driving and the time of testing, it also is possible that his BAC was rising during at least part of that time and had not yet reached .08 when he was driving. Because there was no evidence to aid the factfinder in distinguishing between those possibilities, defendant contends that there was no basis for the factfinder to "logically deduce a probable conclusion from the underlying facts."

The decision of the Court of Appeals suggests that a similar degree of precision governs the inquiry into whether evidence permits a "reasonable inference" of guilt. In an *en banc* decision, the Court of Appeals majority explained that it understood the issue as "whether mere logic renders probable that, when a person's BAC is .09 percent one hour and 45 minutes after he drove and he has not consumed alcohol over that period, that person's BAC was at least .08 at the time that he was driving." *Hedgpeth*, 290 Or App at 404. The court reasoned that "it does not follow solely as a matter of probability and logic that a person whose BAC is measured at .09 percent would have necessarily had a BAC of at least .08 percent an hour and 45 minutes earlier if he or she consumed no alcohol during that intervening time period." *Id*. at 406-07.

The suggestion of defendant and the Court of Appeals that reasonable inferences are limited to those that follow "necessarily" from the established facts, or as a matter of probability through "logical syllogism," unduly narrows the test that courts must apply when reviewing a motion for judgment of acquittal. "Probability" generally refers to something that is "more likely than not." *See, e.g.*, *State v. Longo*, 341 Or 580, 603-04, 148 P3d 892 (2006) (noting that "probability" of future dangerousness as used in ORS 163.150(1)(b)(B) meant "more likely than not"); *State v. Vasquez-Villagomez*, 346 Or 12, 23, 203 P3d 193 (2009) (probable cause standard set forth in ORS 131.005(11) states standard as "more likely than not"); *Joshi v. Providence Health System*, 342 Or 152, 159, 149 P3d 1164 (2006) (noting that "reasonable probability" causation standard for negligence claim equated to "more likely than not").

But a court evaluating a motion for judgment of acquittal does not base its decision on whether any particular

inference to be drawn from the evidence is "more likely than not." Rather, our decisions make clear that the evidence in a case can give rise to more than one reasonable inference, and when it does, the factfinder is allowed to decide the case. *See, e.g.*, *State v. Hall*, 327 Or 568, 574, 966 P2d 208 (1998) (defendant was not entitled to judgment of acquittal, where factfinder "reasonably could infer" three different things from the evidence offered to prove an element of the offense but, because "[a]ny of those inferences is reasonable *** it was appropriate to allow the jury to decide the question"); *State v. Walker*, 356 Or 4, 6, 333 P3d 316 (2014) ("court gives the state the benefit of *all* reasonable inferences that can be drawn from the evidence"). The notion that reasonable inferences are those that follow necessarily from the state's evidence cannot be squared with our case law that the evidence may give rise to multiple reasonable inferences and that the choice between those reasonable inferences is a matter for the jury.

Nevertheless, defendant and the Court of Appeals are not wrong to emphasize the court's obligation to distinguish between inferences that can be reasonably drawn from the evidence and inferences that are mere speculation. We have emphasized that facts in issue can "be established by reasonable inferences, but not through speculation." *State v. Jesse*, 360 Or 584, 597, 385 P3d 1063 (2016). This court has identified certain inferences as impermissible speculation and, thus, held the evidence insufficient to support a reasonable inference. For example, in *State v. Daniels*, 348 Or 513, 519, 234 P3d 976 (2010), we emphasized that the state was relying "on speculation" to prove that the defendant had once possessed drugs that his girlfriend was carrying in a plastic baggie. Pointing to evidence that the defendant in *Daniels* had plastic baggies in his house and had sold drugs within the prior month, the state argued that a jury reasonably could infer possession either by inferring that the defendant had supplied his girlfriend with the drugs she carried or by inferring that he had placed the drugs in her bag to avoid having them discovered by the police. *Id.* This court emphasized that "[a]lthough those scenarios are possible, they rely on speculation rather than reasonable inferences," and we held that the defendant was entitled to a motion for judgment of acquittal. *Id.* at 519, 522.

Defendant and the Court of Appeals also are not wrong to suggest that logic plays some role in determining whether evidence permits a "reasonable inference." We cautioned in *Jesse* that "[t]he line between permissible inferences and impermissible speculation is difficult to articulate with precision," but we explained that "federal courts usefully have described that line" as "drawn by the laws of logic." 360 Or at 597 n 7 (quoting *Tose v. First Pennsylvania Bank, N.A.*, 648 F2d 879, 895 (3d Cir), *cert den*, 454 US 893, 102 S Ct. 390, 70 L Ed 2d 208 (1981), *abrogated on other grounds by Griggs v. Provident Consumer Discount Co.*, 459 US 56, 103 S Ct 400, 74 L Ed 2d 225 (1982)).

However, references to "logic" do not mean that a reasonable inference must follow "necessarily" or in the form of a "logical syllogism." "Logic" includes "principles of deduction or inference." *Webster's Third New Int'l Dictionary* 1330 (unabridged ed 2002). And it has long been settled law in Oregon that a party may rely on reasonable inferences arising from circumstantial evidence to establish elements of a criminal offense. *See, e.g.*, *State v. Colson*, 251 Or 624, 625, 447 P2d 302 (1968) ("law is settled that the commission of a crime may be proved solely by circumstantial evidence"); *see also Hall*, 327 Or at 570 ("[w]hen analyzing the sufficiency of the evidence," court makes "no distinction between direct and circumstantial evidence as to the degree of proof required").

When a court considers a motion for judgment of acquittal, the question is whether the factfinder reasonably could infer that a particular fact flows from other proven facts, not whether the inference *necessarily* flows from the proven facts. *See id.* at 574 (because factfinder could "reasonably infer" three different things from the evidence, "it was appropriate to allow the jury to decide the question").

B. *"Common Knowledge" to Connect Defendant's BAC Test Result to His Earlier BAC*

Ultimately, the resolution of this case turns both on the line between speculation and inference and on the extent to which common knowledge of the body's reaction

to alcohol bridges that gap. The state does not dispute that "[s]omething more" than a blood alcohol level obtained nearly two hours after driving is needed for the factfinder reasonably to infer that defendant's BAC was at least .08 at the time he drove, as we explained in *Eumana-Moranchel*, 352 Or at 9-10. And defendant does not dispute that a factfinder's common knowledge can supply the bridge to a factfinder's reasonable inference. *See, e.g.*, *Dodge v. Tradewell Stores*, 256 Or 514, 516, 474 P2d 745 (1970) ("jury is entitled to draw inferences from matters of common knowledge"). Defendant also does not dispute that it is a matter of common knowledge that alcohol dissipates from the blood over time. He acknowledges our cases that have seemingly accepted that proposition. *See Eumana-Moranchel*, 352 Or at 10 (describing *State v. Parker*, 317 Or 225, 232 n 9, 855 P2d 636 (1993), as "stating, in *dictum,* that, in [a] case where the defendant had a BAC of .07 percent five hours after driving, the state did not need to call an expert on the dissipation of blood alcohol content, because the fact that blood alcohol dissipates over time is common knowledge").[5] However, defendant and the state propose very different answers to the question of whether common knowledge that blood alcohol dissipates over time is sufficient to permit a reasonable inference in this case that defendant had a BAC of at least .08 two hours before the test.

Defendant contends that the common knowledge that blood alcohol dissipates over time is too general on this record to bridge the gap between his breath-test BAC of .09 and his BAC two hours earlier because how a particular body processes alcohol in a particular situation depends on numerous factors, none of which are addressed by the evidence here. Defendant does not endorse the more extreme suggestion of the Court of Appeals, that the state needed evidence "on rates of accumulation and dissipation" to connect defendant's BAC test to his BAC at the time of driving. *Hedgpeth*, 290 Or App at 406. He observes that the gap might be filled by something other than expert testimony, such as evidence that a defendant showed symptoms of impairment

[5] *Eumana-Moranchel* did not comment on whether the state must call an expert to prove a case of *per se* DUII when the breath test shows a BAC *under* the legal limit. That is an open question that has not been resolved by this court.

at the time he or she was stopped.[6] But he argues that the bare record in this case is insufficient to permit more than speculation that defendant's BAC was at least .08 at the time he drove.[7]

The state emphasizes that "the process of alcohol absorption and dissipation is a matter of common knowledge, even if the specific *rates* of absorption and dissipation are not" (emphasis in brief). According to the state, that general knowledge permitted the jury reasonably to infer that defendant's BAC was lower after a period of nearly two hours without additional consumption than his BAC level had been when he drove. The state relies on a statement that this court made in *Eumana-Moranchel*. In that case, after emphasizing that "the state must be able to offer relevant evidence to explain how a driver's BAC at the time of the test 'shows' that he or she had .08 percent or more by weight of alcohol in the bloodstream at that earlier point," we observed, "[t]hat explanation can be simply an inference that blood alcohol rates dissipate over time, or, as in this case, an expert's testimony explaining that retrograde extrapolation shows the actual presence of the prohibited percentage of alcohol in a driver's blood when he or she was driving." 352 Or at 10, 11. The state seizes on that reference to the possibility that an "inference that blood alcohol rates dissipate over time" can explain "how a driver's BAC at the time of the test 'shows' that he or she had .08 percent or more" at the time of driving as confirmation that "common knowledge" supplies the explanation in this case.

The Court of Appeals at least implicitly concluded that our observation in *Eumana-Moranchel* was *dictum*, and does not resolve this case, when it held that common knowledge cannot "bear the weight" of proving defendant's

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[6] As our decisions in *Clark* and *Eumana-Moranchel* make clear, such evidence is relevant even to prove a *per se* violation of ORS 813.010 because it can be used by the factfinder as the "[s]omething more" that "is necessary to connect the breath result to the statutory requirement of a BAC of .08 percent or more at the time of driving." *Eumana-Moranchel,* 352 Or at 9-10.

[7] The limited record in this case is a product of the trial court's ruling—based on an erroneous interpretation of *O'Key*—that evidence "other than the exact chemical test" was irrelevant given the state's election to prove "a *per se* DUII .08 or above blood alcohol." But the state did not cross-assign error to the ruling in the Court of Appeals.

BAC on a record like this. *See Hedgpeth*, 290 Or App at 405. Before explaining why we agree with the Court of Appeals that "common knowledge" is insufficient to bear such weight in this case, we begin with an examination of the power of "common knowledge" to fill evidentiary gaps.

In general, common knowledge can be understood as information that is commonly known to the average person. *See, e.g.*, *Meyers v. Oasis Sanitorium, Inc.*, 224 Or 414, 418, 356 P2d 159 (1960) ("matter of common knowledge that a linoleum floor becomes slippery while it is being mopped"); *Black's Law Dictionary* 334 (10th ed 2014) (defining "common knowledge" as a "fact that is so widely known that a court may accept it as true without proof"). Scholars have proposed that the rationale for allowing the factfinder to base a decision on a commonly known fact is that the high degree of reliability or lack of disagreement in the community makes it unnecessary to introduce formal evidence to establish the point. *See generally 2 McCormick On Evidence* § 329 (7th ed 2013); Richard M. Fraher, *Adjudicative Facts, Non-Evidence Facts, and Permissible Jury Background Information*, 62 Ind LJ 333, 342-43 (1987) (explaining that treatises, case law, and statutes "suggest that the basis for letting information get to the jury without the test of the adversarial process is either the high reliability of the information or the lack of disagreement in the community").[8]

In the context of alcohol intoxication, this court has identified a variety of propositions that are matters of common knowledge. For example, this court long ago declared the proposition that certain beverages are intoxicating liquors to be a matter of common knowledge. *State v. Carmody*, 50 Or 1, 7, 91 P 446 (1907) (finding that "[a]s long as laws for licensing the sale of intoxicating liquors have existed, brandy, whisky, gin, rum and other alcoholic liquids have been held to be intoxicating liquors *per se* *** because it is within the common knowledge *** that they are intoxicating liquors"); *see also State v. Edwards*, 106 Or 58, 64, 210

[8] In any discussion of "common knowledge," it is worth noting that even commonly understood propositions can be wrong. *See, e.g.*, 1 *Weinstein's Federal Evidence* § 201.11 (2019) (observing that, as "circumstances and society change, so does our 'common knowledge,' including the facts that meet with unconditional acceptance by the public").

P 1079 (1922) (common knowledge that beer is intoxicating liquor).[9]

This court also has identified as a matter of common knowledge the effects that intoxicating liquor *may* have on individuals. *See Chapman v. Mayfield*, 358 Or 196, 218, 361 P3d 566 (2015) (common knowledge that intoxicated persons experience impaired judgment); *Lynn v. Stinnette*, 147 Or 105, 114, 31 P2d 764 (1934) ("It is common knowledge that intoxicating liquor has varying effects on different individuals. Some it impels to boisterousness and loud talking; others, to quarrelsomeness and sullenness."); *State v. Noble*, 119 Or 674, 678, 250 P 833 (1926) ("matter of common knowledge" that drinking liquor "has some effect upon the person drinking it, and that this effect continues for a longer or shorter period, according to the amount drunk, and the individual drinking it"); *see also Clark*, 286 Or at 39-40 (listing observable signs of alcohol intoxication,[10] and explaining that common knowledge of those signs could provide foundation to make evidence of the "absence of such observable symptoms" relevant for the purpose of challenging the accuracy of BAC test result).

However, we have also emphasized that certain effects of alcohol consumption are beyond the realm of common knowledge. *See, e.g.*, *O'Key*, 321 Or at 297 (explaining that "[t]he relationship between the effects of alcohol on the central nervous system, the nystagmus phenomenon, and the HGN test is not within the realm of common knowledge of the average person"). Moreover, and of particular relevance to the present dispute, this court has emphasized that common knowledge of a general proposition regarding the effects of alcohol does not equate to knowledge of the effects in a specific instance. For example, in *Eumana-Moranchel*,

[9] The tradition of allowing the factfinder to rely on facts of "common knowledge" may be a hold-over from the historical role of juries at English common law as a factfinding body that relied exclusively upon its own knowledge of events within the county. *See State v. Mills*, 354 Or 350, 358, 312 P3d 515 (2013) (explaining historical role of juror knowledge about county events as source of venue requirement).

[10] The court took judicial notice of symptoms such as flushed appearance, lack of coordination, speech difficulties, dizziness and nausea, among other things. *Clark*, 286 Or at 39-40. We do not suggest that judicial notice and common knowledge are necessarily identical concepts.

352 Or at 10, we observed that, although the proposition that alcohol dissipates over time may be a matter of common knowledge, the rate of dissipation in a specific instance is not a matter of common knowledge. *See also Noble*, 119 Or at 678 (explaining that, although it was a "matter of common knowledge" that drinking liquor "has some effect upon the person drinking it," bare proof of consumption of liquor was insufficient to prove that person was under the influence of intoxicants because "[t]he effects resulting from the drinking of intoxicating liquor[s] are manifested in various ways"). *Compare State v. Sprague*, 171 Or 372, 377, 136 P2d 685 (1943) (observing that it is common knowledge that some intoxicated men are "brutal and quarrelsome") *with Chapman*, 358 Or at 218 (concluding that "general knowledge is not sufficient to permit a jury to decide, from the fact of overservice alone, that one who serves alcohol to a visibly intoxicated person should reasonably have expected that that person would commit an assault"). The "common knowledge" concerning alcohol that we draw from this court's earlier case law described above is that alcohol consumption causes intoxication, but also that its effects last "for a longer or shorter period according to the amount drunk, and the individual drinking it." *Noble,* 119 Or at 678.

In the context of that authority, our reference in *Eumana-Moranchel* to an "inference that blood alcohol rates dissipate over time" should not be understood as a holding that resolves this case. 352 Or at 11. *Eumana-Moranchel* did not address the extent to which the state can rely on common knowledge to prove the defendant's BAC at the time of driving; rather, the issue in *Eumana-Moranchel* was whether the state was entitled to rely on expert testimony regarding blood alcohol dissipation to show the relationship between the defendant's BAC at the time of driving and his BAC as measured by a later breath test. Although we described an earlier decision as having "suggested" in *dictum* that common knowledge about alcohol dissipation made it unnecessary for the state to call an expert on the dissipation of blood alcohol content, *id*. at 10 (quoting *Parker*, 317 Or at 232 n 9), we did not decide—and we have never decided—that common knowledge alone is sufficient to provide the "something more" that can establish the connection between

a BAC result at the time of testing with BAC at the time of driving. Indeed, our emphasis on the state's valid reasons for introducing the expert testimony in *Eumana-Moranchel* suggests that common knowledge will *not* be sufficient to permit a reasonable inference that a defendant drove with a BAC over the legal limit.

C. *Application to This Case*

Under the circumstances of this case, the general proposition that blood alcohol concentrations fall over time is too general to permit any reasonable inference about defendant's blood alcohol concentration at the time that he drove. The parties agree that various factors affect the rates of alcohol absorption and dissipation, and they provide citations to authorities that describe the scientific process of using a later BAC test to identify BAC levels at a point two hours earlier.[11] Those authorities describe a process that is more complicated than simply applying the general rule that blood alcohol dissipates over time. Indeed, as the cited authorities reveal, the complexity can leave even experts unable to reach a nonspeculative decision on a record as spare as the record in this case.

Defendant cites *Eumana-Moranchel*, in which we explained that the state sought to offer testimony from an expert in alcohol absorption and dissipation that, *given information about when the defendant stopped drinking*, he could use the defendant's later breath test result to estimate a range for the defendant's BAC at the time of driving, through "a method called retrograde extrapolation." 352 Or at 5. We then described in detail the expert's explanation of the variables affecting that scientific extrapolation:

> "Bessett testified that men and women eliminate alcohol at an average rate of .018 percent per hour, but that the specific elimination rate for any particular individual varies according to his or her tolerance for alcohol. The least alcohol-tolerant drinker would eliminate alcohol at a rate of

[11] The state agrees that "variability in specific rates of alcohol absorption and dissipation make it *possible* that someone's BAC may still be rising—and not yet at .08 percent—at the time of driving" but disagrees about the likelihood of that scenario in a given case and the significance of that possibility in evaluating the sufficiency of the evidence.

> .01 percent per hour, while the most tolerant drinker would eliminate alcohol at a rate of up to .025 percent per hour. For that reason, Bessett testified, retrograde extrapolation would produce a *range* for a driver's BAC at any given time, rather than a single, specific number."

Id. (footnotes omitted, emphasis in original). We added that the expert "testified [that], to calculate a person's BAC at a given time, he would need to know the time of the test, the time of the driver's last consumption of alcohol, and the time that the driver was stopped." *Id.*

As defendant emphasizes, scientific evidence described in cases from both the United States Supreme Court and the Oregon Court of Appeals also consistently demonstrates the complexity and variability that limit an expert's ability to predict how a particular person will eliminate alcohol on a particular occasion. *See Missouri v. McNeely*, 569 US 141, 152, 133 S Ct 1552, 185 L Ed 2d 696 (2013) ("Testimony before the trial court in this case indicated that the percentage of alcohol in an individual's blood typically decreases by approximately 0.015 percent to 0.02 percent per hour once the alcohol has been fully absorbed ***. More precise calculations of the rate at which alcohol dissipates depend on various individual characteristics (such as weight, gender, and alcohol tolerance) and the circumstances in which the alcohol was consumed." (citing Stripp, *Forensic and Clinical Issues in Alcohol Analysis, in Forensic Chemistry Handbook* 437-441 (L. Kobilinsky ed 2012))); *see also State v. Baucum*, 268 Or App 649, 661 n 12, 343 P3d 235 (2015), *rev den*, 357 Or 550 (2015) (explaining that other studies show that experts use a range of elimination rates from 0.010 to 0.025 percent per hour (citing Alan Wayne Jones, *Evidence-based survey of the elimination rates of ethanol from blood with applications in forensic casework*, 200 Forensic Science International 1, 14 (2010))).

In addition, the scientific evidence discussed in those cases reveals that extrapolating to a blood alcohol concentration in any particular case is further complicated by variations in the time it can take for consumed alcohol to be absorbed, and BAC to rise to peak level, before beginning to dissipate. *See Eumana-Moranchel*, 352 Or at 9 (describing

expert as testifying "that 80 percent of consumed alcohol enters the blood within five to 10 minutes, and 100 percent enters the blood within 30 to 60 minutes"); *Baucum*, 268 Or App at 662 n 14 (noting that "[a]rticles on retrograde extrapolation indicate that some studies show individuals reach peak BAC between forty-five and seventy-five minutes after the last drink was consumed, and other studies show that peak BAC is reached in as few as fifteen minutes and as long as three hours" (citing Justin Noval and Edward J. Imwinkelried, Jr., *Retrograde Extrapolation of Blood Alcohol Concentration,* 50 No. 1 Crim. Law Bulletin ART 7 (WestlawNext at 10) (2014)); A.W. Jones. K.A. Jonsson, A. Neri, *Peak Blood-Ethanol Concentration and the Time of Its Occurrence After Rapid Drinking on an Empty Stomach*, 36 Journal of Forensic Sciences 376, 381 (1991) (concluding that the time for an individual to reach peak BAC depends on variables including, "drinking pattern, the type of beverage consumed, the fed or fasted state, the nature (liquid or solid) and composition of foodstuff in the stomach, the anatomy of the gastrointestinal canal, and the mental state of the" individual); *see also McCormick On Evidence* § 205 (7th ed) (cautioning that "one cannot assume that BAC inevitably is higher at the time of an accident than it is afterwards, for the concentration rises after drinking, then drops").

Our discussion of the reviews of scientific studies is not an endorsement of the accuracy of any particular study. Rather, we discuss the cited authorities to emphasize the uniformity with which they describe the process of using a later test to identify earlier BAC levels as a process that is far more complex than simply applying the general rule that blood alcohol dissipates over time. The state's strongest response is a citation to one study of retrograde extrapolation to measure BAC for 161 drivers who had been given a breath test at the time of the stop and a second test up to two hours later. Rod G. Gullberg and Anthony J. McElroy, *Comparing Roadside with Subsequent Breath Alcohol Analyses and Their Relevance to the Issue of Retrograde Extrapolation*, 57 Forensic Science International 193 (1992). Based on a review of that data, the authors emphasized that "when retrograde extrapolation is performed, a range of values should be reported with the lower limit being the results of actual

evidentiary analyses," and they concluded that earlier values calculated through that method "appear to be very good approximations and certainly not overestimations" of BAC at the point of driving. *Id.* at 200. For purposes of the present analysis, however, the significance of the Gullberg article is that the technical nature of the process that the study recommends for using later tests to estimate an earlier BAC level confirms that the process requires more than just application of "common knowledge" that alcohol generally dissipates over time.

Indeed, the limitations of the bare *knowledge* that blood alcohol dissipates is so commonly recognized that courts in a number of jurisdictions prevent the state from using even an expert's opinion to prove that a later blood alcohol test proves a person's blood alcohol concentration at the time of driving unless there is a factual basis for inferring that the defendant had reached peak absorption at the time of the stop. *See, e.g.*, *State v. Trujillo*, 271 Or App 785, 792 n 9, 353 P3d 609, 614 (2015), *rev den,* 358 Or 146 (2015) (noting that "some jurisdictions require an expert to demonstrate knowledge of whether the defendant's body was absorbing or eliminating alcohol at the time of a blood-alcohol test, sufficiently consider the eating and drinking history of a defendant in establishing peak absorption, or demonstrate where on a BAC curve a defendant's BAC falls, in order for retrograde extrapolation evidence to be deemed reliable"); *State v. Babich*, 797 SE2d 359, 363-64 (NC Ct App 2017) (relying on what it described as view of the "majority" of courts to consider the issue to hold that expert opinion purporting to extrapolate defendant's BAC at time of driving from BAC test results obtained 1 hour and 45 minutes later should have been excluded as unhelpful because expert conceded that mathematical model was accurate only if the driver had already reached peak absorption by the time of the stop and because no evidence supported that assumption); *see also State v. Eighth Judicial Dist. Court*, 127 Nev 927, 937, 267 P3d 777, 783 (2011) (holding that trial court did not err in concluding that probative value of expert's opinion purporting to extrapolate BAC at the time of driving from blood draw more than two hours after the accident was substantially outweighed by danger of unfair prejudice

because opinion was "insufficiently tethered to individual factors necessary to achieve a reliable calculation").[12]

We have not previously addressed whether we agree with those limits on the state's ability to rely on an expert's extrapolation of BAC from a later measurement, and we do not address that issue here. But the complexity inherent in such extrapolations even when undertaken by experts persuades us that a lay factfinder's "common knowledge" that blood alcohol dissipates over time cannot supply the only basis for a reasonable inference that a BAC of .09 percent, measured two hours after driving and without consumption in the interim, establishes that the defendant's BAC was at least .08 percent at the time of driving. We emphasize: There was no evidence of when or how much alcohol defendant had consumed before he was stopped; there is no evidence of why the officer who stopped defendant for riding a motorcycle without a helmet arrested defendant for DUII; and there is no evidence that defendant exhibited any signs of intoxication either before or after the stop.[13] And, of course, as the Court of Appeals observed, there was no evidence about alcohol absorption and dissipation rates, although we do not suggest that such evidence is necessary.

The sole question before us is whether that extremely limited record was sufficient to survive a motion for judgment of acquittal. We conclude that it was not. Viewed in the light most favorable to the state, there must still be some

[12] Although this court in *Eumana-Moranchel* held that the evidence of retrograde extrapolation was not categorically inadmissible in a prosecution for DUII based on "chemical analysis of the breath or blood," this court was not asked to consider and did not address other potential challenges to admissibility of that expert testimony. 352 Or 1.

[13] The state suggests that the evidence of defendant's arrest for DUII provides some additional basis for an inference that his blood alcohol concentration exceeded the legal limit at the time of driving. But the state offered no evidence of why the officer believed that the stop and arrest were justified. The state cites no authority for its proposition that the arrest itself is probative of anything other than the fact that it occurred, and we reject the state's suggestion that a factfinder can draw an inference of guilt from the bare fact that an officer stopped or arrested defendant for a crime. *See, e.g.*, *Taylor v. Kentucky*, 436 US 478, 485, 98 S Ct 1930, 56 L Ed 2d 468 (1978) (emphasizing that, as a matter of due process, "one accused of a crime is entitled to have his guilt or innocence determined solely on the basis of the evidence introduced at trial, and not on grounds of official suspicion, indictment, continued custody, or other circumstances not adduced as proof at trial").

evidence to permit an inference that defendant drove with a blood alcohol level of at least .08 percent. The dissent would prefer a rule under which the state makes out a *prima facie* case of the crime of driving under the influence of intoxicants with nothing more than evidence that the defendant had a BAC above the legal limit two hours after driving (without alcohol consumption in the interim). As the state points out, other states have adopted DUII statutes that capture the policy reflected by such a rule of proof.[14] But Oregon has not. Whatever the practical advantages of such a policy may be, deciding whether to adopt that policy is a matter for the legislature.

Here, the only evidence was that defendant's blood alcohol level was over the legal limit when measured almost two hours after he drove, and that he had consumed no alcohol in the interim. In the absence of any other evidence, the jury's common knowledge of the generic (and incomplete) proposition that alcohol dissipates from the blood over time is not sufficient to constitute the "[s]omething more" that—as we said in *Eumana-Moranchel*—is necessary for a non-speculative connection between the BAC test results and defendant's blood alcohol concentration when he was driving approximately two hours earlier. *See* 352 Or at 9.

III. CONCLUSION

The decision of the Court of Appeals is affirmed. The judgment of the circuit court is reversed, and the case is remanded to that court for further proceedings.

BALMER, J., dissenting.

Defendant was lawfully stopped for driving his motorcycle without a helmet. The officer who stopped him developed probable cause (which defendant does not dispute) to believe that defendant was driving under the influence of intoxicants. A breath test nearly two hours after the initial stop (during which time defendant had consumed

[14] *See, e.g.*, Colo Rev Stat § 42-4-1301(2)(a) ("A person who drives a motor vehicle when the person's BAC is 0.08 or more at the time of driving or within two hours after driving commits DUI per se."); Wash Rev Code § 46.61.502(1)(a) (defining per se DUII as having a BAC of .08 or higher "within two hours after driving").

no alcohol) found a blood alcohol content (BAC) of .09 percent. The majority concludes that that evidence, presented through the testimony of the arresting officer, was insufficient to support a conviction. For that reason, the majority concludes, the trial court erred as a matter of law in denying defendant's motion for a judgment of acquittal. I disagree, and I fear that the majority opinion may lead to serious and unnecessary impediments to the use of BAC evidence in future DUII cases. I respectfully dissent.

I agree generally with the thoughtful dissent in the Court of Appeals. *State v. Hedgpeth,* 290 Or App 399, 407, 415 P3d 1080 (2018) (Powers, J., dissenting). I direct the reader to that dissent, including its discussion of this court's prior cases, which strongly, if sometimes in *dicta*, point in the opposite direction of the majority's articulation of how courts should draw the line between reasonable (and therefore permissible) inferences that a factfinder may draw from measured BAC levels and impermissible "speculation."

I add the following thoughts to the analysis set out in the dissent in the Court of Appeals. First, although the majority sets out the standards of review correctly, it is difficult for me to square the facts in this case with the majority's application of those standards. A motion for judgment of acquittal must be denied if, viewing all the evidence in the light most favorable to the state, "*any* rational trier of fact *could* have found the essential elements of the crime beyond a reasonable doubt." *State v. King*, 307 Or 332, 339, 768 P2d 391 (1989) (emphases added). Here, the evidence above, including the testimony of the arresting officer—and the reasonable inferences that the trial court *could* have drawn from that evidence—seems to me to meet that standard. Moreover, when the trial court's denial of a motion for a judgment of acquittal is reviewed by an appellate court, we are to accept all "reasonable inferences and reasonable credibility choices" that the finder of fact could have made. *State v. Walters*, 311 Or 80, 82-83, 804 P2d 1164, *cert den*, 501 US 1209 (1991). Here, the trial court necessarily inferred from the evidence presented at trial that defendant's BAC at the time he was driving was at or over .08 percent. Focusing on that standard of appellate review—viewing the evidence in the light most favorable to the state and giving the

factfinder the deference to which he was entitled, including to draw reasonable inferences from the evidence—I would conclude that the trial court did not err in denying defendant's motion for judgment of acquittal.

On the merits, this case turns on the elusive line between permissible inferences and impermissible speculation. The majority importantly—and correctly—rejects the suggestion in the Court of Appeals' majority opinion that a factfinder cannot draw a conclusion from facts unless that conclusion follows as a result of "probability and logic." 290 Or App at 406. The Court of Appeals majority seemed to view inductive logic as an invalid means of reaching rational conclusions, when that plainly is not correct. The majority instead reaffirms our cases holding that we defer to the factfinder whenever "the evidence may give rise to multiple reasonable inferences." 365 Or at 732.

But I part ways with the majority when it concludes that the trial court's finding that defendant drove with a BAC of at least .08 was not a reasonable inference that could be drawn from the record here. The basis for the majority's position is that, although it may be "common knowledge" that alcohol is absorbed into the blood and then dissipates over time, the rates of absorption and dissipation, and the factors that affect those rates in any particular circumstance, are *not* common knowledge. Without that "common knowledge" to link defendant's BAC of .09 percent measured two hours after the last moment at which he could possibly have consumed alcohol to a BAC of .08 or more at the time he was driving, the majority holds, defendant should have been acquitted without a trial.

But although the majority cites various scientific studies about alcohol absorption and dissipation rates, none of those support the majority's conclusion about what is or is not "common knowledge" among judges or jurors. Nor do those studies support the majority's conclusion that it was unreasonable for the trial judge here to infer from the evidence at trial that defendant was driving with a BAC of at least .08 percent. Although jurors may not know the details of absorption and dissipation rates, even occasional drinkers

and high school students who have taken mandatory heath education classes, as well as experienced trial court judges, know that the effects of alcohol increase after consumption and then decrease. They also know that whether one has eaten before or while consuming alcohol, the type of food one has eaten, one's body weight, and other individual and circumstantial factors can influence the effects of alcohol consumption and the duration of those effects. From that common knowledge, they also can draw a reasonable inference (even if, as the majority acknowledges, it is not a logically *necessary* inference) that a BAC level that is measured *at least two hours* after the last consumption of alcohol and is *above* the legal limit strongly suggests that the BAC level also was above the legal limit when defendant was driving two hours earlier.

What the studies described by the majority do show is the many variables that can affect the BAC measurement for a particular individual on a particular occasion. As noted, in my view, members of the public have a layperson's understanding that alcohol is absorbed into the blood over some time period after drinking and at some point begins to dissipate, and that a number of factors (only some of which they may be aware of) can affect those rates. But the asserted complexity of inferring an earlier BAC while driving from a later test for DUII purposes, upon which the majority relies, although not particularly persuasive as to this defendant, in fact calls into question the entire enterprise of measuring BAC levels, whether through a breath test, as here, or a blood draw that is tested in a laboratory. The majority enumerates multiple variables as to the time that an individual may reach peak BAC (in addition to the most obvious factors such as the amount of alcohol consumed and when it was last consumed), including weight, gender, type of beverage, "fed or fasted state," drinking patterns, alcohol tolerance, "the anatomy of the gastrointestinal canal," and the individual's mental state. 365 Or at 740-41. If all those variables must be known for a post-driving BAC test to be used to determine whether the driver's BAC was at least .08 percent when he or she was driving, one wonders whether any BAC measurement could ever be the basis for a DUII conviction.

Although not mentioned in the majority opinion, as a practical matter, this decision may well mean that the state will have to present expert testimony in every case about absorption and dissipation rates and about at least some of the factors mentioned above that might affect those rates.[1] The defendant might also want to present expert testimony, but because the burden is on the state to prove the facts beyond a reasonable doubt, the defendant, like defendant here, may simply raise general questions about the validity of BAC measurement and extrapolation—and cite today's decision. But the state's expert will encounter a problem. To answer the challenges posed by the majority, the expert would want information on the variables mentioned above, including most importantly, when the driver last drank (and ate) and what and how much, weight, alcohol tolerance, drinking patterns, and so on. Yet that information ordinarily will be available only from the driver, and the driver need not answer any questions that might incriminate him. *See State v. Scott*, 343 Or 195, 203, 166 P3d 528 (2007) (interrogation for purposes of right against self-incrimination extends to police conduct that police should know is "reasonably likely to elicit an incriminating response," which means "any inculpatory or exculpatory response that the prosecution later may seek to introduce at trial"); *State v. Fish*, 321 Or 48, 60, 893 P2d 1023 (1995) (holding aspects of field sobriety tests that required an individual to provide information about residence, date of birth, beliefs, knowledge, or state of mind unconstitutional as "testimonial" for purposes of Article I, section 12, of the Oregon Constitution).

The majority fails to mention this obvious problem (or to explain why it is not a problem) or to provide any guidance for prosecutors who wish to use BAC evidence. Of course, testimony about the driver weaving back and forth, slurring her words, the smell of alcohol, and so on can always be used to help prove that the driver was driving

[1] But the majority seems to throw cold water even on such expert testimony, at least in circumstances like those present here: "Indeed, *** the complexity [of extrapolating from a BAC measurement] can leave even experts unable to reach a nonspeculative decision on a record as sparse as the record in this case." 365 Or at 739.

under the influence of intoxicants. But the legislature's purpose in establishing a more consistent, objective means of determining when one is driving under the influence of intoxicants—the BAC test—will have been seriously undermined.

Perhaps concerned about the potential consequences of its decision, the majority points to multiple aspects of this case to suggest that it may be an outlier: The prosecutor chose to rely only on a *per se* theory, depending almost entirely on the BAC evidence; the trial court (erroneously, in the majority's view) excluded testimony by the state's expert; the state failed to cross-assign error to that trial court ruling; no one asked the arresting officer about defendant's appearance or demeanor; the record was "sparse"; the BAC level was only slightly above the legal limit of .08 percent.[2] Perhaps in the next case, the state will not choose to pursue only a *per se* theory (although the legislature presumably established the *per se* test in order to simplify DUII cases); perhaps the trial judge will allow the state's expert to testify, despite the majority's previously noted caution (or if not, the state will appeal the erroneous ruling); perhaps the officer will offer additional testimony about the appearance, bad driving, demeanor, or smell of alcohol on the driver's breath to support the charge. Perhaps.

But I am concerned that the majority's stark conclusion—that it is not permissible for a factfinder to infer that a driver whose BAC level was .09 percent two hours after being arrested for DUII had a BAC of level of at least .08 percent when he was driving—will unnecessarily hinder the state's efforts to deter and punish drunk driving.

I respectfully dissent.

Baldwin, S. J., joins in this dissent.

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[2] Query at what *post-driving BAC level* the majority would draw the line and hold that an inference of .08 percent or more at the time of driving *would* be "reasonable." Query, too, how the majority would approach a measured BAC of .09 percent 20 minutes after driving, or four hours after driving. Given the apparently daunting complexity of the task, the viability of the entire BAC testing protocol seems potentially at risk.