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STATE OF CONNECTICUT *v.* EDWIN RONALD GLASS
(AC 43092)

Bright, C. J., and Alvord and Seeley, Js.*

Syllabus

Convicted of the crimes of burglary in the first degree and robbery in the first degree, the defendant appealed to this court. An intruder entered the house of the victim, F, one night while she was at home and, inter alia, struggled with her before stealing money and other various items. F never saw the intruder's face, but he left behind what appeared to be the fingertip of a latex glove. The police responded to the home shortly after the crime was committed. With the assistance of a canine officer, they recovered the stolen items, which had been discarded in the neighborhood, and tracked the intruder's scent past the defendant's house to a garage that was a couple of houses north of the defendant's, where the trail disappeared. Various officers spoke with the defendant that night, after encountering him outside of his home during their investigation. Although the defendant matched F's general description of the intruder, his clothing did not match her description, and one of the officers determined that the defendant's breathing and heart rate appeared to be normal shortly after the crime was completed. Touch DNA evidence was recovered from the glove fragment and certain of the recovered stolen items, and the defendant was determined to be a major contributor to a mixture of DNA found on what was believed to be the interior side of the glove fragment. The state was unable to identify the defendant as a contributor to the DNA found on the other items tested. On the defendant's appeal to this court, *held* that the cumulative force of the state's evidence, even when viewed in the light most favorable to sustaining the verdict, was insufficient to establish, beyond a reasonable doubt, the defendant's identity as the intruder: the DNA evidence alone was insufficient for the jury to determine that the defendant had worn the glove during the robbery because there was no testimony or other evidence as to whether the DNA on the interior piece of glove was deposited via primary or secondary transfer, as to the significance of the defendant being a major contributor to the DNA mixture found on the glove fragment, or as to whether the defendant, in contrast with the two other unknown DNA contributors, was more likely to be the individual who wore the glove during the commission of the crime; moreover, because the state could not identify the defendant as a contributor to the touch DNA found on the other items tested, there was no other physical evidence connecting the defendant to the crime; furthermore, the nonphysical evidence, even when considered with the DNA evidence, was insufficient to prove beyond a reasonable doubt that the defendant was the perpetrator, as such evidence did not provide any compelling reason for the jury to conclude that the defendant, rather than any other black male of average build in the neighborhood, was the perpetrator of the offenses; accordingly, this court reversed the trial court's judgment and remanded the case with direction to render a judgment of acquittal.

Argued November 10, 2021—officially released August 2, 2022

Procedural History

Substitute information charging the defendant with the crimes of burglary in the first degree, robbery in the first degree, and sexual assault in the fourth degree, brought to the Superior Court in the judicial district of Hartford, geographical area number twelve, and tried to the jury before *Graham*, *J.*; verdict and judgment of guilty of burglary in the first degree and robbery in the first degree, from which the defendant appealed to this court. *Reversed*; *judgment directed.*

John R. Weikart, assigned counsel, with whom was *Emily Graner Sexton*, assigned counsel, for the appellant (defendant).

Melissa L. Streeto, senior assistant state's attorney, with whom, on the brief, were *Sharmese L. Walcott*, state's attorney, and *Richard J. Rubino*, senior assistant state's attorney, for the appellee (state).

Opinion

ALVORD, J. The defendant, Edwin Ronald Glass, appeals from the judgment of conviction, rendered after a jury trial, of burglary in the first degree in violation of General Statutes § 53a-101 (a) (3), and robbery in the first degree in violation of General Statutes § 53a-134 (a) (3).[1] On appeal, the defendant claims that there was insufficient evidence to establish his identity as the person who committed the burglary and robbery.[2] We agree and, accordingly, reverse the judgment of the trial court.

The jury was presented with evidence of the following facts. On the evening of September 4, 2016, F[3] was alone at her home on Ferncrest Drive in East Hartford. Although her son, S, lived with her, he was away for the weekend. At about 8 p.m., F remembered that she had left a bag in her car from a shopping trip earlier that day. She went outside to retrieve the bag and saw a person dressed in all black walking in front of her driveway. She felt uneasy, went back into her house, and locked all the windows and doors on the first floor. She placed her car keys on the end table by the couch in the living room.

Around 10:30 p.m., while F was watching television in the living room, she heard a noise upstairs, which she thought was her cat. After hearing the noise two more times, she thought her cat was stuck behind a door and went upstairs to investigate. She peeked into her bedroom, went into S's room and her spare bedroom, and then opened the door to her "junk room."[4] At that time, an intruder came out from behind the door. F described him as a black man, in his late twenties or early thirties, wearing all black clothing, including pants, a shirt, sneakers, and a baseball cap, and about F's height or a little bit taller.[5] The intruder grabbed her, and the two wrestled to the ground while she tried to get away. The intruder pushed her into the spare bedroom as they continued to wrestle. F had a pen in her hand, and she attempted to jab the intruder with the pen.[6] F screamed, and the intruder told her not to scream and put a blanket over her head. He told her he had a knife and poked it into her leg. When she tried to grab "something," the intruder told her that she did not want to cut herself, and she let go. He then tied her hands behind her back using a soft cloth.

During the struggle, F smelled a strong odor of latex.[7] She was not able to see the intruder's face because he told her not to look at him and he kept twisting her body so that he was behind her. At trial, F testified that she could not identify the intruder who robbed her. F also testified that she did not recognize the defendant and that she never had allowed him into her home.

The intruder pushed F into her bedroom and face forward down onto her bed. At that time, he saw her

purse on the dresser and asked whether there was money in it. When she replied that there was no money in it, he accused her of lying. When he grabbed the purse, the strap got looped around her neck and she feared she was "gone." He then removed it from her neck and looked in the purse. F told him that there was money in another purse that was in the living room downstairs. He then pulled her by the hair and led her down the stairs. He pushed her face first onto the couch and dumped the contents of the second purse onto the couch. The intruder then told F that he was going to take her upstairs and "wash [her] down." He pushed her back up the stairs, all the while keeping her in front of him, and told her to get into the shower. He then washed her with a washcloth, untied her hands, and told her not to move. After he went into and out of different rooms, he came back and told her: "Listen to me, I know where you live; don't call the cops; if I see them in the area I will come back and I will kill you."

F heard the intruder go down the stairs and the front door open and close. She did not hear a vehicle start. The intruder took $400 from F's wallet, an orange vest from a teddy bear that was located in the spare bedroom, a baseball cap, a blanket, and the cloth, which F later testified was a T-shirt, that he had used to tie her hands. She waited four or five minutes and called the police at 11:02 p.m.

Officer Robert Jones of the East Hartford Police Department responded to F's home. He observed that other officers were present on the street, the front door to the home was open, F was standing in the doorway, and a set of keys was lying on the front steps. F identified the keys as belonging to her and stated that she had placed them on the end table earlier in the evening. Officer Jones went into the home and met with F, who told him what happened and gave him a description of the intruder. Officer Jones walked with F through the house to make sure there was no one else in the home. While walking through F's bedroom, Officer Jones observed a piece of latex on the floor next to the bed.

Officer Todd Mona, together with Casus, his tracking canine, also responded to F's home. He was the first or second officer to arrive. Officer Mona brought Casus to the front steps to get the intruder's scent from F's keys that the police believed had been dropped there by the intruder. He subsequently gave Casus a command to track. Casus began tracking in a southerly direction across the front yard and continued south. He stopped in front of 58 Ferncrest Drive and "downed on"[8] a baseball cap and T-shirt, which Officer Mona described as a white tank top.[9] Officer Mona transmitted via radio a request for an officer to stand beside the evidence to preserve it. When Officer Jared Richards arrived and took control of the area, Officer Mona and Casus continued tracking across front yards in a southerly direction,

to the end of Ferncrest Drive where it intersects with Woodycrest Drive.[10] Casus then tracked north on Woodycrest Drive, tracking by the defendant's house[11] at 31 Woodycrest Drive, and stopping a couple of houses north of the defendant's house, at 21 Woodycrest Drive. Casus took Officer Mona up to a garage window at 21 Woodycrest Drive. North of 21 Woodycrest Drive, Casus gave Officer Mona cues that the trail was no longer there, and Officer Mona ended the track. The entire track, which covered about fourteen houses, took approximately one minute, as it was a strong trail and they were moving at "almost a full sprint."

Officer Mona and Casus then walked back in a southerly direction on Woodycrest Drive, where they encountered the defendant talking with one or two other officers.[12] At that time, Casus was no longer tracking and he did not alert to the defendant. Officer Mona spoke with the defendant for a "brief minute." The defendant stated that he lived with his mother at 31 Woodycrest Drive, had just left his house, and was walking to his friend's house. Officer Mona placed his leather gloved hand on the defendant, over his clothing. Officer Mona stated that he appeared to be breathing normally and that his heartbeat felt normal and was not elevated. Officer Mona believed that the defendant met the description of the intruder in terms of his height and weight, although he was wearing clothing that did not match the clothing described by F. Officer Mona did not think he relayed to the other officers that the defendant said he was at home and that someone should go speak to his mother, as his function was handling his canine and he needed to return to the items to which Casus had alerted, to preserve the chain of evidence.

Detective Robert Zulick also was involved in the investigation. He responded to Ferncrest Drive and photographed and collected the baseball cap, orange teddy bear vest, and T-shirt. He then went to F's house, photographed the exterior of her house, and conducted a walk-through of the interior. Detective Zulick photographed and collected the piece of latex from the floor of F's bedroom, the washcloth, and the pieces of the pen with which she attempted to jab the intruder.[13]

Detective Donald Loehr was assigned to the investigation. A couple of days following the crime, Detective Loehr conducted a canvass of the neighborhood. He spoke with Tandra Denson, the defendant's mother, inside her home and also in the driveway. While speaking with Denson, Detective Loehr noticed that the defendant was watching the conversation from the front door. Denson told Detective Loehr that, on the night of the crime, she was home, she noticed flashlights outside the windows, and the defendant was coming out of the bathroom as she was looking out the window.

One or two days after the robbery, F noticed bruises, rug burns, and cuts on her body, and Detectives Chris-

tina Johnston and Zulick returned to her home to photograph them. Detective Zulick also took additional photographs of what was believed to be the point of entry to the home, where a screen in the window of the "junk room" on the second floor had been slit open. At trial, F testified that the window was unlocked.

The piece of latex was sent to the state forensics laboratory (laboratory), along with a buccal swab[14] taken from F. Subsequently, the police received notice that the DNA sample from the piece of latex was associated with the defendant by way of a "hit off a database." Detective Loehr answered yes when asked during cross-examination if the identification of the defendant by the DNA report ended the case as far as he was concerned. A buccal swab subsequently was taken from the defendant. Along with the buccal swabs of S and the defendant, the T-shirt, orange teddy bear vest, baseball cap, and washcloth also were submitted to the laboratory, and Jennifer Green, a forensic science examiner with the laboratory, swabbed these items for "touch DNA . . . ." At trial, Green testified that "[t]ouch-type DNA is the collection of basically your skin cells that may have been left behind on an object or an item from a person who has handled it. So if an evidence item comes in we try to determine which ways that item was handled and therefore collect the sampling to obtain any DNA that may have been left behind. [Wear] DNA is very similar, in that it's an item of clothing or something that may have been worn, so we would collect the sample from an area that may have been touching an individual that could have left behind their skin cells."[15] Green designated the sides of the latex, which appeared to be the fingertip portion of a latex glove, as "exterior" and "interior," on the basis of her own observation. She did not determine which way the glove had been worn.

Lana Ramos, a forensic science examiner with the laboratory, extracted the DNA, performed analysis, and developed DNA profiles for the samples taken from the orange teddy bear vest, baseball cap, and piece of latex.[16] She also prepared two reports of her findings.[17] Ramos testified that a sample is classified as a mixture "[w]hen we are looking at a DNA profile if the sample contains DNA from two or more individuals . . . ." She further testified that, "[w]hen we do our profile analysis, if there [are] higher peaks which would indicate more DNA from one contributor, we may be able to deconvolute out[18] that major contributor."[19] (Footnote added.) She also testified that, in the case of a major profile, "there is enough DNA from one individual as compared to the other individuals in the mixture that we were able to deduce out a major profile from the mixture."

With respect to the side of the piece of latex designated as the interior, Ramos concluded that the DNA sample contained a mixture and "[a] major profile was deduced at all loci tested except for [one]. . . . The

results are consistent with [the defendant] being the source of the major DNA profile deduced from [the side of the piece of latex designated as the interior]. The expected frequency of individuals who could be the source of the major DNA profile deduced from [the side of the piece of latex designated as the interior] is less than one in seven billion in the African American, Caucasian, and Hispanic populations." When asked to explain the expected frequency of "less than one in seven billion," Ramos stated: "When we give the qualitative statement of a match we then give a quantitative statement of how many other individuals we would also expect to match that DNA profile." Specifically, she explained that "if you obtained the DNA profile of seven billion African American, Caucasian, or Hispanic individuals you would not expect another individual to have—to match that DNA profile." Both F and S were eliminated as sources of the DNA profile from the side of the piece of latex designated as the interior.[20]

A mixture of DNA also was found on the side of the piece of latex designated as the exterior. Both F and S could not be eliminated as potential contributors. The results were inconclusive[21] as to whether the defendant could be a contributor.

DNA testing also was performed on the orange teddy bear vest and baseball cap. The exterior of the orange teddy bear vest contained a mixture of DNA. Both S and F were eliminated as contributors to that DNA profile. "[I]nsufficient amplification products[22] were detected from [the exterior of the orange teddy bear vest] for comparison to [the defendant]." (Footnote added.) Insufficient to compare means that "there's not enough DNA in the sample to produce a profile that is sufficient to compare to a known sample; we can only eliminate individuals."

The interior of the orange teddy bear vest also contained a mixture of DNA. "Assuming two contributors to the mixture, a major DNA profile was deduced at all loci tested except for [three loci]." The results were consistent with F being the source of the major profile. Both the defendant and S were eliminated as sources of the major DNA profile. A minor profile was deduced at three loci. Both the defendant and S were eliminated as sources of the minor profile.

The black rimmed arm holes of the orange teddy bear vest also contained a mixture of DNA. F was eliminated as a contributor to the DNA profile. "Insufficient amplification products were detected from [the black rimmed arm holes of the orange teddy bear vest] for comparison to [the defendant and S]."

The interior rim of the baseball cap also contained a mixture of DNA. Both F and the defendant were eliminated as contributors to the DNA profile from the interior rim of the baseball cap. The data was "inconclusive"

as to whether S could be a contributor to the DNA profile.

Ramos testified that she understood the distinction between primary and secondary transfer of DNA.[23] Defense counsel provided Ramos with the following example of a possible secondary transfer: "[I]f I were to come up to you today and shake your hand . . . and you were to leave the courtroom and shake [the prosecutor's] hand . . . there's a pretty good chance some of my DNA would be on [the prosecutor's] hand," to which Ramos responded, "[p]ossibly." Defense counsel asked: "And that would be the kind of DNA that you would detect in your testing. Correct?" Ramos responded: "Possibly." Ramos testified that her testing does not draw a distinction between primary and secondary transfers.[24]

Following the issuance of Ramos' second report in January, 2017, the laboratory "validated and implemented a new software analysis . . . ." Jillian Echard, a forensic science examiner with the laboratory, was asked to reexamine the samples in this case, applying the laboratory's "latest, newest protocols . . . ." In August, 2018, Echard reanalyzed the samples,[25] recompared the samples to the known samples, and prepared a report dated August 8, 2018. Echard testified that the new software analysis "deconvolutes DNA profiles into their most probable components and creates statistical findings of knowns to that deconvoluted profile." Echard explained that the statistic generated had changed from a "combined probability of inclusion or a random match probability" to a likelihood ratio.[26] Echard testified that a result of "included" meant that "the known DNA profile is present at every single one of the fifteen test sites that we perform our testing on." "Cannot be eliminated" meant that "there was genetic linkage of that person's DNA profile to the question sample, but their DNA type was not present at every single one of our fifteen test site locations." "The inconclusives were when a likelihood ratio was calculated but fell in our lab's inconclusive zone, which is a likelihood ratio between 1 and 10,000. When we receive a likelihood ratio between 1 and 10,000 we give it an inconclusive result as to not report out what we believe might be false positive associations."

Echard testified, with respect to the sample from the side of the piece of latex designated as the interior: "I had determined the DNA profile . . . to be a contributor of a mixture of three contributors with at least one of them being male. I manually compared the DNA profiles from [F] and [S] to that DNA profile and I eliminated them as contributors without the software. I had found that [the defendant] was included as a contributor to this DNA profile, which meant that his DNA profile was present at all of the fifteen test sites. So I deconvoluted the profile using our probabilistic

genotyping software, which deconvoluted the DNA profile to its most probable components, and then I compared the DNA profile of [the defendant] to the DNA profile from the interior of the glove and calculated a likelihood ratio. And assuming three contributors, the DNA profile from [the side of the piece of latex designated as the interior] is at least a hundred billion times more likely to occur if it originated from [the defendant] and two unknown contributors as opposed to it originating from three unknown contributors."

Echard also reanalyzed the sample from the exterior of the piece of latex. Although Ramos' analysis had indicated that results were inconclusive with respect to the defendant, Echard's reanalysis determined that he was eliminated as a source. Echard also reanalyzed the samples from the orange teddy bear vest and the baseball cap. With respect to the exterior of the orange teddy bear vest, the results of the reanalysis differed from the original analysis in that the defendant was eliminated as a contributor to that DNA profile. With respect to the black rimmed arm holes of the orange teddy bear vest, the results of the reanalysis differed from the original analysis in that it was inconclusive as to whether F or the defendant were contributors, and S was eliminated as a contributor. With respect to the interior rim of the baseball cap, the results of the reanalysis differed from the original analysis in that it was inconclusive as to whether F could be a contributor to the DNA profile.

The defendant was charged with burglary in the first degree in violation of § 53a-101 (a) (3), robbery in the first degree in violation of § 53a-134 (a) (3), and sexual assault in the fourth degree in violation of General Statutes § 53a-73a (a) (2). Following a trial,[27] the jury found the defendant guilty of burglary and robbery and not guilty of sexual assault. Thereafter, the court sentenced the defendant to a total effective sentence of nineteen years of incarceration. This appeal followed.

"In reviewing criminal convictions for the sufficiency of the evidence, we apply a well established two part test. First, we construe the evidence in the light most favorable to sustaining the verdict. Second, we determine whether upon the facts so construed and the inferences reasonably drawn therefrom the [jury] reasonably could have concluded that the cumulative force of the evidence established guilt beyond a reasonable doubt. . . . On appeal, we do not ask whether there is a reasonable view of the evidence that would support a reasonable hypothesis of innocence. We ask, instead, whether there is a reasonable view of the evidence that supports the [jury's] verdict of guilty. . . . Although proof beyond a reasonable doubt does not mean proof beyond all possible doubt . . . [or] require acceptance of every hypothesis of innocence posed by the defendant that, had it been found credible by the trier [of fact], would

have resulted in an acquittal . . . it does not satisfy the [c]onstitution to have a jury determine that the defendant is probably guilty. . . . [When] the evidence is in equipoise or equal, the [s]tate has not sustained its burden [of proof] . . . .'' (Citations omitted; emphasis omitted; internal quotation marks omitted.) *State* v. *Dawson*, 340 Conn. 136, 146–47, 263 A.3d 779 (2021).

''Although [t]here is no distinction between direct and circumstantial evidence as far as probative force is concerned . . . [b]ecause [t]he only kind of an inference recognized by the law is a reasonable one . . . any such inference cannot be based on possibilities, surmise or conjecture. . . . It is axiomatic, therefore, that [a]ny [inference] drawn must be rational and founded upon the evidence. . . . However, [t]he line between permissible inference and impermissible speculation is not always easy to discern. When we infer, we derive a conclusion from proven facts because such considerations as experience, or history, or science have demonstrated that there is a likely correlation between those facts and the conclusion. If that correlation is sufficiently compelling, the inference is reasonable. But if the correlation between the facts and the conclusion is slight, or if a different conclusion is more closely correlated with the facts than the chosen conclusion, the inference is less reasonable. At some point, the link between the facts and the conclusion becomes so tenuous that we call it speculation. When that point is reached is, frankly, a matter of judgment.'' (Citation omitted; internal quotation marks omitted.) *State* v. *Bemer*, 340 Conn. 804, 812, 266 A.3d 116 (2021).

''The state has the burden of proving beyond a reasonable doubt the defendant's identity as the perpetrator of the crime. . . . [T]he issue of the identity of the defendant as [the] perpetrator of the robbery is one of fact for the jury.'' (Citation omitted; internal quotation marks omitted.) *State* v. *Hazard*, 201 Conn. App. 46, 55, 240 A.3d 749, cert. denied, 336 Conn. 901, 242 A.3d 711 (2020).

On appeal, the defendant claims that the evidence of his identity as the intruder was insufficient to support his conviction. Specifically, the defendant argues that the DNA evidence, consisting of ''his DNA within a tiny sample of a three person mixture of touch DNA,'' did not provide the jury with an ''evidentiary basis allowing it to conclude that the defendant being a 'major contributor' to the DNA mixture meant that the defendant was the most recent or sole wearer of the latex glove.'' The defendant further contends that the non-DNA evidence was ''particularly weak,'' in that ''none of [it] directly links the defendant to the offenses of which he was convicted.'' We agree with the defendant that the evidence was insufficient to support his conviction.

Before turning to a discussion of the evidence in the present case, we examine our Supreme Court's recent

discussion of touch DNA and decisions from other jurisdictions addressing the issue. In *State* v. *Dawson*, supra, 340 Conn. 139–40, the defendant was present with five other individuals in a courtyard of a housing complex. The defendant was seated at a picnic table with two of the individuals when police entered the courtyard and noticed a gun lying in plain view, resting on top of leaves. Id., 140–41. Four of the six individuals, including the defendant, voluntarily provided a DNA sample. Id., 142. Touch DNA was collected from the gun. Id., 143. A forensic science examiner analyzed the sample and was able to generate a partial profile, obtaining results at seven out of fifteen loci tested. Id. The DNA profile consisted of a mixture of DNA. Id. Of the four individuals who provided samples, three individuals were eliminated as possible contributors to the DNA profile, but the defendant could not be eliminated as a contributor. Id. " 'The expected frequency of individuals who could not be eliminated as a contributor to the DNA profile is approximately one in 1.5 million in the African-American population, one in 3.5 million in the Caucasian population, and one in 930,000 in the Hispanic population.' " Id., 143–44. The defendant was charged with and convicted of criminal possession of a pistol or revolver. Id., 144. On appeal to this court, he claimed that there was insufficient evidence to support his conviction. Id. This court affirmed the judgment of conviction, and the defendant appealed to our Supreme Court. Id., 144–45.

Our Supreme Court reversed the judgment of conviction, concluding that "the jury could not reasonably have concluded beyond a reasonable doubt that the defendant had knowledge of the gun and, with intent, exercised dominion or control over it." Id., 150. Specifically, the court agreed with the defendant's argument that the DNA evidence did not establish that he constructively possessed the gun. Id., 153. The court found troubling "the sheer lack of conclusiveness regarding the DNA evidence in this case as it relates to the charged crime . . . ." Id., 156. The court's first concern was that the state's DNA expert, the forensic science examiner, "was not able to determine how the defendant's DNA ended up on the gun; [the examiner] could not say whether it was via primary transfer, secondary transfer, or aerosolization. In other words, [the examiner] could not determine whether the defendant's DNA ended up on the gun because he touched the gun, because he touched something that subsequently came into contact with the gun, or because he breathed, sneezed, or coughed near the gun."[28] Id., 156–57. Second, the court noted that the DNA expert was "unable to determine when the defendant's DNA was deposited on the gun . . . ." Id., 157. Third, the court referred to the expert's testimony that the DNA sample was a mixture, "meaning that at least one other person's DNA was on the gun and possibly as many as three or four other people's DNA." Id. Fourth, the court stated that the expert had

"conceded that, although the other three individuals at the picnic table were able to be excluded as contributors to the sample, that did not mean that their DNA was not on the gun; rather, it simply meant that it was not detected." Id. Fifth, the court noted that two of the individuals present in the courtyard were not DNA tested. Id. Finally, the court explained that the expert "could not definitively say that the DNA profile developed was that of the defendant; [the examiner] could determine only that he could not be excluded as a contributor." Id. On the basis of these several concerns, the court concluded that "there were simply too many unknowns for the jury to find beyond a reasonable doubt that the defendant had even touched the gun, much less that he was aware of its presence near where he was seated on the night in question and intended to exercise dominion or control over it." Id.

We note two key differences between the present case and *Dawson*. First, it was determined in *Dawson* only that the defendant "could not be excluded as a contributor"; id.; whereas here, the defendant was determined to be "included" not merely as a contributor, but as a major contributor. Second, we recognize that the issue presented in *Dawson* was whether the state proved beyond a reasonable doubt that the defendant constructively possessed the gun; id., 145–46; whereas the issue in the present case is whether the state proved beyond a reasonable doubt that it was the defendant who committed the crimes of burglary and robbery. Nevertheless, our Supreme Court's concerns regarding touch DNA as expressed in *Dawson* resonate in this case.

The state contends in its appellate brief that the DNA evidence "alone allowed the jury to find that the defendant was [F's] attacker, because it was undisputed that her attacker wore latex gloves and that a piece of a latex glove with the defendant's DNA on it was found in [F's] bedroom immediately after the assailant had restrained and struggled with [F] therein." We disagree.

At trial, there was no testimony or other evidence as to whether the DNA on the side of the piece of latex designated as the interior was deposited via primary or secondary transfer. To the contrary, Ramos testified that her analysis does not distinguish between the two forms of transfer and that her testing could "[p]ossibly" detect DNA deposited via secondary transfer. In addition, the DNA found on the side of the piece of latex designated as the interior contained a mixture of DNA of three contributors. Ramos testified that her results were "consistent with [the defendant] being the source of the major DNA profile deduced" from the side of the piece of latex designated as the interior. Ramos explained that a major contributor is "when there's more DNA from one individual" as compared to the other individuals in the mixture. Thus, the extent of

the evidence regarding the defendant being a "major contributor" was that there was more of the defendant's DNA than the other individuals' DNA. The jury was not presented with any evidence of a threshold for the determination of a major contributor or any evidence as to the amount of DNA of the other two contributors. Cf. *United States* v. *Perez*, United States District Court, Docket No. 3:18-CR-274-VLB-1 (D. Conn. December 20, 2021) (analyst from laboratory "conducted proportional analysis and determined that 85% of the DNA mixture was from the contributor associated with the [d]efendant").

More importantly, there was no evidence presented as to the significance of an individual being a major contributor to a DNA mixture. The jury was not presented with any evidence from which it could infer that the designation of a major contributor is correlated with the likelihood that DNA was deposited via primary transfer. Significantly, the state argued at trial that the latex glove was worn only once and stated that it was unknown what the defendant touched before he put the glove on. Extrapolating from the state's theory, the individual who wore the glove transferred his DNA, via primary transfer, along with the DNA of two other individuals, via secondary transfer. The jury was not provided any evidentiary basis, however, to determine the likelihood that the defendant, in contrast with the two other contributors, was the individual who wore the glove during the commission of the crime.

Accordingly, as in *Dawson*, we conclude that "there were simply too many unknowns" for the jury to find beyond a reasonable doubt that the defendant had worn the glove during the robbery. *State* v. *Dawson*, supra, 340 Conn. 157.

The state relies on *State* v. *Faust*, 161 Conn. App. 149, 166, 127 A.3d 1028 (2015), cert. denied, 320 Conn. 914, 131 A.3d 252 (2016), to support its contention that the DNA evidence alone allowed the jury to find that the defendant was the intruder. In *Faust*, the defendant was convicted of robbery with a firearm, among other charges. Id., 151–52. On appeal to this court, he claimed, inter alia, that the evidence was insufficient to permit the jury to find, beyond a reasonable doubt, that he had participated in the robbery. Id., 158. The evidence presented by the state included the testimony of a forensic science examiner that the defendant could not be eliminated as a contributor to mixtures of DNA found on the ends of two pieces of duct tape used to bind the legs and arms of the robbery victims. Id., 164. The defendant's specific argument on appeal was that there was "no evidence directly indicating that his DNA was left on the duct tape *at the time the crime took place* . . . ." (Emphasis added.) Id., 162. This court rejected the defendant's argument, explaining that, "[a]lthough DNA may be transferred to an object at any time, the

jury reasonably could have concluded that, because the samples were taken from the torn ends of the duct tape, the DNA was impressed during the commission of the crime rather than at some other point in time." Id., 166.

We first note that *Faust* was decided in 2015, long before our Supreme Court expressed concern regarding the various methods of transference of touch DNA in 2021. Indeed, the defendant in *Faust* challenged the sufficiency of the DNA evidence on the basis that "there was no evidence directly indicating that his DNA was left on the duct tape *at the time the crime took place* . . . ." (Emphasis added.) Id., 162. This court rejected that claim on the basis of the forensic science examiner's testimony that she had collected DNA from "the ends of the torn fragments of duct tape," which were "more likely to contain the DNA of the person who handled the duct tape, and may have torn it at the ends, rather than the DNA of the person to whom the duct tape was applied." Id., 164. The opinion focuses on the time, during the commission of the crime or some other time, when the defendant may have deposited the DNA and makes no mention of the methods, primary or secondary, of transfer of DNA. See id., 166. Thus, we find our Supreme Court's analysis in *Dawson* to be more instructive than that of this court in *Faust* in resolving the specific claim presented in this appeal.

Second, the DNA evidence in *Faust* is distinguishable from the present case. Notably, the DNA evidence in *Faust* included *two* samples from *two* pieces of duct tape, and the defendant could not be eliminated as a contributor to *either* sample. Id., 164. In the present case, the defendant was identified as a contributor only to the mixture of DNA found on the side of the piece of latex designated as the interior; he was not identified as a contributor to the DNA found on any of the items the intruder took from F's home.

Third, the non-DNA evidence implicating the defendant in *Faust*, his conduct prior to the robbery, significantly "add[ed] to the cumulative weight of the evidence presented at trial." Id., 166. Specifically, one witness identified the defendant as the driver of a stolen Mercedes, and a second witness, an employee of the jewelry store, identified the defendant as having approached the store the night before the robbery before then turning around and getting inside the stolen Mercedes. Id., 154. Moreover, the stolen Mercedes was recovered on the day of the robbery less than one-half mile from the jewelry store. Id., 155. Thus, this court concluded that the jury reasonably could have determined that the defendant was one of the perpetrators.[29] Id., 166.

The defendant directs this court to *United States* v. *Bonner*, 648 F.3d 209, 211 (4th Cir. 2011), in which the United States Court of Appeals for the Fourth Circuit affirmed the District Court's granting of the defendant's motion for a judgment of acquittal on the basis that the

government had failed to produce sufficient identity evidence placing the defendant at the scene of the robbery. In that case, two African American male assailants, wearing pantyhose over their faces, hooded sweatshirts, and hats, confronted a restaurant employee outside the back of the restaurant, forced him into the restaurant, told him to call his supervisor, and ordered him to the floor. Id. The employee stated that one of the robbers was wearing a black and white Yankees hat. Id. The assistant manager gave one of the robbers money from the cash register, and the robbers left. Id. The robbery occurred at about 10 p.m. and took only about two minutes to complete. Id. The employee had observed a " 'pink' " or " 'reddish' " sport utility vehicle parked in the back of the restaurant seconds before the robbery and also saw the same vehicle in the vicinity after the robbers left. Id. The manager called the police and described the vehicle as a reddish pink Honda Passport. Id.

A police officer observed a burgundy Honda Passport exiting the restaurant's parking lot as the officer approached the scene. Id., 212. He conducted a stop of the vehicle, which contained one occupant. Id. Surveillance footage revealed that the occupant did not match the description of the robbers, and the employee did not identify the occupant as one of the robbers. Id. The defendant's wallet, however, was located in the vehicle.[30] Id. Police recovered a New York Yankees hat from near the dumpster behind the restaurant, and the manager identified the hat as belonging to one of the robbers. Id.

DNA testing was performed on the hat, which revealed "multiple DNA matches and that one of them, identified as the 'predominant' profile, belonged to [the defendant]." Id. Although there was other DNA on the hat, the forensic analyst "did not try to match that DNA to other individuals." Id. "The DNA analysis could not determine who last wore the hat." Id. One canine tracked the scent from the Yankees hat to a nearby condominium development and a second canine tracked it to a gas station less than one-half mile away. Id. Five hours after the search was completed, a phone call was placed from that gas station to the home of the defendant's girlfriend. Id.

The court in *Bonner* concluded that the evidence was insufficient to support the defendant's conviction. Id., 216. Specifically, with respect to the DNA evidence, the court considered and rejected the government's argument that the jury reasonably could infer that the defendant was the last wearer of the hat from the fact that the defendant's DNA was " 'predominant.' " Id., 214. The court stated: "[T]his confuses the permissible practice of viewing conflicting evidence and credibility in favor of one side, with the impermissible practice of allowing juries to invent new evidence based on

unsubstantiated scientific assumptions." Id. The court found the government's position troubling, describing it as "draw[ing] unscientific conclusions based on two disparate pieces of scientific evidence . . . ." Id., 215. The court posited a number of other, also seemingly logical but nonetheless "analytically flimsy," conclusions that could be drawn. Id., 215. For example, the jury could have drawn the unscientific conclusions that as the robber wore pantyhose over his face during the robbery, there was a potential that his DNA was not on the hat at all, or that an individual who perspires more than other individuals also would have more " 'predominant' " DNA. Id. The court summed up the dangers of drawing these unscientific conclusions by stating that "a jury could draw a number of apparently plausible, but analytically flimsy conclusions that border on pseudo-science from the expert evidence presented by the government. However, not every articulable inference is proper because scientific rigor demands more than a theory of plausible deductions strung together." Id.

We also find persuasive *Jennings* v. *Commonwealth*, 67 Va. App. 620, 627, 798 S.E.2d 828 (2017). There, the Court of Appeals of Virginia reversed the defendant's conviction for robbery on the basis that the evidence was insufficient to prove that he was the perpetrator. Id., 628. On the day of the robbery of a gas station, a person entered the store wearing "a black stocking cap, a blue hooded sweatshirt, black jeans with white embroidery on the rear pockets, a scarf wrapped around his face, gloves, and sunglasses." Id., 623. The robber leapt over the counter and produced a knife, taking $38 from the cash register. Id. The only physical description the sales clerk could provide was that the robber was " 'tall' " and " 'slim.' " Id. Police arrived at the scene with a canine officer, who led the police to the woods behind the store to a brown bag and several $5 bills. Id. The canine then alerted on a black stocking cap and a scarf, which were found close together on a wooded path. Id., 624. A hooded sweatshirt also was discovered, approximately ten feet off the path, along with blue jeans and black tennis shoes. Id. The police also discovered a knife approximately twenty to twenty-five yards from the path. Id. The sales clerk subsequently identified the items as having been used by the assailant during the robbery. Id. DNA analysis was performed on samples collected from the stocking cap, the scarf, the knife, and the hooded sweatshirt. Id. Each of the items contained a combination of DNA from multiple individuals. Id. The state's expert, a forensic scientist in the field of forensic biology, determined that the defendant was the " 'major contributor' " of DNA on both the stocking cap and scarf, "meaning his DNA was the most prominent on them." Id. The expert also testified that the defendant's DNA mixture represented about one half of that present on the knife. Id.

The defendant in *Jennings* argued on appeal that the evidence established only that he came into contact with the items at some point, not that he used or wore them during the robbery. Id., 626. The court agreed with the defendant, stating that "the evidence at best is legally in equipoise, because it equally supports a conclusion that the unknown contributor of DNA is just as likely as [the defendant] to have been the wearer of the clothing and possessor of the knife, and therefore, the robber." Id., 627. In support of its conclusion, the court noted that "it is equally reasonable to conclude from the evidence that [the defendant] was a major contributor because he either wore the clothing more often than any of the other DNA contributors, but not necessarily at the time of the robbery, or that another contributor wore the clothes less often but did so during the robbery." Id., 628. It further noted that there was "no evidence establishing whether the items containing DNA other than that of [the defendant] belonged to a single individual or multiple individuals, and if from multiple individuals, what the statistical significance of [the defendant's] DNA on all of those items would be." Id., 627. Accordingly, the court determined that the inference that the defendant wore the items during the robbery, formed on the basis that the defendant was a major contributor of DNA found on some of the items, lacked necessary evidentiary support. Id., 627–28; see also *Commonwealth* v. *Anitus*, 93 Mass. App. 104, 105, 110, 97 N.E.3d 700 (2018) (DNA major profiles developed from T-shirt and bandana discarded near crime scene that matched defendant's DNA profile were insufficient to establish that defendant was one of assailants who wore objects during crime).

We find persuasive the reasoning supporting the conclusions of the court in *Bonner* and *Jennings*. Both courts rejected, as unsupported by evidence, the drawing of an inference that a defendant used an item during a crime on the basis of evidence that the defendant was a major contributor to a DNA mixture found on that item. Just as in *Bonner*, the state here "asked the jury to draw unwarranted inferences based on . . . scientific evidence through argument instead of specialized knowledge." *United States* v. *Bonner*, supra, 648 F.3d 215. Indeed, in closing argument, the state in the present case argued: "Ramos testified to you what a major contributor of DNA was. She did tell you the definition. More DNA from one individual in this case is coming from the defendant. The state would argue that this is not a reused latex glove. People usually don't do this; it's difficult to do. We don't know what the defendant touched before he put the glove on. But keeping in mind one thing: the defendant is the major contributor of the DNA in this case. . . . Ramos gave you those statistics and that would explain the mixture of the unknowns." Any inference, however, that the defendant wore the glove and, therefore, that his DNA was trans-

ferred via primary transfer, drawn from the evidence that he was the "major contributor," is unwarranted and lacks evidentiary support in the record. See *State* v. *Bemer*, supra, 340 Conn. 812 ("if the correlation between the facts and the conclusion is slight, or if a different conclusion is more closely correlated with the facts than the chosen conclusion, the inference is less reasonable" (internal quotation marks omitted)).

Counsel for the state, during oral argument before this court, stated that she did not think that an expert could tell whether just because someone was the major contributor that that necessarily meant the transfer was primary versus secondary.[31] DNA experts testifying in both the United States District Court for the District of Connecticut and courts in other jurisdictions, however, have offered the evidentiary basis lacking in the present case—that is, the correlation between the amount of DNA deposited on an item and the *likelihood* that such DNA was deposited via primary transfer as opposed to secondary transfer. See *United States* v. *Perez*, supra, United States District Court, Docket No. 3:18-CR-274-VLB-1 (A DNA expert testified that "the amount of DNA found from a secondary transferor when compared to a direct transferor is expectingly less, specifically stating 'I haven't seen an example where the primary toucher has less DNA than the secondary person' and '[t]ypically . . . the initial touching is going to give more DNA.' . . . He did testify that it was possible, but 'in general, [he] would think the direct touching is going to transfer more of that individual's DNA.' " (Citation omitted.)); see also *United States* v. *Brooks*, 678 Fed. Appx. 755, 758 (10th Cir.) (expert testified that there is no way to confirm secondary transfer on basis of forensic testing but also testified that secondary transfer was highly unlikely on basis that defendant was major contributor of DNA), cert. denied, U.S. , 138 S. Ct. 240, 199 L. Ed. 2d 154 (2017); *State* v. *Castro*, 206 So. 3d 1059, 1063 (La. App. 2016) (expert testified that "a lower level of DNA would be found through secondary transfer, and that, considering the high concentration of [the defendant's] DNA found on [the victim's] right breast, it was highly unlikely that the right breast swab would have contained transferred DNA"), writ denied, 227 So. 3d 285 (La. 2017); *State* v. *Shine*, 113 N.E.3d 160, 172 (Ohio App. 2018) (noting, in sufficiency of evidence analysis, that forensic scientist from regional laboratory had testified that defendant was major contributor to DNA found on shell casings, testified that minor contributor was present at " 'very low level,' " and opined that defendant's DNA was present through primary transfer). We emphasize, based on our review of decisions from other jurisdictions considering expert testimony elucidating DNA evidence, that such testimony can provide a jury with an evidentiary basis from which it reasonably can infer that a defendant's having been designated as a major contributor to a mixture of

DNA makes it more likely that the defendant's DNA was deposited via primary transfer. Of particular importance to our review, the jury was presented with no evidence that the DNA of a major contributor was more likely the result of primary, as opposed to secondary, transfer.

Accordingly, given the absence of any evidence from which the jury reasonably could infer a connection between the defendant's status as a major contributor to the mixture of DNA found on the side of the piece of latex designated as the interior and the likelihood of the defendant having deposited his DNA via primary transfer, we are compelled to reject, on this record, the state's argument that the DNA evidence was sufficient, standing alone, to establish the defendant's identity as the perpetrator.

Because the state could not identify the defendant as a contributor to the DNA found on the other items tested, the orange teddy bear vest and baseball cap, and because the state never tested the T-shirt, washcloth or pen for DNA, there is no other physical evidence connecting the defendant to the crime. Instead, the state relies on the following additional, nonphysical evidence. First, it argues that the victim's "general description" of the attacker as a black male in his late twenties or early thirties, approximately 200 pounds, and a little taller than her (five feet, eight inches), fit the defendant, who was a thirty-five year old black man, weighed 180 pounds, and stood five feet, nine inches tall. Second, the state highlights the assailant's warning that he would return to F's house and kill her if he saw a police presence in the future, which the state contends implied that he lived nearby. The state notes that the defendant lived one street over from F and that Casus tracked to a garage near the defendant's property before losing the scent. Third, the state points to the defendant's presence on the street at 11:30 p.m. when the police were investigating the crime.

The defendant responds that such evidence did not "provide any compelling reason for a jury to conclude that the defendant, rather than any other black male of average build in the neighborhood, was the perpetrator of these offenses." We agree with the defendant that the non-DNA evidence, when considered together with the DNA evidence, was insufficient to prove beyond a reasonable doubt that the defendant was the perpetrator. As the defendant points out, when the police encountered him on the street on the night of the crime, his clothing did not match the clothing described by F; nor was there any evidence that he owned clothing matching the description. Additionally, his heartbeat and breathing both seemed normal to Officer Mona. The intruder's threat, even if considered by the jury as suggesting that he is able to keep an eye on F's house, cannot overcome, as reasoned by the defendant, that

the other two individuals who contributed DNA to the sample taken from the side of the piece of latex designated as the interior "are completely unknown, and there has been no showing eliminating any of the other neighbors as contributors, even though the state insists that residing in the neighborhood is one of the key indicators of guilt here." As to the defendant's presence on the street, Officer Mona testified that it would not be unusual in this multiracial community to see a young black man walking along the street at night.

Moreover, Casus' track, which covered fourteen homes, took him *past* the defendant's house, where he did not pause, and brought him to a garage window at 21 Woodycrest Drive, a couple of houses away from the defendant's. Casus stopped at only one address, and it was not the home of the defendant. Although the state explains the failure of Casus to track to the defendant's house by noting that the defendant's entering of the home would have interrupted Casus' track, Officer Mona testified that "when somebody enters a home, the dog technically can't follow it into the home. He can bring you to the home, circle the home, get very close, a house or two next to it . . . ." Casus neither brought Officer Mona up to the house nor circled the house. Instead, he brought Officer Mona past the defendant's house, traveling two houses beyond that house and tracking up to a garage window. Thus, the correlation between Casus' track, following the scent from F's keys, past the defendant's home, and the conclusion that the defendant was the intruder who had dropped the keys following the commission of the crime is weak.

"Although we must not substitute our judgment for that of the jury, a reviewing court must determine whether the jury reasonably could have concluded as it did." *State* v. *Bemer*, supra, 340 Conn. 820. In the present case, the cumulative force of the state's evidence, including the DNA evidence, the canine tracking, the defendant's meeting the very general description given of the intruder, and the threat made by the perpetrator along with the defendant's presence on the street in his neighborhood, even when viewed in the light most favorable to sustaining the verdict, was insufficient to establish, beyond a reasonable doubt, the defendant's identity as the intruder.

The judgment is reversed and the case is remanded with direction to render a judgment of acquittal.

In this opinion the other judges concurred.

* This appeal originally was argued before a panel of this court consisting of Chief Judge Bright, Judge Alvord, and former Justice Sullivan. Thereafter, Judge Seeley replaced Justice Sullivan. Judge Seeley has read the briefs and appendices, and listened to a recording of the oral argument prior to participating in this decision.

[1] The defendant also was charged with sexual assault in the fourth degree in violation of General Statutes § 53a-73a (a) (2). The jury found him not guilty of that charge.

[2] The defendant also claims that the court improperly admitted scientific evidence generated by a DNA analysis software without first conducting a

hearing pursuant to *State* v. *Porter*, 241 Conn. 57, 80–90, 698 A.2d 739 (1997), cert. denied, 523 U.S. 1058, 118 S. Ct. 1384, 140 L. Ed. 2d 645 (1998), and that he was deprived of his constitutional right to a fair trial as a result of prosecutorial impropriety during closing arguments. We do not reach these claims because we conclude that the evidence was insufficient to support the defendant's conviction, and we reverse the judgment of conviction on that basis.

[3] In accordance with our policy of protecting the privacy interests of victims in cases involving alleged sexual assault, we decline to identify F or others through whom her identity may be ascertained. See General Statutes § 54-86e.

[4] F stored S's sports equipment and other various items in the junk room.

[5] F testified that she is five feet, seven inches or five feet, eight inches.

[6] F did not think she ever had made contact with him. At some point, he took the pen from her.

[7] When asked how she identified the smell of latex, she testified that it "smelled like a condom," and she thought that the intruder was there to sexually assault her.

[8] Officer Mona testified that Casus alerts to an item, or "downs," by placing the item between his paws.

[9] Although the orange teddy bear vest also was located in that area, Casus did not alert to it.

[10] Officer Mona testified that Casus went off track at one point but that he circled back around, which he is trained to do, and put himself back on the trail.

[11] When asked to describe the difficulties in tracking when someone is inside their home, Officer Mona explained: "So using the example of the cigar or cigarette, if you were in here smoking and you walked into that room but you put out your cigarette here, the cigarette does not go—the smoke that you can visibly see, that represents scent in a comparison. The smoke is not going to go into that room if you close the door and put out the cigarette if it was sealed properly. I'm just giving this as kind of like a comparison. So when somebody enters a home, the dog technically can't follow it into the home. He can bring you to the home, circle the home, get very close, a house or two next to it, because if you can imagine that scent is—you have groundbreaking vegetation where you have the disturbance of the grass that breaks and then you have our scent."

[12] Officer Mona testified that he could not recall which officers were speaking with the defendant.

[13] The pen was not submitted to the laboratory for testing.

[14] "A buccal swab involves rubbing a Q-tip like instrument along the inside of the cheek to collect epithelial cells." *State* v. *Walker*, 332 Conn. 678, 683 n.2, 212 A.3d 1244 (2019).

[15] Our Supreme Court recently recognized that "touch DNA does not necessarily indicate a person's direct contact with the object. Rather . . . abandoned skin cells, which make up touch DNA, can be left behind through primary transfer, secondary transfer, or aerosolization. Primary or 'touch' transfer occurs, for example, when you directly touch or pick up an object. Secondary transfer, alternatively, occurs when, for example, person A bleeds onto a table and, subsequently, person B walks by the table, accidentally brushes against it, and then sits in a chair. Person A's blood can potentially be on that chair via secondary transfer, although person A personally never came into contact with the chair. Finally, skin cells can be deposited on an object through aerosolization, which . . . occurs when, for example, a person speaks, breathes, coughs, or sneezes on or near an item." *State* v. *Dawson*, 340 Conn. 136, 153–54, 263 A.3d 779 (2021).

[16] No DNA analysis was performed on the samples taken from the T-shirt or washcloth.

[17] The first report, dated September 27, 2016, analyzed the samples taken from the two sides of the latex and the buccal swabs of F and the defendant. The second report, dated January 4, 2017, referred to her earlier report and also analyzed the buccal swab of S along with the samples taken from the orange teddy bear vest and the baseball cap.

[18] Ramos testified that "[d]econvoluting" is the same as "deducing out . . . ."

[19] Ramos additionally testified that "[m]ajor contributor is when there's more DNA from one individual, that we are able to use our standard operating procedures to deduce that profile."

[20] The quantity of the DNA from the swab taken from the side of the piece of latex designated as the interior was 400 picograms. Each cell contains

approximately 6.6 picograms. The swabs were consumed in the initial extraction.

[21] Ramos testified that inconclusive meant that "the data [was] not sufficient to make a conclusion, either positive or elimination." She further testified that results could be inconclusive "if there is a sufficient amount of DNA overall but we cannot draw a conclusion with comparing it to a known sample."

[22] Christine Hsiao, a forensic science examiner in the DNA unit of the laboratory, performed DNA testing on the known samples taken from F and the defendant and testified regarding the process of obtaining a DNA profile. She explained: "So we use the standard forensic DNA typing procedure. Basically we extract the DNA using chemicals and heat, and then we can estimate how much DNA we obtained. And then we move on to a step we call the amplification step, which you can think of it as the molecular Xeroxing, basically making millions of copies of specific regions of DNA and we analyze the result and obtain the DNA profile, which is represented by a series of numbers." Adrianne Schoefer, also a forensic science examiner in the DNA unit of the laboratory, testified as to the steps she performed in the present case. Specifically, she testified: "I start off with a DNA extraction, which is where we break open the cells and we remove the DNA from the cells. The next stage is called quantification; we determine how much DNA is present in the sample. After that we have a step called amplification, which is like a copying; we copy the DNA. We copy specific regions; we don't copy all of the DNA. And once we have the copies we then develop a DNA profile and that's represented by a series of numbers."

[23] Both Detectives Zulick and Loehr also testified that they are aware of secondary transfer.

[24] In *State* v. *Dawson*, 340 Conn. 136, 154, 263 A.3d 779 (2021), the forensic science examiner testified that "when analyzing a sample, there is no way to determine whether DNA was deposited through primary transfer, secondary transfer, or aerosolization."

[25] Echard explained that "[t]he testing to generate the DNA profile had already been done, so I received the electronic data that had already been generated and I reanalyzed that data."

[26] See *State* v. *Rodriguez*, 337 Conn. 175, 190–91, 252 A.3d 811 (2020) ("The random match probability is the probability that the defendant's DNA profile would match the DNA profile of an unrelated member of the general population who is chosen at random. . . . The combined probability of inclusion is employed when there is a mixed DNA profile, which indicates the presence of genetic material from two or more contributors. . . . This method takes all of the observed data and considers all possible profiles that could produce that data. Then, it generates a statistic, which expresses the probability that a random person would have any of those generated profiles. . . . Source probability is the probability that someone other than the defendant is the source of the DNA found at the crime scene." (Citations omitted; internal quotation marks omitted.)).

[27] At the close of the state's evidence, the defendant moved for a judgment of acquittal, which was denied.

[28] See also 2 P. Giannelli et al., Scientific Evidence (6th Ed. 2020) § 18.04 [4], pp. 18-100–18-101 (noting that one person's DNA can " 'hitchhike' " its way to crime scene through secondary DNA transfer, and, therefore, presence of one's DNA at crime scene no longer means that one was even at crime scene).

[29] The state also relies on *State* v. *Rodriguez*, 337 Conn. 175, 252 A.3d 811 (2020), which is inapposite. *Rodriguez* involved a sexual assault perpetrated by two men, where the laboratory ultimately determined that the defendant was a potential contributor to a DNA mixture that had been extracted from the "sperm-rich fraction" of vaginal swabs taken from the victim's body. Id., 178–79, 182. Specifically, prior to conducting its analysis, the laboratory separated the epithelial—or skin—cells from the sperm cells, "[b]ecause it is preferable to analyze a profile of the semen sample alone . . . ." Id., 181 n.3. The defendant's claim on appeal was that "a random match probability of 1 in 230,000, by itself, is insufficient to prove that he is guilty beyond a reasonable doubt. Specifically, the defendant contend[ed] that a random match probability of 1 in 230,000 in the Hispanic population means that there are about ninety Hispanic males over the age of fifteen in the United States who could have contributed a DNA profile to the vaginal sample." Id., 198–99. In the present case, the defendant is not challenging the sufficiency of the evidence on the basis of the random match probability or likelihood ratio presented to the jury. Given that the claims on appeal were completely

different, *Rodriguez* is inapplicable.

Moreover, in *Rodriguez*, the state responded to the defendant's claim that the random match probability was insufficient evidence by asserting that the defendant's claim was " 'meritless because the evidence establishing the defendant's identity was not based on the DNA evidence alone.' " Id., 199. Our Supreme Court ultimately concluded that "the circumstantial evidence, combined with the DNA evidence, was sufficient for the jury to find beyond a reasonable doubt that the defendant was one of the perpetrators of the sexual assault." Id., 201–202. The court focused heavily on statements made by the defendant to the police during recorded interviews. Id., 200–201. Specifically, "after denying ever having had a threesome during the first interview, during the second interview, the defendant admitted that he had engaged in threesomes on two occasions. When the detective asked him during the second interview what happened the day the victim reported being assaulted, the defendant abandoned his lack of recollection and offered an account of picking up a man and a woman in his car near an AutoZone in New Britain and engaging in a threesome. The defendant later explained that he could not remember when that occurred or whether it was the same incident the detective was referencing. The defendant's mention of an AutoZone was significant, however, because the jury was presented with evidence that an AutoZone was located in the vicinity of where the victim reported being abducted. Finally, when the detective informed him that, in addition to the assault, the victim stated that she had been robbed of several hundred dollars, the defendant replied with words to the effect of: 'That's not me. It's the other guy.' " Id.

[30] During a search of the vehicle, police found "several other items including: [the defendant's] identification and wallet, several rounds of .357 ammunition, a toy gun, two walkie-talkies, registration of the car to Tyra Edmonds (who was [the defendant's] girlfriend at that time), and some scattered clothing items. Three cell phones, belonging to [the vehicle's occupant], Ms. Edmonds, and LaMont Ruth ([the defendant's] cousin), were also recovered. [The defendant] placed several short calls to Ms. Edmonds' and Mr. Ruth's cell phones that night." *United States* v. *Bonner*, supra, 648 F.3d 212.

[31] We note that experts have testified, consistent with the testimony in the present case, that DNA analysis cannot determine whether DNA was deposited via primary or secondary transfer. See, e.g., *Young* v. *Commissioner of Correction*, Superior Court, judicial district of Tolland, Docket No. CV-16-4007713-S (March 18, 2019) (forensic science examiner from laboratory testified that DNA analysis cannot determine who was last contributor to mixture, nor order in which contributors to mixture deposited their respective DNA, nor whether DNA was deposited via primary or secondary transfer), aff'd, 201 Conn. App. 905, 241 A.3d 215 (2020), cert. denied, 336 Conn. 904, 242 A.3d 1009 (2021).