SJC-12310

COMMONWEALTH vs. CARA L. RINTALA.

Hampshire. May 3, 2021. - September 27, 2021.

Present: Budd, C.J., Lowy, Cypher, Kafker, & Georges, JJ.

Homicide. Witness, Expert. Evidence, Expert opinion, Qualification of expert witness, Prior misconduct, Relevancy and materiality. Constitutional Law, Double jeopardy. Practice, Criminal, Capital case, Required finding, Double jeopardy.

Indictment found and returned in the Superior Court Department on October 19, 2011.

Following review by this court, 473 Mass. 1018 (2016), the case was tried before Mary-Lou Rup, J., and a motion for a new trial, filed on March 1, 2019, was considered by Jane E. Mulqueen, J.

Chauncey B. Wood for the defendant.

Steven E. Gagne, Assistant District Attorney (Jennifer Handel Suhl, Assistant District Attorney, also present) for the Commonwealth.

The following submitted briefs for amici curiae:

Peter R. De Forest, Brooke W. Kammrath, Peter A. Pizzola, & John A. Reffner, pro se.

M. Chris Fabricant & Tania Brief, of New York, & Stephanie Roberts Hartung for New England Innocence Project & another.

Katherine H. Judson, of Wisconsin, Anthony D. Mirenda, Neil Austin, & Rachel L. Davidson for Center for Integrity in Forensic Science.

KAFKER, J. In 2016, a jury convicted the defendant of murder in the first degree for the murder of her spouse, Annamarie Rintala (victim). On appeal, the defendant challenges the admission of expert testimony as to the victim's time of death as well as expert testimony related to the time and manner in which paint was either poured or spilled on, under, and around the victim in the basement where the victim was found. The defendant also argues that there were errors requiring reversal related to the denial of her motion for a required finding of not guilty, the admission of evidence of prior misconduct, the judge's sua sponte instruction on consciousness of guilt, and the Commonwealth's closing argument. Finally, she argues that the retrial as well as the manner in which the Commonwealth presented its evidence at the third trial violated her constitutional rights.

We conclude that the admission of the expert testimony as to the timing and manner of application of paint in the basement was error. Because the error was prejudicial, we vacate the judgment entered against the defendant.[1]

[1] We acknowledge the amicus briefs submitted by four forensic scientists; by the New England Innocence Project and

1. Background. a. Facts. We briefly summarize the facts that the jury could have found at the defendant's trial, reserving details for our discussion of the legal issues.

On March 29, 2010, the defendant, a paramedic, returned to the home she shared with the victim in Granby at around 7 P.M. Shortly after entering the home, she saw the victim at the bottom of the stairs to the basement. The defendant initially only saw the victim's feet in the basement. Before going down to check on the victim, the defendant first brought their daughter and their dog to a neighbor and asked the neighbor to call 911. When first responders arrived, they found the defendant in the basement with the victim. Paramedics quickly determined that the victim was dead, and several members of the Granby police department brought the defendant upstairs. She spoke briefly with an officer at the scene before going to the Granby police station to speak with a State police detective working with the office of the district attorney for the northwestern district.

Various members of the State police responded to the scene and initiated an investigation. They extensively photographed the scene and collected physical evidence. Investigators

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the Innocence Project, Inc.; and by the Center for Integrity in Forensic Science.

recovered a container of paint from the floor near the body.[2] When first responders had arrived, they observed paint all over the defendant, the victim, and the basement floor. The two paramedics and the first two police officers on scene offered various descriptions of the paint, each generally describing the paint as white, wet, and shiny. The victim had twenty-three distinct bruises all over her body, all of which appeared recent or fresh. These included multiple blunt injuries to the victim's head. The victim also had wounds around her neck, and the medical examiner concluded that the cause of death was manual strangulation.

Over the course of two interviews with the State police, the defendant provided a timeline of her activity on the date of the homicide. The defendant told detectives that she and the victim had been arguing the night before, as the victim had been upset about the defendant socializing with a male friend at home while the victim was at work.[3] The defendant said that she left the house sometime around 3 P.M. on the day of the homicide. After leaving the house, the defendant went to a number of

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[2] The paint at issue was Glidden EZ Track ceiling paint. The paint was manufactured by Glidden Paint.

[3] The victim had worked a night shift on March 28 that began at 8 P.M. She was scheduled to work the same shift on the day she was killed.

different locations.[4] She eventually went to the Holyoke Mall, where she was identified on surveillance video footage just before 5 P.M.[5] From there, the defendant stopped at a restaurant around 5:47 P.M. The defendant did not enter the restaurant; instead, surveillance video footage shows her truck near the rear of the parking lot. From the video recording, it appears that the defendant threw several items in a trash can in the parking lot before driving away within one to two minutes of entering the parking lot. Three rags were later recovered from the trash can, one of which contained a "faint" bloodstain.[6] After leaving the parking lot, the defendant then drove to a nearby grocery store, arriving just before 6 P.M. She purchased a few items and left the store at 6:19 P.M. She then drove to another restaurant that was approximately five miles away before returning home.

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[4] The State police traced the defendant's steps at each location and, where possible, recovered physical evidence and surveillance video footage.

[5] In her interviews with the State police, the defendant stated that she and the daughter went to several locations before going to the Holyoke Mall. There is no surveillance video footage or physical evidence to corroborate these stops.

[6] An expert testified for the defense that the bloodstain contained "degraded" deoxyribonucleic acid (DNA). He opined that the analysis of the DNA indicated that it likely was not freshly deposited on the rag.

Throughout the time she was away in the afternoon, the defendant sent the victim text messages, attempted to call her multiple times, and left her several voicemail messages. The police recovered the victim's cell phone, which included the messages from the defendant and a significant number of text messages and calls, with the last outgoing communication occurring at 12:21 P.M. During her first interview on the night of the homicide, the defendant permitted the detectives to perform a brief visual search of most of her body.[7] The Commonwealth's theory at trial was that the defendant and the victim had an acrimonious, at times violent, marriage, culminating with the defendant strangling the victim on March 29. The Commonwealth argued that the defendant engaged in a scheme designed to cover up her involvement in the homicide by driving around all afternoon, disposing of evidence, and attempting to communicate with the victim to demonstrate that she believed the victim was alive at the time of the calls. The defendant then intentionally poured the paint on the body and

[7] The only thing that the detective noticed during the examination was a small mark on the victim's neck or upper chest. The detective described the mark as an abrasion at trial, but the defendant said to her during the interview that the mark came from a recent consensual encounter with the victim. The defendant also changed her clothes at the crime scene and was near a Granby police detective as she did so. The detective did not notice any marks or abrasions on the defendant and agreed that she would have made note of it if she had seen anything like that.

lifted the body onto herself before the police arrived to make the crime more difficult to investigate.

b. Procedural history. The defendant was indicted in October 2011. She was tried in early 2013 and again in early 2014. Both trials ended in mistrials because of hung juries. The Commonwealth tried the defendant a third time in September and October of 2016, and the defendant was convicted of murder in the first degree. At the third trial, the Commonwealth introduced for the first time the testimony of David Guilianelli, a quality engineer at the company that manufactured the paint found at the crime scene. Guilianelli provided expert testimony, based on his own experiments, explaining that the paint found at the crime scene was poured deliberately and not spilled and that the paint was poured no more than four hours before photographs were taken of the crime scene just after 9 P.M. The defendant filed a motion for a new trial in March 2019, which was denied. This appeal followed.

2. Discussion. On appeal, the defendant brings a number of claims related to (1) the admission of expert testimony, (2) the denial of her motion for a required finding of not guilty, (3) the admission of evidence of prior misconduct, (4) the judge's sua sponte instruction on consciousness of guilt, (5) the Commonwealth's closing argument, and (6) her due process rights. We address each argument in turn.

a. Expert testimony. The defendant contends that the trial judge erred in admitting the expert testimony of the medical examiner, Dr. Joann Richmond, as to the time of death.[8] The defendant also challenges the admission of testimony from Guilianelli, the Commonwealth's paint expert. We address each challenge.

i. Legal background. We begin with the legal standards governing expert testimony. "We review a judge's determination to admit or exclude expert testimony . . . for an abuse of discretion." Commonwealth v. DiCicco, 470 Mass. 720, 729 (2015). The defendant must therefore demonstrate that the judge made "a clear error of judgment in weighing the factors relevant to the decision, such that the decision falls outside the range of reasonable alternatives" (quotation and citation omitted). L.L. v. Commonwealth, 470 Mass. 169, 185 n.27 (2014). Given that the defendant moved to exclude the challenged testimony prior to trial and objected to the testimony during trial, she need only demonstrate that any error was prejudicial to warrant reversal. See Commonwealth v. Rosa, 468 Mass. 231, 239 (2014).

[8] Prior to the second trial, the defendant filed a motion in limine to exclude the testimony, which was denied without a hearing. The defendant renewed her objection at the third trial. The judge overruled the defendant's objection, determining that the issues raised by the defendant related to the weight and credibility of the testimony, not its admissibility.

For expert testimony to be admissible, the proposed witness must be qualified as an expert to testify to a specific subject matter. See Mass. G. Evid. § 702 (2021). "'The crucial issue,' in determining whether a witness is qualified to give an expert opinion, 'is whether the witness has sufficient "education, training, experience and familiarity" with the subject matter of the testimony.'" Commonwealth v. Frangipane, 433 Mass. 527, 533 (2001), quoting Commonwealth v. Richardson, 423 Mass. 180, 183 (1996). "Testimony 'on matters within the witness's field of expertise is admissible' when the testimony concerns matters beyond the common knowledge of the jurors and will aid the jurors in reaching a decision" (emphasis in original). Frangipane, supra, quoting Commonwealth v. Dockham, 405 Mass. 618, 628 (1989). At the same time, however, "a judge's discretion can be abused when an expert witness is permitted to testify to matters beyond an area of expertise or competence." Frangipane, supra.

In addition to whether the proposed expert is qualified, the judge must also determine that the expert testimony is sufficiently reliable to reach the jury. As the proponent of the expert testimony at issue, the Commonwealth "bears the burden of establishing . . . that the methodology or theory underlying the expert testimony is sufficiently reliable." Commonwealth v. Shanley, 455 Mass. 752, 761 (2010). See

Commonwealth v. Davis, 487 Mass. 448, 453 (2021) ("proponent must establish a sufficient foundation for a judge to determine whether the expert's opinion satisfies gatekeeper reliability"); Commonwealth v. Hinds, 487 Mass. 212, 220 (2021), quoting Commonwealth v. DiCicco, 470 Mass. 720, 729 (2015) ("Under the Daubert-Lanigan standard, 'the touchstone of admissibility is reliability'"). See also Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 585-595 (1993); Commonwealth v. Lanigan, 419 Mass. 15, 25-26 (1994). When assessing reliability, a reviewing court may, when appropriate, consider material that was not before the trial judge "to ensure an accurate decision concerning the reliability of scientific evidence." Commonwealth v. Camblin, 478 Mass. 469, 479 (2017).[9] "Although 'our review under this standard is deferential and limited, it is not perfunctory. A judge's findings must apply the correct legal standard to the

[9] In this case, we have considered the affidavit of Dr. Arghavan Louhghalam, which the defendant submitted with her motion for a new trial, as part of our plenary review of the record pursuant to G. L. c. 278, § 33E. See Commonwealth v. Billingslea, 484 Mass. 606, 617 (2020) (plenary review entails review of entire record). Louhghalam is an assistant professor in the civil and environmental engineering department at the University of Massachusetts, Dartmouth. Louhghalam's research focuses on the behavior and response of construction materials (e.g., concrete, ceramics, and steel) under external loading and environmental conditions. She is very familiar with the design of experiments and models to predict how materials will respond to external and environmental conditions. Although we recognize that Louhghalam has not been subjected to any form of cross-examination, and take that into account, we have considered her opinions and incorporate them where relevant.

facts of the case and must be supported by an examination of the record.'" Hinds, supra at 218, quoting Commonwealth v. Patterson, 445 Mass. 626, 639 (2005), overruled on other grounds by Commonwealth v. Britt, 465 Mass. 87 (2013). Simply stated, "[i]f the process or theory underlying [an] . . . expert's opinion lacks reliability, that opinion should not reach the trier of fact." Davis, supra, quoting Patterson, supra.

ii. Time of death testimony. A. Relevant facts. Four of the first responders testified that they touched the victim's body in the basement once they arrived on scene. One paramedic stated that the victim's arms were locked in an unnatural position and that she "was very, very cold, ice cold." The other testified that the victim's wrist was "cold" and "stiff." One of the police officers who moved the body similarly testified that the body was "extremely stiff and very cold," with the other describing the body as "very, very stiff" and observing that her "whole body moved as one unit." The victim's cell phone records from March 29 also shed light on the time of her death . The victim was active on her cell phone throughout the morning. Her last activity on her phone, as referenced supra, was a call she placed at 12:21 P.M.

At trial, Richmond testified to her opinion that the victim's time of death was "six to eight to twelve" hours before the first responders found her. She based this opinion on the

reports of first responders regarding the state of the victim's body, particularly their descriptions of the body as cold and stiff. The first responders did not thoroughly examine the body for rigor mortis or take the body's core temperature; rather, they described their impression of the body's temperature and stiffness when they briefly touched and moved the body.

B. Analysis. The defendant does not dispute that Richmond was qualified to testify as an expert regarding time of death or that time of death estimates are generally admissible. Commonwealth v. Bennett, 424 Mass. 64, 68–69 (1997) ("There is substantial authority establishing the reliability of estimates of time of death by medical examiners, and they need not be proved infallible to be admissible"). Rather, the defendant argues that Richmond's opinion was not based on "sufficient facts or data," and was not "the product of reliable principles and methods" that were "reliably applied . . . to the facts of the case." Mass. G. Evid. § 702. The defendant argues that because no one properly examined the body for rigor mortis, Richmond could not reliably estimate the time of death.[10]

[10] The defendant also argues that because the first responders' descriptions of the body temperature were based on skin contact and not measurement of core temperature, which is generally used to assess the cooling of the body after death (algor mortis), Richmond's reliance on reports of the body being cold was unreasonable, and thus Richmond's opinion was in practice only based on reports of stiffness. For the same

"[G]eneral acceptance in the relevant community of the theory and process on which an expert's testimony is based . . . continues to be sufficient to establish the requisite reliability for admission in Massachusetts courts regardless of other Daubert factors." Patterson, 445 Mass. at 640. See Hinds, 487 Mass. at 217 n.11 (expert testimony may be admitted under general acceptance standard). Four experts testified regarding rigor assessments and time of death in this case, each to the effect that no time of death estimate is precise, an appropriate time of death assessment takes into account all available information, and the quantity and quality of the information available affects the range of the estimate. As the experts explained, it is common for medical examiners to rely on assessments conducted by others, often professional death scene investigators. Richmond's determination that she could place significant weight on the consistent descriptions of the experienced first responders who testified in the instant cases was a decision made within the framework of existing methodology to credit certain available information. As made clear by the experts, time of death estimates may be derived from an assessment of rigor, and that assessment does not have to be completed by the medical examiner herself. The defendant's

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reasons discussed infra, we conclude that this goes to the weight, not the admissibility, of Richmond's opinion.

contention in this case that Richmond's opinion was based on inadequate information goes to the weight and not the admissibility of the testimony. Given Richmond's undisputed qualifications, the data available to her, her reliance on generally accepted methods for estimating time of death, and her application of those methods to the available data, we conclude that the judge did not make "a clear error of judgment in weighing the factors relevant to the decision" to admit Richmond's testimony (quotation and citation omitted). L.L., 470 Mass. at 185 n.27. See Mass. G. Evid. § 702.[11]

This was also not, as the defendant contends, an unreliable application of an established methodology to a new usage. For this argument, the defendant relies on Patterson, 445 Mass. at 628, in which we considered an expert opinion that employed a particular method of fingerprint examination to identify simultaneous impressions, even though that method is usually used for individual impressions. The court concluded that the

[11] The defendant also contends that Richmond improperly gave an initial opinion as to time of death -- which she never changed -- entirely based on a telephone call with State police Detective Jamie Magarian on the night of the victim's death, in which he asked her if it was possible for a body to become "cold as ice" and "stiff as a board" in a matter of hours. This mischaracterizes Richmond's conversation with Magarian. Richmond was very clear in her testimony that she gave Magarian an answer to a specific hypothetical question about rigor mortis that night, but not a time of death opinion as to the victim, and that her ultimate opinion was based on all of the information she later gathered.

judge should not have assumed the method of identification could be reliably applied to a new usage (simultaneous impressions), but rather the judge should have engaged in a fact-specific Lanigan inquiry regarding the reliability of "the particular application of that process." Id. at 645-649. Here, we are not confronted with a new usage or an untested methodology.[12]

iii. Paint testimony. The defendant claims that Guilianelli's testimony should not have been admitted because he was not qualified to testify as an expert and because his testimony lacked sufficient reliability to reach the jury. The defendant also contends that trial counsel's assistance as it related to excluding or countering Guilianelli's testimony was ineffective. As we detail infra, we agree that Guilianelli lacked the necessary expertise to perform the paint analysis here and that his testimony lacked the requisite reliability and therefore should not have been admitted. Moreover, because Guilianelli's testimony was significant and likely swayed the

[12] We do not agree with the defendant that because the first responders lacked professional training in assessing rigor mortis, their reports are so unreliable that an opinion based on them should not be admissible. Although they were not professional death scene investigators, the first responders -- particularly the medical personnel -- were experienced and had previously encountered dead bodies, and some did have specific training on rigor mortis. Given their collective medical experience and qualifications and the consistency of their descriptions, any lack of specific training goes to the weight, and not the admissibility, of Richmond's opinion.

jury's verdict, we conclude that the error was prejudicial, and we therefore vacate the judgment against the defendant. We thus need not resolve the defendant's ineffective assistance of counsel claim.[13]

A. Relevant facts. We begin by describing the state of the crime scene when first responders arrived shortly after 7 P.M. The first officer to arrive testified that he observed the victim lying in "what appeared to be a large pool of pink wet paint and a couple different areas of large pools of blood."[14] He also stated that "there was no coagulation [of the paint] whatsoever" and that he was leaving footprints everywhere as he moved around. The next officer that arrived similarly described the paint as "white paint, fresh, still wet." He explained that the paint "didn't appear dry to [him]" and that he did not see a film on top of the paint. The two paramedics provided similar descriptions. One testified that the paint was "wet" and "shiny" and that "it was all over the place." He also did not notice any film or coagulation on top of the paint. The other

[13] We do note, however, that the expert identified on appeal describes in devastating detail the weaknesses of Guilianelli's methodology. Although these weaknesses are somewhat evident without the benefit of this expert, they are clarified with the expert's assistance.

[14] In his first report, written shortly after the incident, this paramedic described the paint as "spilled white paint" (emphasis added). In his second report, written within days of the incident, he wrote that the paint was pink.

paramedic testified that the "paint appeared to be very wet, fresh-looking." Three of the first responders testified that they did not smell any odor of fresh paint. A State police detective testified that when he went to the basement several hours later, after 9 P.M., he observed "wet fresh paint on the floor and paint on the body as well."

The condition of the basement is reflected in the photographs taken by investigators at the scene. The basement floor appears to be made of concrete. The photographs show a large pool of paint under the victim, with the paint appearing pink in some spots and white in others. There are also a number of footprints and other marks around the paint, as well as several bloodstains. Investigators did not take any measurements of the pools of paint, such as the depth or thickness of the paint. The paint container was found next to a pool of paint, and the lid was found underneath the container. Photographs of a dehumidifier in the basement indicated that the temperature was approximately fifty-five degrees with sixty-five percent humidity.[15]

B. Background and experiments. In April 2014, after the second trial, the Commonwealth sought to determine whether the drying time of the paint could be extrapolated from the change

[15] The dehumidifier was not preserved, so it is unclear whether the temperature and humidity it recorded were accurate.

of the color of the paint on the basement floor. The Commonwealth contacted the company that manufactured the paint and were connected with Guilianelli, a quality engineer at PPG Industries.[16] Guilianelli has a bachelor's degree in chemistry and a minor in physics, and he had worked in the paint industry for twenty years. He described his primary task over the course of his career as developing and formulating paints and coatings. Guilianelli explained that, as part of his work, he would test new paints by looking at how they behave in a can after being stirred and then after being brush- or roll-applied to a surface. When Guilianelli tested new paints, all of the testing was done at three mils, that is, three one-thousandths of an inch.[17]

Although he did not design the paint at issue in this case -- EZ Track paint -- Guilianelli was "very, very familiar" with another paint that was modified to make the EZ Track. He testified that the EZ Track paint is designed for ceilings and has a special dye that makes the paint change from pink when it is applied to white once it has dried. The paint is designed to be applied at a thickness of three mils. At that thickness, the

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[16] PPG Industries is the parent company of Glidden Paint, the company that manufactured the paint.

[17] Guilianelli explained that most paints are applied at six mils wet and dry at three mils.

paint will be dry to the touch and turn white within approximately thirty minutes under ideal drying conditions.

To respond to the Commonwealth's request, Guilianelli decided to perform a series of experiments. He documented each experiment with a series of photographs as well as his personal notes and observations. He noted several over-all conclusions at the end of the experiments. Because these experiments are central to Guilianelli's testimony, we describe them in detail.

In his first experiment, Guilianelli tried to determine if a timeline could be established based on the rate at which the paint cured and the color changed from pink to white. To do this, he (1) poured 127 grams of paint onto a Lanetta chart[18] and (2) applied the paint in varying thicknesses to a different Lanetta chart with a sag bar.[19] The thicknesses of the samples in the sag bar ranged from eight mils to forty mils.[20] He performed this experiment at seventy-five degrees Fahrenheit and

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[18] The chart was a Lanetta CU-1 chart, which is commonly used in the paint industry. It has a sealed surface. Unless otherwise noted, each of the samples was poured onto this type of chart.

[19] Guilianelli explained that a sag bar is a chart that has several parallel "tracks" or "little rivers" allowing for paint at various different thicknesses.

[20] For reference, forty mils is approximately one tenth of one centimeter.

thirty percent humidity.[21] He observed the paint over a period of time and took photographs with varying lighting conditions at varying intervals, ranging from ten minutes to over thirty minutes. From this test, he concluded that (1) poured paint did not show any color change for four hours; (2) an edge formed around the poured paint after approximately fifty minutes, and cracking in the paint began after sixty minutes; and (3) it would be better to analyze the drying timeline based on the cracking pattern of the paint as opposed to the change in color.

In the second experiment, Guilianelli's objective was to determine if a timeline could be established based on the curing properties of EZ Track paint. He poured seven 150-gram samples on a Lanetta chart in a large, walk-in environmental chamber.[22] He also poured an additional sample that he intended to touch to determine when a skin formed over the sample. The chamber was set to sixty-two degrees Fahrenheit and forty-three percent humidity. As he did before, Guilianelli observed the samples at various intervals and documented the experiment with

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[21] As set forth supra, the temperature and humidity reading on a dehumidifier in the basement was different: fifty-five degrees with sixty-five percent humidity.

[22] Guilianelli poured the second sample one hour after he poured the first and repeated this sequence for all seven samples.

photographs.[23] From this experiment, Guilianelli concluded that "[d]rying patterns did start to emerge . . . . The edge of the [sample] started to dry around [thirty] minutes. Cracking started around [ninety] minutes and was very prevalent at 120 minutes. A dulling of the surface from drying and skinning starts about [thirty] minutes."

In the third experiment, Guilianelli poured a single sample of 300 grams of paint onto a Lanetta chart and placed the chart into a different environmental chamber set to fifty degrees Fahrenheit and seventy percent humidity.[24] During the experiment, Guilianelli noted that the chart had bowed such that the edges were elevated and the paint had pooled towards the center of the chart. Guilianelli concluded that the increased humidity resulted in the color of the paint staying pink longer. He also concluded, "Edge starts to form around [forty-five] minutes. Cracks along edge start to form at [ninety] minutes. . . . Rapid changes [sic] the appearance of the coating

[23] The photographs of the experiments appear to have been taken from different heights and angles and under differing lighting conditions. In some photographs, there is a visible glare or reflection. Conversely, some photographs have shadows over the samples.

[24] The chamber used in the third, fourth, fifth, and sixth experiments was smaller than the one used in the second experiment.

happened between [two] and [five] hours. These changes can be used as markers to determine the dry time in other photos."

The fourth experiment largely replicated the third experiment, with the only apparent change being that Guilianelli used clips to prevent the chart from bowing as it had in the third experiment. Guilianelli also noted that in this experiment his observations "focus[ed] on the curing that occurs along the edge of the coating." He concluded, "Edge starts to form between [thirty] and [sixty] minutes. Cracks along the edge start to form at [ninety] minutes. Cracks in the center of the paint film showing up at 120 minutes. Cracking throughout the film at 150 minutes. Very noticeable cracking throughout the film at 180 minutes. Severe cracking seen at 240 minutes."

The fifth experiment involved two separate samples. The first used the same parameters as the fourth experiment. The second sample was an unknown quantity of paint poured into a cookie tray of unknown dimensions lined with aluminum foil and placed into the chamber with the first sample. The purpose of the second sample was to "show what happens to EZ Track paint if it was to pool in a depression." For the first sample, Guilianelli observed the same pattern as he had in the fourth experiment, with the edge forming between thirty and sixty minutes and cracking progressing from ninety to 240 minutes. For the second sample, Guilianelli observed that the sample

"started to crack between [thirty] and [sixty] minutes. Severe cracking by hour [two]."

In the sixth experiment, Guilianelli poured 500 grams of paint onto a chart and placed it into the environmental chamber set to fifty-five degrees Fahrenheit and sixty-five percent humidity.[25] The chart was "taped down on a cement block" to "more closely mimic the environment in question." Guilianelli also placed a "panel . . . above the CU-1 chart to minimize the airflow coming in contact with the paint." Guilianelli did not record any conclusions from this last experiment.

Guilianelli drew several over-all conclusions from these experiments. First, he concluded that "[d]ulling of the paints [sic] surface happens around [thirty] minutes." Next, he concluded, "The edge of the paint starts to dry first. This causes a ridge of dry paint at the outer most edges of the spill. This starts to form between [thirty] minutes and [sixty] minutes. A defined edge is prevalent at [ninety] minutes." As to cracking, he concluded, "Edge [c]racking starts to show between [sixty] and [ninety] minutes. It becomes prevalent at 120 minutes." Finally, he concluded, "Cracking starts to show in the middle of the paints [sic] surface around 120 minutes.

[25] This was the temperature and humidity displayed on the dehumidifier in the basement.

Become [sic] prevalent around 150 minutes and is [e]xtremely noticeable at 180 minutes."

C. Pretrial procedure. On June 23, 2014, the Commonwealth notified the defendant that it intended to call Guilianelli as an expert witness. It indicated that Guilianelli would testify about the chemical composition and properties of the paint and "the manner and pace at which it dries in specific atmospheric conditions." It also indicated that Guilianelli may offer an opinion as to the quantity of paint and how long before the crime scene photographs were taken that the paint had been poured or spilled. On July 15, the Commonwealth sent the defendant the photographs and notes that Guilianelli took during his experiments.

On May 2, 2016, the defendant filed a motion in limine to exclude Guilianelli's testimony. The defendant's arguments focused on the differences between the conditions at the crime scene and the conditions under which Guilianelli conducted his experiments. Drawing on his experiments, Guilianelli then produced a report in late May 2016. In the report, Guilianelli offered four opinions, two of which are relevant here.[26] First, Guilianelli opined that "the paint was intentionally poured

[26] Guilianelli's first two opinions -- that the paint in the can was homogenous except for the dye, and that there was approximately one gallon of paint in the container before it was applied to the floor -- are not directly challenged.

rather than being knocked over, dropped, or otherwise spilled." Relying on the crime scene photographs, Guilianelli highlighted six factors that led to this conclusion: "the paint flow, the position of the container atop the lid, the position of the handle, the lack of spatter, the lack of fresh paint on the lid, and the paint ending up on top of certain surfaces with evidence of a controlled turn." Additionally, Guilianelli opined that "the paint was poured within a half hour of the first responders arriving on scene." In reaching this opinion, he relied on his experiments, the observations made by first responders, and his review of the crime scene photographs. In particular, he explained that he felt "very strongly" that the paint was poured within two and one-half hours before the photographs were taken. First responders arrived at the house at approximately 7:15 P.M., and the first photograph of the scene appears to have been taken at 9:18 P.M. He also concluded that the paint was applied no more than four hours before the photographs were taken, or roughly 5 P.M.

On July 7, after reviewing Guilianelli's report, the defendant filed a supplemental memorandum of law in support of her motion in limine arguing that Guilianelli's testimony failed to satisfy the Daubert-Lanigan reliability standard because his testimony was "nothing more than anecdotal observations that have not been tested by the scientific method." In support of

these arguments, the defendant submitted the affidavit of Dr. Otto Gregory, a chemical engineer with substantial experience with paints.[27] Gregory stated that Guilianelli's conclusions were "not the result of scientific methodology" but rather were "simply anecdotal observations." Gregory explained that very little of Guilianelli's work "was the product of any experimentation" and that "those experiments fail to take into account many unknowns and . . . are based on false assumptions." Gregory spelled out how Guilianelli's conclusion that the paint was poured was not "based on scientific study." For example, Gregory pointed out that Guilianelli's reliance on the position of the lid under the container was "nothing more than speculation and has not been tested by means of a scientific method." Gregory also raised concerns about Guilianelli's failure to control for airflow in his experiments and at the crime scene as well as the assumptions that Guilianelli made about the homogeneity of the paint.

Shortly before trial, the trial judge denied the defendant's motion in limine to exclude the paint testimony without first conducting a Daubert-Lanigan hearing. This was done after the Commonwealth and the defendant both agreed that the judge could decide the defendant's motion in limine on the

[27] Gregory is a personal friend of the defendant's parents.

papers filed and did not need to conduct an evidentiary hearing. The trial judge concluded that "Guilianelli's drying-test and pour/spill observations and his conclusions are the product of his professional experience with paint in general, and with the . . . paint at issue, and that they are based on reliable principles and methods that he applied to the relevant facts of this case." The trial judge's only further explanation for what made Guilianelli's experiments "based on reliable principles and methods" was that "[i]t appears that the conditions he utilized in his studies were in general sufficiently similar to conditions in the basement on the evening of March 29, 2010, so as to make his observations and conclusions of value to [the] jury." The judge determined that criticisms of the experiments went not to the admissibility of the evidence but to its weight and therefore were properly raised on cross-examination.

D. Testimony. At trial, Guilianelli testified in detail about the properties of paint generally and this particular paint. He then described his experiments, sharing many of the details and findings listed in his notes and his report. He told the jury that the paint was applied to the floor "within approximately [thirty] minutes of the time the first responders arrived." He explained that this opinion relied on the consistent descriptions of the paint as wet and shiny by various first responders. He also relied on the crime scene photographs

depicting the paint in the basement. He pointed to the lack of any dry edge in multiple photographs as well as limited evidence of cracking and wrinkling in the photographs as consistent with what he saw in his experiments after approximately two hours. Guilianelli also testified that the paint was not spilled but was intentionally poured by someone based on the same reasons he provided in his report.

Guilianelli acknowledged that this area was "a new realm" for him, as he had never before poured paint and watched it as it dried. On cross-examination, he acknowledged that he also had never before testified regarding the use of the dulling, cracking, and wrinkling of paint to estimate when the paint was applied, nor was he aware of anyone else in the paint industry who had done so. He also acknowledged that he had never read any scholarly or industry articles regarding estimating drying time based on the edge of a pool of paint or the wrinkling and cracking of the paint's surface.[28]

E. Analysis. As detailed supra, the defendant contends both that Guilianelli was not qualified to offer this expert testimony and that Guilianelli's testimony was not based on sufficiently reliable methods. Although we have serious doubts about whether Guilianelli was qualified to offer this testimony,

[28] Guilianelli does not refer to any reference materials in his report or testimony.

we need not resolve that issue, as it is clear that his experiments here were not based on sufficiently reliable methods.[29]

As the proponent of the expert testimony at issue, the Commonwealth "bears the burden of establishing . . . that the methodology or theory underlying the expert testimony is sufficiently reliable." Shanley, 455 Mass. at 761. Typically, reliability is assessed using the familiar Daubert-Lanigan

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[29] The precise question is whether Guilianelli possessed "sufficient 'education, training, experience and familiarity'" to determine forensically when and how the paint was applied to the basement floor and the victim's body based on the information he was provided. See Frangipane, 433 Mass. at 533, quoting Richardson, 423 Mass. at 183. At the time of trial, Guilianelli had worked in the paint industry as a chemist for twenty years, developing and testing new paints for their ordinary uses. There is a significant distinction, however, between what Guilianelli had done in the paint industry for over twenty years and what the Commonwealth asked him to do in this case. What testing Guilianelli had done appears to be at very low thicknesses on sealed surfaces. There is nothing in the record to suggest that he had the education, training, or experience to develop experiments to test paint in other vastly different circumstances. Designing paints and observing what happens when they dry at three one-thousandths of an inch on a sealed chart is an entirely different exercise from forensically analyzing the drying patterns of large pools of paint found below and on top of a dead person and spread about a concrete floor. Guilianelli testified that he had never done an experiment like this before, nor had anyone in his company. He had never testified about paint drying in any court proceeding and was not aware of any other instance of such testimony. He also did not do any research on the topic or search for any academic or industry materials on this topic. That Guilianelli had worked in the paint industry for twenty years and was involved with the design and production of the paint at issue here does not mean that he was qualified as an expert witness on any topic related to paint.

factors or the general acceptance test.[30] See Davis, 487 Mass. at 454; Hinds, 487 Mass. at 217 & n.11. We have also recognized that "[d]iffering types of methodology may require judges to apply differing evaluative criteria to determine whether scientific [or technical] methodology is reliable." Canavan's Case, 432 Mass. 304, 314 n.5 (2000). "A judge has 'broad discretion' to weigh [the Daubert-Lanigan] factors and to apply varying methods to assess the reliability of the proffered testimony, depending upon the circumstances of a particular case . . . ." Commonwealth v. Camblin, 478 Mass. 469, 476 (2017), quoting Palandjian v. Foster, 446 Mass. 100, 111 (2006).

Expert testimony also may be based on or informed by the results of experimentation. "Whether testimony as to experiments shall be admitted must be largely left to the discretion of the trial judge, and that discretion will not be interfered with unless in its exercise [the judge] clearly appears to be wrong." Griffin v. General Motors Corp., 380 Mass. 362, 365 (1980). The conditions in the experiments must nonetheless be "substantially similar" to those at the crime

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[30] "The five nonexclusive factors are 'whether the scientific theory or process (1) has been generally accepted in the relevant scientific community; (2) has been, or can be, subjected to testing; (3) has been subjected to peer review and publication; (4) has an unacceptably high known or potential rate of error; and (5) is governed by recognized standards.'" Davis, 487 Mass. at 454, quoting Commonwealth v. Powell, 450 Mass. 229, 238 (2007).

scene for the experiments to be of any value. Id. at 365-366. And "[w]here new hard science is involved, an appellate court will always take a hard look at the trial judge's decision to admit or exclude the evidence." Canavan's Case, 432 Mass. at 317 (Greaney, J., concurring). See Commonwealth v. Weaver, 474 Mass. 787, 811 (2016), aff'd, 137 S. Ct. 1899 (2017) ("Our case law demonstrates that when expert testimony as to a novel or developing area of science is offered, the court carefully considers whether it is sufficiently reliable to reach the trier of fact" [quotation and citation omitted]).

Our analysis of Guilianelli's approach begins with the important principle that judges should closely scrutinize expert testimony where the testimony is "prepared solely for purposes of litigation, as opposed to testimony flowing naturally from an expert's line of scientific research or technical work." Johnson v. Manitowoc Boom Trucks, Inc., 484 F.3d 426, 434 (6th Cir. 2007). See 2000 Advisory Committee Note to Fed. R. Evid. 702, quoting Daubert v. Merrell Dow Pharms., Inc., 43 F.3d 1311, 1317 (9th Cir.), cert. denied, 516 U.S. 869 (1995) (courts should consider as part of their reliability analysis whether experts are "proposing to testify about matters growing naturally and directly out of research they have conducted independent of the litigation, or whether they have developed their opinions expressly for purposes of testifying").

Guilianelli's experimentation and trial testimony had little relation to his professional work. As set forth supra, Guilianelli testified that he had never done an experiment like this before, nor had anyone in his company. He had never testified about paint drying in any court proceeding and was not aware of any other instance of such testimony. He also did not do any research on the topic or search for any academic or industry materials on this topic.[31] Rather than flowing naturally from his work, therefore, his experiments greatly differed from the work he ordinarily performed and the observations he had experience making, and his opinions were developed solely to assist the Commonwealth's prosecution of the defendant. See Kumho Tire Co. v. Carmichael, 526 U.S. 137, 152 (1999) (objective of Daubert's gatekeeper requirement "is to make certain that an expert, whether basing testimony upon professional studies or personal experience, employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field").

Relatedly, the Commonwealth has not pointed to any basis in existing scientific literature or research for Guilianelli's

[31] Because Guilianelli conceived of and designed the experiments without any stated basis in existing science or literature, and because neither the Commonwealth nor the trial judge applied the Daubert-Lanigan factors, it would make little sense to attempt to apply them here.

methodology or experiments. Instead, it appears that Guilianelli designed these experiments on his own without any guidance. We are not aware of any case in which expert testimony relating to the drying time of paint in this manner was admitted. This further erodes the reliability of his testimony. See Kumho Tire Co., 526 U.S. at 157 ("We have found no indication in the record that other experts in the industry use [the method] or that [other experts] normally make the very fine distinctions about, say, the symmetry of comparatively greater shoulder tread wear that were necessary, on [the expert]'s own theory, to support his conclusions. Nor, despite the prevalence of tire testing, does anyone refer to any articles or papers that validate [the expert]'s approach").

Guilianelli's experiments also do not appear to have been performed consistently with basic scientific principles. See Hinds, 487 Mass. at 221 ("experts in the 'hard sciences' primarily base their findings on repeatable experiments conducted under controlled conditions"). See also National Research Council, Strengthening Forensic Science in the United States: A Path Forward 111 (2009) (NAS Report) ("Adherence to scientific principles is important for concrete reasons . . . . The reliability of forensic science methods is greatly enhanced

when those principles are followed").[32] Critically, he never attempted to measure the thickness or depth of the paint at the crime scene, which Dr. Arghavan Louhghalam, see note 9, supra, submitted was actually the most important variable when assessing the drying and curing time of paint.[33] Guilianelli's experiments also did not take into account the surface upon which the paint was found, a dead body and concrete, as opposed to a sealed chart.[34] He also did not account and control for the disturbances in the paint caused by the defendant and first responders. To the extent he considered temperature and humidity, he was dependent on the accuracy of the readings at the crime scene, which were not verified. In most of his

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[32] Both Gregory and Louhghalam identified numerous flaws with Guilianelli's experiments and criticized his approach for not following the scientific method. And while not available to the trial judge, the Center for Integrity in Forensic Science submitted an amicus brief arguing that Guilianelli's testimony was flawed forensic science.

[33] Guilianelli acknowledged that the thickness of the paint affects drying time.

[34] In one experiment, Guilianelli taped the Lanetta chart to a random "concrete slab" in order to "best mimic the floor at the crime scene." As Louhghalam pointed out, this makes no sense. There were no Lanetta charts taped to concrete found at the scene. Guilianelli himself explained that the charts are sealed substrates, so very little water would be absorbed into the chart, rendering whatever to which the chart was taped a seemingly irrelevant consideration. If Guilianelli wanted to account for the conditions at the crime scene, he should have, at the very least, poured the paint onto concrete, not a sealed chart taped to concrete.

experiments he did not even use the temperature and humidity reflected in these readings. In sum, Guilianelli's experiments did not account or control for many important conditions at the crime scene. Failing to control for, or even attempt to measure, potentially significant variables seriously undermines the reliability of testimony derived from experimentation. Hinds, 487 Mass. at 221 (experts in hard sciences control conditions for experiments). See, e.g., Muñoz v. Orr, 200 F.3d 291, 301 (5th Cir.), cert. denied, 531 U.S. 812 (2000), citing Tagatz v. Marquette Univ., 861 F.2d 1040, 1045 (7th Cir. 1988) (emphasizing significance of expert's failure to control for or account for important or explanatory variables).

Furthermore, given the novelty of his experiments, that Guilianelli did not repeat or validate any of his six experiments is also significant. See NAS Report, supra at 112 ("Typically, experiments or observations must be conducted over a broad range of conditions before the roles of specific factors, patterns, or variables can be understood"). Louhghalam explained that the more reliable scientific approach would have been for Guilianelli to "repeat the experiment at each thickness, temperature and humidity level and report the average and standard deviation of the measured times." Louhghalam noted that, without such repetition, it is not possible to know whether the measurement is accurate, an outlier, or the product

of some other influence, as "small sample sizes usually lead to poor prediction performance." Guilianelli instead treated the outcomes of a series of isolated experiments as conclusive as to the drying time of paint. His failure to control for important variables and attempt to repeat or validate his findings further undermines the reliability of his opinions.

Finally, Guilianelli's findings and conclusions were also largely subjective. See NAS Report, supra at 124 ("The goal is to make scientific investigations as objective as possible so the results do not depend on the investigator"). For example, one of Guilianelli's conclusions from his experiments was that "[d]ulling of the paints [sic] surface happens around [thirty] minutes," and he testified at trial that paint goes from being shiny to being more dull and less shiny after approximately thirty to forty-five minutes. But, as Louhghalam attests, how shiny or dull paint appears is influenced by the location of the person viewing the paint and the lighting conditions, making it highly subjective.[35] Guilianelli's conclusions also relied heavily on the subjective descriptions of the paint provided by the first responders as well as his own subjective

[35] Louhghalam attempted to illustrate the subjective nature of describing a surface as shiny or dull by pointing to a photograph of the second experiment. One photograph showed two samples of the same quantity that were poured at the same time, but one of the samples appears to be noticeably "shinier" than the other.

interpretation of the photographs from the crime scene. His opinion was based essentially on his comparison of their subjective observations of the crime scene with his own subjective observations of the crime scene photographs. He then compared these subjective observations with his still subjective observations of a set of experiments that did not replicate the reality of the crime scene. This is not a reliable methodology for expert testimony.

In sum, Guilianelli's testimony lacked most if not all of the features of reliability that are necessary for the expert testimony to be admissible at trial. Guilianelli's testimony did not satisfy either the general acceptance test or the Daubert-Lanigan standard, and we see no other "evaluative criteria" that suggest his methodology is reliable. See Shanley, 455 Mass. at 761; Canavan's Case, 432 Mass. at 314 n.5. See also Kumho Tire Co., 526 U.S. at 154-155. Therefore, it was an abuse of discretion to permit the Commonwealth to introduce this testimony.

We also conclude that it was error for Guilianelli to testify to his opinion that the paint was poured and not spilled. None of Guilianelli's experiments attempted to distinguish between poured paint and spilled paint. Rather, his testimony was based solely on his interpretation of the crime scene photographs and his personal experience with spilled

paint. He identified six reasons in his report and his testimony as the basis for his opinion. At least two of those reasons -- that the handle of the container was in a certain position and that the container was resting on the lid on the floor of the basement -- have no apparent basis in any "scientific, technical, or other specialized knowledge." See Mass. G. Evid. § 702.[36]

Although Guilianelli's other four reasons -- that there was no wet paint on the lid, that the flow patterns on the basement floor suggest a "controlled pour," the patterns of flow visible on the container, and the absence of spatter on the basement floor -- appear to have some potential scientific basis, Guilianelli made no attempt to use experimentation or other

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[36] The fact that the container was found atop the lid in the crime scene photographs does suggest that it was placed there, but that is not based on any expert analysis, as this would be obvious to lay observers as well as an expert. The question is when and by whom. Guilianelli testified that if the container was knocked over, the lid would have been in front of the container, so the paint must have been poured. Crucial to Guilianelli's conclusion is the assumption that the container was not moved. However, there are a number of possible explanations, as the container could just as easily have been accidentally or deliberately moved at some point before the photographs were taken. At least four first responders walked around the victim's body near or through the paint, and the defendant told a detective that she moved the victim's body when she got to the basement. This was not a well-controlled crime scene, to say the least. As a result, these observations appear to be little more than lay supposition and guesswork by Guilianelli. For the same reasons, the position of the handle is also not a proper subject for expert testimony.

methods to determine whether the paint was poured or spilled. Instead, he simply relayed his past experiences working with and around paint and drew conclusions therefrom. See Commonwealth v. Franceschi, 94 Mass. App. Ct. 602, 610 (2018) ("While training and experience, to which [the expert] referred, might have taught [the expert] a methodology, it is not itself a methodology").

For example, regarding the absence of paint on the lid, Guilianelli testified that the photographs of the lid indicated to him that the lid had been removed before the paint was spilled. He stated that he would expect to see wet paint on the lid if the lid had been on when the paint spilled. Louhghalam agreed with Guilianelli that the absence of paint on the lid would suggest that the lid had been removed beforehand. But Louhghalam pointed out that she could not determine from the photographs whether there was in fact any paint on the lid or when the photographs of the lid were taken. As such, Louhghalam noted that there was not adequate information on which Guilianelli could base his opinion. As a result, the basis for Guilianelli's personal observations regarding the lid appears to be subjective and questionable, and not based on experimentation or technical knowledge.

Similarly, Guilianelli testified on cross-examination that the lack of a spatter pattern indicated that the paint was not

kicked or dropped because "[w]hen you kick [the paint container] or something, it's going to spatter." Defense counsel responded by asking, "How do you know that?" to which Guilianelli answered, "Because I've dropped paint before." Without any experimentation or research, however, there is no way for Guilianelli to assert reliably that the absence of spatter here indicates whether the paint was spilled or poured. Gregory stated in his affidavit that "[t]he pouring and the spatter or lack thereof . . . that [Guilianelli] refers to is essentially a problem in fluid mechanics that has not been tested by means of a scientific method." And, as Louhghalam pointed out, the flow of the paint could have covered any spatter, as paint can move "in different shapes or directions." The same is true for Guilianelli's observations regarding a "controlled turn" and flow patterns on the floor. Louhghalam added that paint can flow in any direction and that its flow depends on variables like the slope and topography of the surface it is on. Yet, Guilianelli made no attempt to measure or account for these variables in the basement. Again, the lack of any attempt by Guilianelli to measure or control for these variables, and instead simply offering an opinion after reviewing crime scene photographs, demonstrates the subjectivity and unreliability of this methodology, rather than its expert basis.

Guilianelli's testimony is thus precisely the type of speculation, even from a qualified expert, that should not be admitted. Aleo v. SLB Toys USA, Inc., 466 Mass. 398, 406 (2013), quoting Sevigny's Case, 337 Mass. 747, 751 (1958) ("Expert opinion testimony may be excluded 'where it amounts to no more than mere speculation or a guess from subordinate facts that do not give adequate support to the conclusion reached'"). Guilianelli claimed no scientific or technical basis for this opinion and offered little more than his own anecdotal experience to support it. Recognizing as much, the judge sustained several objections during the direct examination as Guilianelli was setting forth his opinion and came close to striking this portion of the testimony during trial sua sponte.[37] Guilianelli therefore again lacked a sufficiently reliable methodology for concluding that the paint was intentionally poured. See Shanley, 455 Mass. at 761.

Because the defendant sought to exclude Guilianelli's testimony and objected to it at trial, we must determine whether

[37] During the cross-examination of Guilianelli, after asking counsel to come to sidebar, the judge stated, "I don't want to be frank but I'm having great difficulty understanding how this witness can or should be testifying about this paint spilled versus paint poured hypothesis and it just seems as though the hole keeps getting dug deeper and deeper and deeper. And my inclination is to strike at least that portion." The judge ultimately decided to let the cross-examination continue and did not strike the testimony.

the error was prejudicial. See Commonwealth v. Cruz, 445 Mass. 589, 591 (2005). "An error is not prejudicial only if the Commonwealth can show 'with fair assurance . . . that the judgment was not substantially swayed' by it." Commonwealth v. Martin, 484 Mass. 634, 647 (2020), cert. denied, 141 S. Ct. 1519 (2021), quoting Commonwealth v. Rosado, 428 Mass. 76, 79 (1998). The admission of Guilianelli's testimony was clearly prejudicial. He testified that the paint was intentionally poured by someone approximately thirty minutes before the first responders arrived. Considering the testimony from the various medical examiners that the victim had likely died earlier in the day, the testimony that someone had intentionally poured the paint just before first responders arrived was very strong evidence of the defendant's guilt. Indeed, the Commonwealth heavily emphasized the significance of Guilianelli's testimony in its closing argument, arguing that "there can be no question that paint was intentionally poured, deliberately poured on the body" and that "there's no way that if that body had been killed at the same time the paint had been poured, that paint would be fresh and wet and liquidy when first responders got there." The Commonwealth then tied this testimony to the defendant's efforts to cover up the murder, arguing that "nobody but the defendant would have a reason to pour that paint." Indeed, if the jury credited Guilianelli's testimony about the timing of the

intentional pouring of the paint, the evidence showed that the defendant was likely the only person who could have poured the paint on the victim. And the time of death evidence established that the victim would have been dead at the time the paint was poured. Guilianelli's testimony, therefore, was extremely powerful evidence of the defendant's guilt. Moreover, the significance of this evidence was accentuated when the judge sua sponte instructed the jury that it could consider evidence that the defendant "may have altered the scene . . . in the basement" as evidence of consciousness of guilt. We also find it significant that there was no expert testimony regarding the paint admitted at the first two trials, each of which ended with hung juries. This suggests that the expert testimony may have been a significant factor for the jury. Accordingly, the error was prejudicial, and we vacate the judgment against the defendant.[38]

b. Remaining issues. We address several other claims that may arise in a potential retrial.[39]

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[38] Because we have concluded that the error was prejudicial for these reasons, we need not address the comments made by a juror in a posttrial televised interview.

[39] Because they may not arise on retrial, we do not address the defendant's claims related to the judge's sua sponte consciousness of guilt instruction and the Commonwealth's closing argument. We note, however, that the consciousness of guilt instruction accentuated the focus in the instant case on the paint evidence, particularly the intentional pouring of the

i. Motion for required finding. The defendant argues that the judge erroneously denied her motion for a required finding of not guilty at the close of the Commonwealth's case. She argues that the Commonwealth needed to prove that the victim was killed before the defendant left the home, which she told investigators had been around 3 P.M. Essentially, the defendant argues that there was insufficient evidence to convict her. She therefore must show that, viewing the evidence in the light most favorable to the Commonwealth, no "rational trier of fact could have found the essential elements of the crime beyond a reasonable doubt" (citation omitted). Commonwealth v. Latimore, 378 Mass. 671, 677 (1979).

Applying the Latimore standard, we concluded after the defendant's second trial that the Commonwealth had presented sufficient evidence to convict the defendant. See Rintala v. Commonwealth, 473 Mass. 1018, 1018 (2016). As we explained, id. at 1019,

> "the evidence against [the defendant] was sufficient to permit the jury to conclude that she strangled the victim in the basement of their house. Based on the state of the victim's body at the time she was found by first responders, the testimony of the Commonwealth's medical expert, the activity on the victim's cellular telephone (and the abrupt stoppage thereof), and [the defendant]'s own statements, the jury could rationally conclude that, at the time that the victim was killed, she and [the defendant] were the only adults in the house. There also

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paint, making the erroneous admission of Guilianelli's testimony particularly prejudicial.

> was evidence suggestive of an attempt to compromise the crime scene shortly before first responders arrived, of a tumultuous relationship between [the defendant] and the victim, and of [the defendant]'s consciousness of guilt."

The evidence in this case largely mirrored that of the prior trials. Therefore, the defendant's motion for a required finding was properly denied.

ii. Evidence of marital strife. The defendant challenges the admission of evidence of various instances of past marital strife between the defendant and the victim. She argues that the evidence should not have been admitted because it was irrelevant, too remote in time, and cumulative such that it was unfairly prejudicial. The Commonwealth introduced evidence of several incidents that occurred between September 2008 and May 2009. This included evidence that the defendant was arrested for assault and battery after the victim spoke with the police, evidence that the defendant and victim obtained restraining orders against one another, and evidence that the defendant and victim initiated divorce proceedings against each other. We review the decision to admit this evidence for abuse of discretion. Commonwealth v. Denton, 477 Mass. 248, 250 (2017).

It was not an abuse of discretion for the judge to admit this evidence. The evidence was relevant and admissible to show motive and the hostile nature of the relationship between the defendant and the victim. See, e.g., Commonwealth v. Butler,

445 Mass. 568, 575-576 (2005) (prior bad act evidence admissible to demonstrate hostile relationship). See also Commonwealth v. Cheremond, 461 Mass. 397, 410 (2012) (evidence of abuse prevention order admissible to show status of marital relationship and motive to kill spouse). Moreover, the evidence was not too remote, as the incidents all occurred within approximately eighteen months of the homicide. See Commonwealth v. Facella, 478 Mass. 393, 405-406 (2017). See also Commonwealth v. Keown, 478 Mass. 232, 243-244 (2017), cert. denied, 138 S. Ct. 1038 (2018) (prior bad acts occurring in 2002 and 2003 not too remote from 2004 homicide). The prejudice to the defendant was also mitigated to some extent because the defendant was permitted to introduce ample evidence that the defendant and victim had a positive relationship and had reconciled. Finally, the judge properly instructed the jury both during testimony and in her final instructions that they were only to consider the evidence as evidence of the hostile nature of the relationship between the defendant and victim or the defendant's state of mind, intent, or motive. See Commonwealth v. Walker, 442 Mass. 185, 202-203 (2004). There was no error in the admission of this evidence.

iii. Due process. The defendant argues that the Commonwealth's "approach to the third trial" violated the double jeopardy clause of the Fifth Amendment to the United States

Constitution and denied the defendant due process. She argues that the Commonwealth's retention of Guilianelli and the strategic decision by the Commonwealth not to call two important fact witnesses at the third trial violated the defendant's due process rights because "[p]rosecutors cannot be permitted to revise their case after every mistrial until they find a successful mix of evidence to obtain a conviction."

Double jeopardy does not prevent the defendant from being retried if the Commonwealth presents sufficient evidence to convict the defendant of the charged offense but the case ends with a hung jury. Commonwealth v. Phim, 462 Mass. 470, 473-474 (2012). As we explained supra, the Commonwealth has presented sufficient evidence to convict the defendant. We are not aware of any case in which we have held that the Commonwealth's decision to alter its trial strategy after a hung jury implicates a defendant's double jeopardy or due process rights. It is hardly surprising that the Commonwealth sought to retain an additional expert and chose to alter its trial strategy after two hung juries. These decisions do not violate the defendant's constitutional rights.

3. Conclusion. We vacate the judgment entered against the defendant, set aside the verdict, and remand this matter to the Superior Court for a new trial.

So ordered.