Supreme Court of Florida

No. SC92975

JOSEPH J. RAMIREZ,
Appellant,

vs.

STATE OF FLORIDA,
Appellee.

[December 20, 2001]

REVISED OPINION

SHAW, J.

We have on appeal the judgment and sentence of the trial court imposing the death penalty on Joseph J. Ramirez following his third trial for the first-degree murder of a night courier. We have jurisdiction. Art. V, § 3(b)(1), Fla. Const. We reverse the convictions and vacate the sentences for the same reason as before–i.e.,

the trial court erroneously admitted evidence based on the knife mark identification procedure of Robert Hart.

I. FACTS

This is an appeal following the third trial of Ramirez for a 1983 murder.[1] The prior reversals were based on the trial court's admission ("For the first time in the history of the Florida courts," as the first trial court put it) of testimony by Miami crime technician Robert Hart wherein he stated that, based on his knife-mark identification procedure, Ramirez's knife was the murder weapon to the exclusion of all others. The facts underlying the first trial are set forth in Ramirez v. State, 542 So. 2d 352 (Fla. 1989) (Ramirez I):

> The relevant facts are as follows. Early Christmas morning in 1983, the body of a twenty-seven-year-old woman was discovered in the Miami Federal Express building where she worked as a night courier. She had died of multiple stab wounds to her body and blunt trauma to her head. Additional injuries included cuts on her hands and back and one stab wound into her chest cartilage. At the scene, police found blood spatters and pools throughout the dispatch area and break room indicative of a struggle. A bloody paper napkin and bloodstained fragments of a missing sixty-seven-pound telex machine were also discovered. The hot water faucet in the women's restroom was turned on full force. One truck had been tampered with and one of the loading bay doors was unlocked. The desk of an employee who sold

[1] Each of the three trials was conducted by a different judge.

jewelry had been opened, and a mail bag containing approximately $430 was missing. A hair was discovered on the victim's hand. Experts compared hair samples taken from Ramirez with that hair and determined that the hair found on the victim's hand did not belong to Ramirez.

The police discovered a bloody fingerprint on a doorjamb near the victim's body. From a photograph of the patent partial left thumbprint, a technician found ten points of similarity. Despite the fact that only approximately ten percent of the fingerprint area was discernible, the technician positively identified the fingerprint as belonging to Ramirez, an employee of an independent janitorial company which serviced the Federal Express offices. Based upon the fingerprint identification, Ramirez was arrested and charged with first-degree murder.

Police investigation established that Ramirez had cleaned the Federal Express office on the afternoon of December 24. A week earlier, on December 17, the victim was unable to locate her keys to the building and had duplicates made. The lost keys were never found. . . . Ramirez inquired about the amount of revenues coming in and was told by the supervisor that they had a good business. Several people including Ramirez were also working in the area that day when the money was counted and placed in the mail bag.

[Ramirez's] girlfriend testified that at approximately 6:00 p.m. on Christmas Eve Ramirez returned to their residence. She stated that Ramirez left at around 9:00 p.m. in her Renault automobile to visit the home of some friends and that he was wearing a navy blue sweater with a fox emblem on the front. He remained at his friends' home until approximately 11:00 p.m. The appellant's girlfriend testified that Ramirez had returned home at some time during the night, but that she had not noted the time. However, when she arose at 5:30 a.m., Ramirez

was at home. From the time Ramirez left his friends' home until sometime in the early hours of Christmas Day, his whereabouts were unknown.

When asked to produce the clothing he wore on Christmas Eve night, Ramirez told police the sweater he had worn was at Alvarez Cleaners, but the police were unable to locate a dry-cleaning establishment of that name. An inquiry of other dry cleaners in the area did not turn up the sweater. On December 28, Ramirez volunteered to the police a sweater he claimed to have worn Christmas Eve. The sweater was devoid of any emblem. Ramirez claimed the fox emblem had fallen off in the wash. When the police arrested Ramirez on December 28, they found a department store sales receipt in his wallet which indicated he had purchased the sweater that day. A store employee remembered selling Ramirez the sweater because she noticed his expensive watch. According to his girlfriend, Ramirez had purchased the watch on December 26. His old watch, found in the bedroom of his residence, appeared to have traces of blood on the band.

In the search of the Renault, police found a knife which Ramirez's girlfriend kept in the car for protection. The girlfriend testified that after Christmas she had found the knife in her kitchen sink and washed it. Her daughter returned the knife to the Renault when Ramirez, while cleaning the car, requested it to cut some string. Traces of some type of blood were detected on the knife, but in insufficient amount to determine their origin. No blood stains were detected on either Ramirez's sneakers or the pants he purportedly wore on the night of the murder. A police technician, who was qualified as a tool mark expert, testified that the knife found in the trunk of the Renault was the specific knife which produced the victim's chest wound.

Id. at 352-54.

Hart's specific knife mark identification evidence played a crucial role in the trial:

> The trial court allowed the expert to state, "The result of my examination made from the microscopic similarity, which I observed from both the cut cartilage and the standard mark, was the stab wound in the victim was caused by this particular knife to the exclusion of all others." The technician explained that he had compared a piece of cut cartilage from the body of the victim to knife impressions, using the knife in question, but had made no comparisons with other knives.

Ramirez I, 542 So. 2d at 354 (emphasis added). Ramirez was convicted and sentenced to death.

This Court reversed the conviction, ruling that while the knife itself was admissible, Hart's testimony that this particular knife was conclusively the murder weapon was "self-serving" and inadmissible:

> In reviewing the record, we find that no scientific predicate was established from independent evidence to show that a specific knife can be identified from the marks made on cartilage. The only evidence received was the expert's self-serving statement supporting this procedure. The medical examiner testified that this type of knife could have made this type of stab wound. The trial judge expressed concern about this type of evidence when [the judge] stated, "For the first time in the history of the Florida courts . . . I have permitted into evidence knife prints, which the jury considered in the course of arriving at their verdict."

Ramirez I, 542 So. 2d at 354-55.

Prior to the second trial, the court conducted a hearing wherein Hart testified concerning the reliability of his identification theory and submitted an article he had written on the subject; Ramirez was not allowed to present opposing evidence at the hearing. The court ruled the State's evidence admissible, and Ramirez again was convicted and sentenced to death. This Court again reversed:

> Just as important as the burden of proof [at the hearing] is the fact that the hearing must be conducted in a fair manner. There is no question that a hearing on the admissibility of novel scientific evidence is an adversarial proceeding in which conflicting evidence is presented to the trial judge as the trier of fact. Without the testimony of experts presented by both parties, the trial judge is denied a full presentation of relevant evidence. This is especially important in a criminal trial where the defendant is guaranteed certain constitutional rights, not the least of which is the due process right to present witnesses in one's behalf.

Ramirez v. State, 651 So. 2d 1164, 1168 (Fla. 1995) (Ramirez II).

Prior to the third trial, the court conducted a hearing wherein the State presented the testimony of six experts to support Hart's identification methodology. The defense presented one expert in rebuttal. The trial court again admitted the evidence, and Ramirez was convicted and sentenced to death based

on four aggravating circumstances,[2] no statutory mitigating circumstances, and three nonstatutory mitigating circumstances,[3] overriding the jury's nine-to-three vote in favor of life imprisonment.[4] Ramirez raises nine issues on appeal,[5] but we find a single claim dispositive.

Ramirez asserts that the trial court erred in allowing the State's experts to testify that the knife found in Ramirez's car was the murder weapon to the exclusion of every other knife in the world. He contends that Hart's identification method is novel and untested and the State has failed to present sufficient proof of

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[2] The trial court found that the following aggravating circumstances had been established: (1) prior violent felony; (2) pecuniary gain and commission during the course of a robbery or burglary; (3) avoid arrest; and (4) heinous, atrocious, or cruel (HAC).

[3] The trial court found that the following nonstatutory mitigating circumstances had been established: (1) as a child, Ramirez had been sexually abused by his babysitter's teenage son; (2) he had been physically abused by his father; and (3) he is a supportive father and husband and has been a positive influence on his family.

[4] Ramirez also was convicted of armed robbery and armed burglary with an assault and was sentenced to two life terms on these counts. The life terms are to be served consecutively to each other and consecutively to the death sentence.

[5] Ramirez claims that the trial court erred in addressing the following points: (1) admission of "knife mark" evidence; (2) exclusion of defense exhibits concerning the bloody fingerprint; (3) admission of the knife; (4) admission of the former testimony of a crime scene technician due to unavailability; (5) jury override; (6) "avoid arrest" aggravator; (7) HAC aggravator; (8) excluding certain evidence of family background; and (9) denial of a penalty phase special verdict form.

its reliability.

II. RELIABILITY

An expert witness is normally permitted to testify relative to generally accepted scientific theory in the witness's area of expertise. The witness's testimony is subject to the balancing test set forth in section 90.403, Florida Statutes (2000), which focuses on "legal" reliability and applies to all evidence. When a court is faced with expert testimony based on a new or untried scientific theory, however, the balancing test in section 90.403 is inapposite because the court may be unable to gauge accurately the danger of misleading or confusing the jury due to the unproven nature of the testimony. In such a case, "scientific" reliability must be established as a predicate to "legal" reliability.

A. "Legal" Reliability–The Balancing Test

Under the Florida Evidence Code, expert testimony is admissible if it will assist the trier-of-fact in his or her task:

> 90.702 Testimony by experts.–If scientific, technical, or other specialized knowledge will assist the trier of fact in understanding the evidence or in determining a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify about it in the form of an opinion; however, the opinion is admissible only if it can be applied to evidence at trial.

§ 90.702, Fla. Stat. (2000).

All evidence, including expert testimony, is subject to the requirements of sections 90.401, 90.402, and 90.403, which address relevancy and reliability. Section 90.401 defines relevant evidence as evidence that is both probative and material:

> 90.401 Definition of relevant evidence.–Relevant evidence is evidence tending to prove or disprove a material fact.

§ 90.401, Fla. Stat. (2000).

All relevant evidence is admissible, unless specifically excluded:

> 90.402 Admissibility of relevant evidence.–All relevant evidence is admissible, except as provided by law.

§ 90.402, Fla. Stat. (2000).

Relevant evidence is excluded inter alia if it is unreliable under the balancing test in section 90.403:

> 90.403 Exclusion on grounds of prejudice or confusion.–Relevant evidence is inadmissible if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of issues, misleading the jury, or needless presentation of cumulative evidence.

§ 90.403, Fla. Stat. (2000).

In applying this balancing test, the court bars from the jury's purview

evidence that is unduly prejudicial, misleading, or confusing–i.e., evidence that is "legally" unreliable. A trial court's ruling on a section 90.403 issue will be upheld on appeal absent an abuse of discretion.[6]

B. "Scientific" Reliability–The Frye Test

Evidence based on a novel scientific theory is inherently unreliable and inadmissible in a legal proceeding in Florida unless the theory has been adequately tested and accepted by the relevant scientific community.[7] The court in Frye v. United States, 293 F. 1013 (D.C. Cir. 1923), explained:

> Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the

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[6] See, e.g., Mansfield v. State, 758 So. 2d 636, 648 (Fla. 2000) ("We review a trial court's ruling on a section 90.403 objection on an abuse of discretion standard.").

[7] See, e.g., Brim v. State, 695 So. 2d 268, 272 (Fla. 1997) ("This standard requires a determination, by the judge, that the basic underlying principles of scientific evidence have been sufficiently tested and accepted by the relevant scientific community."); Hadden v. State, 690 So. 2d 573, 578 (Fla. 1997) ("In sum, we will not permit factual issues to be resolved on the basis of opinions which have yet to achieve general acceptance in the relevant scientific community; to do otherwise would permit resolutions based upon evidence which has not been demonstrated to be sufficiently reliable and would thereby cast doubt on the reliability of the factual resolutions."); Flanagan v. State, 625 So. 2d 827, 828 (Fla. 1993) ("We begin our analysis of the admissibility of this testimony with the basic principle that novel scientific evidence is not admissible in Florida unless it [is] . . . 'sufficiently established to have gained general acceptance in the particular field in which it belongs.'").

> evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923) (emphasis added). This Court, in adopting the Frye test for use in Florida, pointed out the underlying reason for the rule:

> The underlying theory for this rule is that a courtroom is not a laboratory, and as such it is not the place to conduct scientific experiments. If the scientific community considers a procedure or process unreliable for its own purposes, then the procedure must be considered less reliable for courtroom use.

Stokes v. State, 548 So. 2d 188, 193-94 (Fla. 1989). In keeping with the State's burden in a criminal trial (i.e., the State must prove each element of the charged offense beyond a reasonable doubt), this Court has continued to use the Frye test when evaluating novel scientific evidence proposed by the State even though the United States Supreme Court, in a civil case, has adopted a different rule.[8]

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[8] The United States Supreme Court in Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993), eschewed a rule of "general acceptance" in favor of a rule of "scientific soundness" wherein the trial court must assess the scientific validity of the theory in issue based on various criteria including general acceptance. See also Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999) (holding that Daubert is applicable to all expert testimony, even if the

When applying the Frye test, a court is not required to accept a "nose count" of experts in the field.[9] Rather, the court may peruse disparate sources–e.g., expert testimony, scientific and legal publications, and judicial opinions[10]–and decide for itself whether the theory in issue has been "sufficiently tested and accepted by the

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testimony is based on an expert's personal experience rather than on scientific knowledge). The Florida Supreme Court rejected the Daubert rule in favor of continued use of Frye. See, e.g., Brim v. State, 695 So. 2d 268, 271-72 (Fla. 1997) ("Despite the federal adoption of a more lenient standard in [Daubert], we have maintained the higher standard of reliability as dictated by Frye."); Hadden v. State, 690 So. 2d 573, 577 (Fla. 1997) ("The question of the appropriate standard of admissibility of novel scientific evidence of any kind following the adoption of the evidence code was resolved by this Court in favor of the Frye test."); Flanagan v. State, 625 So. 2d 827, 829 n.2 (Fla. 1993) ("We are mindful that the United States Supreme Court recently construed Rule 702 of the Federal Rules of Evidence as superseding the Frye test. . . . However, Florida continues to adhere to the Frye test for the admissibility of scientific opinions.").

[9] See, e.g., Brim v. State, 695 So. 2d 268, 272 (Fla. 1997) ("[A] 'nose count' is not alone sufficient to establish general acceptance in the scientific community."); Charles W. Ehrhardt, Florida Evidence § 702.3 (2000 ed.) ("Merely counting a majority of the members of the relevant scientific community is not controlling."); see generally Kumho Tire Co. v. Carmichael, 526 U.S. 137, 151 (1999) ("Nor, on the other hand, does the presence of [general acceptance] help show that an expert's testimony is reliable where the discipline itself lacks reliability, as, for example, do theories grounded in any so-called generally accepted principles of astrology or necromancy.").

[10] See, e.g., Hadden v. State, 690 So. 2d 573, 579 (Fla. 1997) ("An appellate court may examine expert testimony, scientific and legal writings, and judicial opinions in making its determination.").

relevant scientific community."[11] In gauging acceptance, the court must look to properties that traditionally inhere in scientific acceptance for the type of methodology or procedure under review–i.e., "indicia" or "hallmarks" of acceptability.[12] A bald assertion by the expert that his deduction is premised upon well-recognized scientific principles is inadequate to establish its admissibility if the witness's application of these principles is untested and lacks indicia of acceptability.[13]

The trustworthiness of expert scientific testimony is especially important because oftentimes "[t]he jury will naturally assume that the scientific principles underlying the expert's conclusion are valid."[14] The Court in Ramirez v. State, 651 So. 2d 1164 (Fla. 1995) (Ramirez II), explained the appropriate burden and standard of proof in a Frye inquiry:

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[11] Brim, 695 So. 2d at 272.

[12] See generally Brim, 695 So. 2d at 272 ("Of course, the trial courts, in determining the general acceptance issue, must consider the quality, as well as quantity, of the evidence supporting or opposing a new scientific technique.") (quoting People v. Leahy, 882 P.2d 321, 336-37 (Cal. 1994)).

[13] This is particularly true if the expert has a personal stake in the new theory or is prone to an institutional bias. See generally People v. Young, 391 N.W. 2d 270 (Mich. 1986); D.H. Kaye, Science in Evidence 85 (1997).

[14] Flanagan v. State, 625 So. 2d 827, 828 (Fla. 1993).

> In utilizing the Frye test, the burden is on the proponent of the evidence to prove the general acceptance of both the underlying scientific principle and the testing procedures used to apply that principle to the facts of the case at hand. The trial judge has the sole responsibility to determine this question. The general acceptance under the Frye test must be established by a preponderance of the evidence.

Ramirez II, 651 So. 2d at 1168. A trial court's ruling on a Frye issue is subject to de novo review,[15] and the reviewing court must consider the level of acceptance at the time of review, not the time of trial.[16] A Frye error is subject to harmless error analysis.[17] This Court on review has applied the Frye test to determine the admissibility of various types of evidence.[18]

III. KNIFE MARK EVIDENCE

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[15] Hadden v. State, 690 So. 2d 573, 579 (Fla. 1997).

[16] Id.

[17] Id. at 581.

[18] See, e.g., Murray v. State, 692 So. 2d 157 (Fla. 1997) (barring evidence based on PCR DNA testing); Hadden v. State, 690 So. 2d 573 (Fla. 1997) (barring evidence of child abuse syndrome); Domino's Pizza v. Gibson, 668 So. 2d 593 (Fla. 1996) (approving evidence of blood alcohol tests); Hayes v. State, 660 So. 2d 257 (Fla. 1995) (barring evidence based on DNA band-shifting technique); State v. Hickson, 630 So. 2d 172 (Fla. 1993) (approving evidence of battered woman syndrome); Flanagan v. State, 625 So. 2d 827 (Fla. 1993) (barring evidence of offender profile syndrome); Stokes v. State, 548 So. 2d 188 (Fla. 1989) (barring evidence based on hypnotically refreshed memory); Davis v. State, 520 So. 2d 572 (Fla. 1988) (barring evidence based on polygraph examinations).

Traditional "knife mark" evidence is a subgroup of the broad category of evidence commonly referred to as "tool mark" evidence. The theory underlying tool mark evidence, which is explained below, is generally accepted in the scientific community and has long been upheld by courts. Many of the analytical methods that were developed for use with tool marks in general have been applied to knife marks in particular and have similarly been accepted by courts. Hart's theory of knife mark identification, however, departs from traditional knife mark identification theory in significant ways, and the State has cited no appellate decision upholding his theory.[19]

A. Traditional Knife Mark Evidence

The term "tool mark" refers to the mark left by a hard material when striking a softer material, and such a mark generally falls into one of two classes, i.e., (1) an

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[19] The cases cited by Hart do not uphold–or even mention–his theory. See State v. Churchill, 646 P.2d 1049, 1054 (Kan. 1982) (containing the bald statement that "[the expert] expressed the opinion that the cuts in the victim's breastbone were made by the [defendant's] knife" where bloodstains matching the victim's blood were found on the knife handle; the decision contains no discussion of the basis or method of identification or the degree of certainty of the match); Potter v. State, 416 So. 2d 773 (Ala. Crim. App. 1982) (approving admission of tool mark testimony in an ax murder case); Stout v. Commonwealth, 376 S.E.2d 288, 290 (Va. 1989) (containing the bald statement that "it was determined [by the State Medical Examiner] that the knife was the weapon used to cut Kooshian's throat"; the decision contains no discussion of the basis or method of identification used by the medical examiner or the degree of certainty of the match).

impression marking, or (2) a striation marking:

> A toolmark may be described briefly as the mark left by an instrument or an object composed of a hard substance coming in contact with and leaving some characteristic mark or impression on a relatively softer medium.
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> Toolmarks may show one of two things: (1) a negative reproduction of the tool itself–size, shape, and contour–which is a true impression; (2) a series of parallel striations [or lines] caused by dragging the tool across the surface of the softer medium.
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> The basic principle in toolmark comparison is the reproduction of similar marks with the suspected tool or instrument, simulating as nearly as possible the conditions under which the original marks were made.

Leland V. Jones, Locating and Preserving Evidence in Criminal Cases, in 1 Am. Jur. Trials 555, 616 (1964).

An identification procedure commonly used by tool mark experts is as follows: (1) the expert attempts to duplicate the original crime-scene mark by using the suspected tool to create a comparable mark on a similar test medium; (2) the test mark (i.e., the "exemplar") is compared to the original mark via microscopic examination; (3) patterns of impressions or groups of striations are matched up under a three-dimensional stereoscopic comparison microscope; (4) two-dimensional photomicrographs (i.e., photos) of the comparison are taken for record purposes; and (5) if the marks are sufficiently similar, the expert may

conclude that they were made by the same tool (i.e., the suspected tool).[20] Marks left by various tools have been studied in this manner, including screwdrivers, chisels, wire-cutters, hammers, axes, and knives.[21]

Unlike wood, metal, plastic, and other hard surfaces, human tissue is pliable and does not readily retain detailed marks. Thus, knife mark analysis in human tissue traditionally has been limited to a gross observation of the wound itself and a microscopic examination of the interior and exterior surfaces of the wound to detect alterations in the cellular structure of the tissue or the presence of fibers or other trace materials.[22] From this analysis, an examiner may deduce, for instance, the general length, width, shape, or contour of the knife blade, and the presence of any foreign matter.[23]

Specifically, courts have permitted experts to attest to the following: that a

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[20] See generally Leland V. Jones, Locating and Preserving Evidence in Criminal Cases, in 1 Am. Jur. Trials 555, 616-628 (1964).

[21] Id.

[22] See generally Thomas M. Fleming, Annotation, Admissibility of Expert Opinion Stating Whether a Particular Knife Was, or Could Have Been, the Weapon Used in a Crime, 83 A.L.R.4th 660 (1991); Kyrill Bosch, On Stabbing and Cutting Wounds from Knives with Serrated Edges, 54 German Journal of Forensic Medicine 273 (1963).

[23] See generally Fleming, supra note 22.

particular knife could have been the murder weapon;[24] that a particular knife was consistent with the victim's wounds;[25] that a victim's wounds were caused either by a particular knife or a knife similar thereto;[26] and that a victim's wounds could not have been caused by a particular knife.[27] On the other hand, courts have approached with caution an expert's testimony that a victim's wounds were caused by a particular knife.[28]

B. Hart's Knife Mark Evidence

Hart's testing procedure is based on the premise that every knife blade is unique due to microscopic imperfections in the steel caused by the manufacturing process. These imperfections, he contends, leave lines–i.e., striations–when a knife

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[24] See Wantland v. State, 413 A.2d 1376 (Md. Ct. Spec. App. 1980), vacated on other grounds, 451 U.S. 1014 (1981), on remand, 435 A.2d 102 (Md. Ct. Spec. App. 1981); State v. D'Ambrosio, 616 N.E.2d 909 (Ohio 1993); Heidle v. State, 86 S.W. 2d 641 (Tex. Crim. App. 1935); State v. Batten, 563 P.2d 1287 (Wash. Ct. App. 1977).

[25] See Mansfield v. State, 758 So. 2d 636 (Fla. 2000); State v. Chaplin, 286 A.2d 325 (Me. 1972); Jackson-El v. State, 415 A.2d 312 (Md. Ct. Spec. App. 1980); see also Foster v. State, 508 So. 2d 1111 (Miss. 1987).

[26] See State v. Weinberg, 575 A.2d 1003 (Conn. 1990).

[27] See State v. Williams, 43 So. 2d 780 (La. 1949), disapproved on other grounds in State v. Weston, 95 So. 2d 305 (La. 1957).

[28] See Ramirez v. State, 651 So. 2d 1164 (Fla. 1995) (Ramirez II); Ramirez v. State, 542 So. 2d 352 (Fla. 1989) (Ramirez I); but see supra note 19.

is plunged into human cartilage, and because cartilage is a relatively firm material, as compared to human flesh, it retains the marks. The striations in the cartilage, i.e., the striation "signature," may be matched by a skilled technician to the imperfections in the blade of the knife that made the wound.

Hart employs the following technique: (1) he conducts a mock stabbing with the suspected knife in a test medium; (2) he separates the cut faces of both the incision in the exemplar and the incision in the victim's cartilage; (3) he makes a hard cast of the cut faces of both incisions; (4) he compares the casts under a firearms comparison microscope to match up the striations; (5) he makes a subjective determination concerning the degree of the match; and (6) if the marks are sufficiently similar–i.e., if the striation "signatures" are sufficiently similar–he concludes to a degree of scientific certainty that both incisions were made by the suspected knife to the exclusion of every other knife in the world.

According to Hart, a technician's ability to identify microscopic similarities in casts is developed by training and is passed on from one technician to another in the workplace. A "match" under his method is declared if there is "sufficient similarity" in the striated marks on the casts to eliminate the possibility of coincidence. This determination is entirely subjective and is based on the technician's training and experience; there is no minimum number of matching

striations or percentage of agreement or other objective criteria that are used in this method. No photographs are made of the casts, Hart explained, because lay persons and those not trained in this procedure would be unable to understand the comparison process; similarly, no notes are made describing the basis for identification. Once a match is declared under his theory, no other knives are examined because an identification under this method purportedly eliminates all other knives in the world as possible sources of the wound. Under Hart's method of identification, a team of expert technicians trained by him would be virtually impossible to challenge notwithstanding the fact that his procedure is untested and yet to be accepted by the relevant scientific community. There is no objective criteria that must be met, there are no photographs, no comparisons of methodology to review, and the final deduction is in the eyes of the beholder, i.e., the identification is a match because the witness says it is a match.

IV. THE PRESENT CASE

At the pre-trial hearing below, the State presented the live testimony of Hart[29] and four other tool mark experts,[30] all of whom are or were at one time affiliated

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[29] Hart is a criminalist specializing in firearm and tool mark identification with the Miami-Dade Police Department and has been in that field since 1971.

[30] The State presented the live testimony of the following tool mark experts: Monty Lutz, a forensic scientist in firearm and tool mark identification in

with law enforcement agencies, and one bite mark expert.[31] The State's experts all testified in a manner that supported Hart's methodology. In counterpoint, the defense presented a single expert[32] who testified that the validity of Hart's method has never been tested and that the underlying principle is suspect.

A. The Frye Hearing

After Hart explained the principle underlying his testing procedure for knife mark identification, he testified that Ramirez's knife was the murder weapon to the exclusion of all others:

Milwaukee, Wisconsin, who testified that he has never made a knife mark identification in cartilage but that the principle underlying such a practice is generally accepted in the field; Lonny Harden, a forensic scientist in firearm and tool mark identification, who testified that he has made knife-cartilage identifications in other cases and that based on the evidence prepared by Hart in the present case he agrees that Ramirez's knife was the murder weapon to the exclusion of all others, even if there had been ten million similar knives produced; William Conrad, formerly a forensic scientist in Virginia, who testified that he has tested consecutively manufactured knives and that each left distinct identifying marks and that Hart's theory appears to use procedures accepted in the field; and John Cayton, the chief forensic firearm and tool mark examiner with the Kansas City Crime Laboratory, who testified generally concerning tool mark identification procedures.

[31] The State presented the live testimony of Richard Souviron, a dentist and consultant in forensic odontology in Dade County, who testified that use of hard casts is generally accepted in the field as a method of analyzing wounds made in human tissue.

[32] The defense presented the live testimony of Dale Nute, a forensic science consultant with a doctorate in criminology from Florida State University.

> Q. And you are willing to say with reasonable scientific certainty that if there were two million knives made that within that one-half inch of space on that knife that there would not be those similarities whether you found two or 200 striae?
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> A. That is correct. I am saying that that approximate half inch area contained such similarity for me to conclude that the mark[s] were made by this knife to the exclusion of all others.
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> . . . .
>
> Q. This would be your explanation to another forensic scientist that you do not know the number [of matching striations], but if you did, it doesn't matter that there were two million other knives out there, that there would not be another knife within that one half inch space; is that correct?
>
> A. That is correct. I am saying to the exclusion of all other similar knives.
>
> . . . .
>
> Q. Mr. Hart, what is the opinion that you have reached regarding the stab wound that was in Marie Jenkins's cartilage inside her chest? What knife caused that stab wound?
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> A. It is my opinion as reflected in my written report that the wound to Marie Jenkins's chest was caused by this knife to the exclusion of all others.

The State's experts subsequently testified that the principles underlying Hart's testing procedure are generally accepted in the field.

One of the State's experts, Lonny Harden, testified that he too examined the evidence prepared by Hart in the present case and agreed with Hart that Ramirez's knife was the murder weapon to the exclusion of all other knives:

> Q. What conclusion did you reach?
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> A. I was able to determine that one of the casts that Mr. Hart made the knife cut, was able to be matched back to the cast he made from the rib, indicating that the same tool was use (sic) to make both impressions.
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> . . . .
>
> Q. If I were to say that there were ten million [similar knives] created that year, is it your testimony that this one half inch [wound in the victim's cartilage] is the only one out of ten million?
>
> A. That is correct sir.

The defense expert, Dale Nute, on the other hand, testified that Hart's knife mark identification procedure has not been properly validated. Nute testified that because Hart's procedure applies to an unusual receiving material, i.e., cartilage, and involves a stabbing rather than cutting motion, it cannot be assumed that this method is as reliable as other tool mark comparisons. Nute further stated that it is not scientific to say "it was a match because I say so," as Hart does, rather than using objective criteria and articulating the bases for making an identification. At the conclusion of the Frye hearing, the court ruled that the evidence was admissible.

B. Hart's Method Fails the Frye Test

Although several of the State's experts testified that the underlying principle employed by Hart is generally accepted in the field, we conclude that this testimony standing alone is insufficient to establish admissibility under Frye in light of the fact that Hart's testing procedure possesses none of the hallmarks of acceptability that

apply in the relevant scientific community to this type of evidence. This is particularly true in light of the extraordinarily precise claims of identification that Hart makes under his testing procedure –i.e., he claims that a "match" made pursuant to his method is made with absolute certainty. Such certainty, which exceeds even that of DNA testing, warrants careful scrutiny in a criminal–indeed, a capital–proceeding.

First, the record does not show that Hart's methodology–and particularly his claim of infallibility–has ever been formally tested or otherwise verified. At the Frye hearing below, the State submitted no substantive proof of scientific acceptance of such testing and its reliability.[33] In fact, the only record evidence that even hints at general acceptance of Hart's testing procedure is a single published article describing an experiment wherein German forensic scientist Wolfgang Bonte examined the wounds left in cartilage by twelve different types of serrated-blade knives. Bonte, however, did not conduct a "blind" study;[34] he was concerned only with documenting the relationship between the nature of the wound and the

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[33] In lieu of proof of formal testing, the State submitted only the testimony of Lonnie Harden wherein he stated that he examined the evidence in the present case and agreed with Hart that Ramirez's knife was the murder weapon.

[34] Bonte did not attempt to identify which knife made which particular wound.

size and shape of the corresponding blade. Microscopic imperfections in knife blades–i.e., the key to Hart's test–was a non-issue in the Bonte study; the Bonte blades were grossly dissimilar to one another.

Second, the record does not show that Hart's test has ever been subjected to meaningful peer review or publication as a prerequisite to scientific acceptance. At the Frye hearing below, the court reviewed two groups of published articles addressing knife mark evidence–one group North American,[35] the other

[35] See J.I. Galan, Identification of a Knife Wound in Bone, 18 Ass'n Firearm & Toolmark Examiners J. (Oct. 1986) (finding a positive match between the suspected knife, i.e., a KA-BAR kitchen knife with a well-worn fourteen-inch blade, and a wound in the victim's rib bone based on gross and fine striae; with photos); Valerie Rao and Robert Hart, Tool Mark Determination in Cartilage of Stabbing Victim, 28 J. Forensic Sci. 794, 798 (1983) (finding a match "within reasonable scientific certainty" between the suspected knife, i.e., a marine survival knife with a cross guard, a serrated blunt edge, a sharp edge, and visible defects on the blade, and a wound in the victim's cartilage based on fine and coarse striae arising from class and individual characteristics and supported by two "cross guard" abrasions in the skin surrounding the wound; with photos); Y.J. Tuira, Tire Stabbing with Consecutively Manufactured Knives, 14 Ass'n of Firearm & Toolmark Examiners J. (Jan. 1982) (concluding that two consecutively manufactured Buck knives left different microscopic marks when used to stab an automobile tire; with photos); Donald J. Watson, The Identification of Tool Marks Produced from Consecutively Manufactured Knife Blades in Soft Plastics, 10 Ass'n Firearm & Toolmark Examiners J. (Sept. 1978) (concluding that two consecutively manufactured Buck knives left different microscopic marks when used to cut soft plastic; with photos).

European.[36] The North American articles were written by law enforcement technicians[37] and while several of those articles address principles related to Hart's theory[38] none undertakes the kind of searching, critical review that is the sine qua

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[36] See Wolfgang Bonte, Tool Marks in Bones and Cartilage, 20 J. Forensic Sci. 315 (1975) (concluding that class and individual characteristics of specially ground knives can be determined from wounds in cartilage; with photos); Kyrill Bosch, On Stabbing and Cutting Wounds from Knives with Serrated Blades, 54 German J. Forensic Med. (1973) (translation in present record) (conducting stab wounds in various mediums with various knives and concluding that several characteristics of the knife can be deduced from the nature of the corresponding wound; with photos); Wolfgang Bonte, Considerations on the Identification of Notch Traces from Stabbing Injuries, 149 Arch-Kriminal 77 (March-April 1972) (translation in present record) (conducting stab wounds in human cartilage with twelve different styles of serrated-blade knives and concluding that each blade left characteristic marks; with photos).

[37] See, e.g., Michael J. Saks, Merlin and Solomon: Lessons from the Law's Formative Encounters with Forensic Identification Science, 49 Hastings L. J. 1069, 1092-93 (1998) ("No other fields are as closely affiliated with a single side of litigation as forensic science is to criminal prosecution."); Paul C. Giannelli, The Abuse of Scientific Evidence in Criminal Cases: The Need for Independent Crime Labs, 4 Va. J. Soc. Pol'y & L. 439 (1997) (promoting the use of independent crime labs to reduce the effect of bias); Andre A. Moenssens, Novel Scientific Evidence in Criminal Cases: Some Words of Caution, 84 Crim. L. & Criminology 1, 6 (1993) (asserting that most crime lab personnel are "technicians," not trained scientists and are prone to pro-police bias and averse to rigorous scientific investigation).

[38] Two articles in this group address microscopic differences in consecutively manufactured knives and a third asserts a positive identification based on a striation signature in human bone. The fourth article in this group, i.e., Hart's own prior article, appears to be based on traditional knife mark theory and does not address–or even mention–his current theory. See supra note 35.

non of scientific acceptance.[39] The European articles, on the other hand, were written by medical doctors and professors and are far more discerning; they delineate general studies and contain extensive analyses. The articles in that group, however, address only traditional knife mark theory relative to striation signatures. None address Hart's testing methodology and the absolute certainty of identification deduced from such a test.

The State's experts testified that the examining technician generally takes no photomicrographs of the casts because lay persons would be unable to understand the identification process.[40] This testimony, however, is belied by the published articles in the present record. Each article–including Hart's own article–contains photos of the matching striae, and the photos are instrumental in confirming–for the

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[39] The North American articles are brief (i.e., several contain only a page or two of text), are uncritical in approach, and are limited to a single anecdotal study.

[40] For instance, Hart testified as follows at the trial below:

> A. It is not the practice in our laboratory to present photographs of an identification unless the photographs were instrumental in our arriving at the identification. The reason for this being, we are looking through the microscope, changing the lighting, moving specimens up and down, conducting an examination perhaps for hours that cannot be accounted for on a single photograph or several photographs. Frequently the interpretation of these photographs requires the specific training in what is and what is not significant.

reader–the validity of the "match."[41] The State's experts further testified that they do not prepare notes or written reports delineating the basis for identification because to do so would not be helpful.[42] Again, this testimony is belied by the record. The German articles, for instance, describe at length the matching points of identification and then relate those points to specific features of the corresponding knife blade,[43] and these descriptions, too, are helpful in confirming the validity of the "match."

Fourth, the record does not show that the error rate for Hart's method has ever been quantified. On the contrary, the State's experts testified that the method is infallible, that it is impossible to make a false positive identification.[44] Fifth, the

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[41] See supra notes 35 & 38.

[42] For instance, Lonnie Harden testified as follows at the trial below:

> Q. So, essentially, if I were to reduce to its common denominator is what we are dealing with, is you looking through a microscope, not taking any notes at that time, not writing down anything, not drawing any diagrams, but as you look through the comparison microscope you are saying there is a connection, there is a match; is that correct?
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> A. That is correct.

[43] See supra note 36.

[44] Hart and Harden both testified that an error in their technique would not result in a false positive identification, only in the inability to make an identification.

record does not show that this method is governed by objective scientific standards. The State's experts repeatedly testified that the method is entirely subjective and that objective standards would be impractical.[45] This testimony, however, is contrary to language in Hart's own published article wherein he refers to the existence of objective scientific standards used in assessing the degree of match in striation marks.[46] And finally, the record contains no written authority–including Hart's own published article–that upholds his current methodology.

We conclude that the State has failed to show by a preponderance of the

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[45] The State's experts testified that an identification under this procedure is a subjective judgment that is based entirely on the examiner's experience and training. For instance, at the Frye hearing below, Hart testified as follows:

> THE COURT: But it is not – you keep using the word criteria, but from what you are telling me, there isn't a criteria. There is a sense that you have enough training, you look at it and you say this is a match, this is not a match. Is that it?
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> THE WITNESS: Basically that is correct. There is not a numerical count score. . . .

[46] See Valerie Rao and Robert Hart, Tool Mark Determination in Cartilage of Stabbing Victim, 28 J. Forensic Sci. 794, 797 (1993) ("Prior studies have suggested that, in order to make a positive identification, at least 60% of the striae on the weapon and injured tissue must match."); see generally Kumho Tire Co. v. Carmichael, 526 U.S. 137, 155 (1999) (questioning the reliability of an expert's testimony in light of the expert's "repeated reliance on the 'subjective[ness]' of his mode of analysis in response to questions seeking specific information").

evidence that Hart's procedure is generally accepted by scientists active in the field to which the evidence belongs. In applying the Frye criteria, general scientific recognition requires the testimony of impartial experts or scientists. It is this independent and impartial proof of general scientific acceptability that provides the necessary Frye foundation. As we emphasized in Ramirez II, "the burden is on the proponent of the evidence to prove the general acceptance of both the underlying scientific principle and the testing procedures used to apply the principle to the facts of the case at hand." Ramirez II, 651 So. 2d at 1168. We hold that while the knife that was recovered in Ramirez's constructive possession may be admitted as conventional evidence of guilt,[47] testimony based on Hart's knife mark identification procedure, which we find to be new and novel, does not reach the threshold for admissibility under Frye and is therefore unreliable and inadmissible.

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[47] See Ramirez v. State, 651 So. 2d 1164, 1168 (Fla. 1995) ("As we stated in our prior opinion in this case, the State is not precluded from introducing Ramirez's knife into evidence and presenting testimony that the wounds on the victim were consistent with that knife."); Ramirez v. State, 542 So. 2d 352, 355 (Fla. 1989) ("The knife itself, however, could have been properly admitted as relevant evidence because it was an instrument which could have caused the victim's wounds, based on the medical examiner's testimony and the other evidence linking this knife to Ramirez."); see also Mansfield v. State, 758 So. 2d 636, 648 (Fla. 2000) (holding the suspected knife admissible where "the medical examiner testified that the incised wounds on Robles' genitalia were consistent with being caused by the knife recovered from Mansfield's room" and "injuries on Robles' eye and forearm were consistent with a pattern at the base of the knife blade containing multiple square-like raised edges").

Because this evidence played a key role in the trial below,[48] the trial court's error in admitting the evidence was harmful beyond a reasonable doubt and requires reversal of the convictions.[49]

V. OTHER ISSUES

We also find that the trial court erred in overriding the jury's recommended sentence, which was nine to three in favor of life imprisonment. A trial court cannot override a jury's recommendation of life imprisonment unless "the facts suggesting a sentence of death [are] so clear and convincing that virtually no reasonable person could differ." Tedder v. State, 322 So. 2d 908, 910 (Fla. 1975). In the present case, the record contains copious mitigating evidence on which the

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[48] At trial, the State introduced the live testimony of Hart and two forensic scientists, Lonnie Harden and William Conrad. Hart and Harden both testified that, based on Hart's analysis, Ramirez's knife was the murder weapon to the exclusion of every other knife. William Conrad testified that the principles underlying Hart's identification method are generally accepted in the field of tool mark examiners.

[49] See State v. DiGuilio, 491 So. 2d 1129 (Fla. 1986).

jury reasonably could have relied.[50] We find claims 2,[51] 3[52] and 4[53] to be without merit, and claims 6, 7, 8 and 9 to be moot.

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[50] As noted above, the court found that the following mitigating circumstances had been established: Ramirez had been subjected to sexual abuse at the hands of his babysitter's teenage son (from the time Ramirez was eight years old until he was eleven or twelve); he had been physically abused by his mentally ill father; and he has been a source of emotional support and encouragement for his siblings, wife, and children.

[51] Rulings on evidentiary matters generally are within the sound discretion of the trial court. See, e.g., Jackson v. State, 648 So. 2d 85 (Fla. 1994). Discretion is abused only where no reasonable person would view the matter as the trial court did. Banks v. State, 732 So. 2d 1065, 1068 (Fla. 1999). Here, the record adequately supports the trial court's conclusion that the bloody wood and cardboard would have been more confusing than probative. See generally Alston v. Shiver, 105 So. 2d 785, 791 (Fla. 1958) ("Demonstrative evidence is admissible only when . . . it is such a reasonably exact reproduction or replica of the object involved that when viewed by the jury it causes them to see substantially the same object as the original."). Further, the demonstrative evidence here was cumulative to Kopec's testimony, which was admitted.

[52] Ramirez did not raise staleness in his motion to suppress; thus, this claim is barred. See Steinhorst v. State, 412 So. 2d 332 (Fla. 1982). On the merits, we find no error. See, e.g., State v. Lewis, 605 So. 2d 590, 591 (Fla. 2d DCA 1992) ("The courts of this state have generally refused to invalidate warrants because of 'staleness,' in the absence of extraordinary circumstances, if the issuance of the warrant occurs within thirty days of the observation of the evidence establishing probable cause.").

[53] A ruling on the unavailability of a witness is within the sound discretion of the trial court. See, e.g., Stano v. State, 473 So. 2d 1282, 1286 (Fla. 1985). In the present case, the record contains copious evidence supporting the trial court's conclusion that Ballard was unavailable to testify in person at this late date, i.e., fifteen years and two trials after the crime was committed.

VI. CONCLUSION

In each of the three successive murder trials in the present case, police crime technician Robert Hart made the extraordinary claim that his newly formulated knife mark identification procedure was infallible. He contended that he could identify the murder weapon to the exclusion of every other knife in the world–even if there had been two million consecutively produced knives of the same type–based on a striation "signature" arising from microscopic imperfections in the steel of the blade. The trial court in all three trials admitted expert testimony based on Hart's testimony, and Ramirez each time was convicted of first-degree murder and sentenced to death.

Our review of the record convinces us that under the general acceptance test of Frye, the State has failed to prove that the testing procedure used to apply the underlying scientific principle to the facts has gained general acceptance in the field in which it belongs.

In sum, Hart's knife mark identification procedure–at this point in time–cannot be said to carry the imprimatur of science. The procedure is a classic example of the kind of novel "scientific" evidence that Frye was intended to banish–i.e., a subjective, untested, unverifiable identification procedure that purports to be infallible. The potential for error or fabrication in this procedure is

inestimable. In order to preserve the integrity of the criminal justice system in Florida, particularly in the face of rising nationwide criticism of forensic evidence in general,[54] our state courts–both trial and appellate–must apply the Frye test in a prudent manner to cull scientific fiction and junk science from fact. Any doubt as to admissibility under Frye should be resolved in a manner that minimizes the chance of a wrongful conviction, especially in a capital case.

Due to the trial court's error in admitting testimony based on Hart's knife mark identification procedure, we reverse the convictions for first-degree murder, armed robbery, and armed burglary with an assault and vacate the sentences. If the State opts for a fourth trial on these charges, the maximum sentence that can be imposed on Ramirez for a first-degree murder conviction is life imprisonment due

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[54] See, e.g., United States v. Starzecpyzel, 880 F. Supp. 1027 (S.D.N.Y. 1995); Erica Beecher-Monas, Blinded by Science: How Judges Avoid the Science in Scientific Evidence, 71 Temp. L. Rev. 55, 97 (1998); David L. Faigman et al., Check Your Crystal Ball at the Courthouse Door, Please: Exploring the Past, Understanding the Present, and Worrying About the Future of Scientific Evidence, 15 Cardozo L. Rev. 1799 (1994); Paul C. Giannelli, The Abuse of Scientific Evidence in Criminal Cases: The Need for Independent Crime Labs, 4 Va. J. Soc. Pol'y & L. 439 (1997); Paul C. Giannelli, Scientific Evidence in Criminal Prosecutions, 137 Mil. L. Rev. 167 (1992); Randolph N. Jonakait, Forensic Science and the Need for Regulation, 4 Harv. J. L. & Tech. 109 (1991); Michael J. Saks, Merlin and Solomon: Lessons from the Law's Formative Encounters with Forensic Identification Science, 49 Hastings L. J. 1069 (1998); Clive A. Stafford Smith & Patrick D. Goodman, Forensic Hair Comparison Analysis: Nineteenth Century Science or Twentieth Century Snake Oil, 27 Colum. Hum. Rts. L. Rev. 227 (1996).

to the jury's current life recommendation.[55]

It is so ordered.

HARDING, ANSTEAD, PARIENTE, LEWIS and QUINCE, JJ., concur.
WELLS, C.J., concurs as to conviction and concurs in result only as to sentence.

NOT FINAL UNTIL TIME EXPIRES TO FILE REHEARING MOTION, AND IF FILED, DETERMINED.

An Appeal from the Circuit Court in and for Dade County,

Ronald C. Dresnick, Judge - Case No. 83-29429

Bennett H. Brummer, Public Defender, and Christina A. Spaulding, Assistant Public Defender, Eleventh Judicial Circuit, Miami, Florida,

for Appellant

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for Appellee

[55] See generally art. I, § 9, Fla. Const.; Tedder.