

United States Court of Appeals For the First Circuit

No. 05-1815

UNITED STATES OF AMERICA,

Appellee,

v.

DAVID RODRIGUEZ-PACHECO,

Defendant, Appellant.

APPEAL FROM THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF PUERTO RICO

[Hon. Daniel R. Domínguez, U.S. District Judge]

Before

Torruella and Lynch, Circuit Judges,
and Woodcock,* District Judge.

Héctor L. Ramos-Vega, Assistant Federal Public Defender, with whom Joseph C. Laws, Jr., Federal Public Defender, and Patricia A. Garrity, Assistant Federal Public Defender, were on brief, for appellant.

Nelson Pérez-Sosa, Assistant United States Attorney, with whom Rosa Emilia Rodriguez-Velez, United States Attorney, was on brief, for appellee.

February 5, 2007

* Of the District of Maine, sitting by designation.

LYNCH, Circuit Judge. David Rodriguez-Pacheco appeals from his sentence of thirty months' imprisonment and three years of supervised release following his guilty plea to the crime of possession of child pornography. See 18 U.S.C. § 2252(a)(4)(B); see generally Child Pornography Prevention Act of 1996 (CPPA), 18 U.S.C. § 2251 et seq. Utilizing the advisory sentencing guidelines, the district court held that Rodriguez-Pacheco possessed at least ten images of child pornography on the hard drive of his computer. That finding resulted in a two-level increase to defendant's sentencing guideline range. See U.S.S.G. § 2G2.4(b)(2) (2002). Consideration of the guidelines was an appropriate first step in the court's sentencing determination. United States v. Jiménez-Beltre, 440 F.3d 514, 518-19 (1st Cir. 2006) (en banc).

Rodriguez-Pacheco presents a single legal issue on appeal: whether the prosecution must, in the absence of direct evidence, produce expert opinion testimony that a particular pornographic image is of a real, non-virtual child, in order to meet its burden of proof by a preponderance of evidence at sentencing. Defendant argues that as a matter of law the Supreme Court's decision in Ashcroft v. Free Speech Coalition, 535 U.S. 234 (2002), requires the government to produce such expert opinion testimony, even in the absence of direct testimony provided by defendant, to meet the burden of proof of guilt beyond a reasonable

doubt, and so also the lesser burden of proof by a preponderance of evidence at sentencing.¹ He argues for a per se rule of reversal in the absence of such expert opinion testimony as to meet its burden to each of ten images.

We hold that the premise of the argument is wrong: Free Speech Coalition does not impose any requirement that the government produce such expert opinion testimony or be deemed to have failed to establish proof by a preponderance of evidence. This is the view of every circuit that has addressed the question.

Further, Free Speech Coalition does not overrule this court's decision in United States v. Nolan, 818 F.2d 1015 (1st Cir. 1987), holding that such expert opinion testimony -- that a photographic image is of a real child -- is not required to meet the government's burden of proving guilt beyond a reasonable doubt. Id. at 1018-20. No other circumstance leaves this panel free to overrule Nolan. We reject, as we have before, such a per se approach that expert opinion testimony on this issue is a sine qua non. Reviewing the totality of the evidence, we affirm the sentence.

¹ On appeal, defendant does not dispute the court's finding that one of the images is of a prepubescent minor or a child under the age of twelve. Nor is there any dispute that the images meet the definition of sexually explicit conduct.

I.

Defendant was charged on September 1, 2004 under a Superseding Indictment which alleged that he knowingly possessed one or more items that contained a visual depiction of an actual person under the age of eighteen engaged in sexually explicit conduct, and that the items were shipped in interstate or foreign commerce by means of a computer, in violation of 18 U.S.C. § 2252(a)(4)(B). The Superseding Indictment also made the sentencing allegation that Rodriguez-Pacheco knowingly possessed at least ten such images.

On September 27, 2004, while the jury was being selected, defendant entered a straight plea of guilty to the requisite knowing possession of at least one such image which traveled in interstate commerce. He did not agree, however, that he possessed at least ten images of minors engaging in sexually explicit conduct, which would enhance his guidelines sentencing range under U.S.S.G. § 2G2.4(b)(2) (2002). The court accepted defendant's guilty plea and stated that it would address the enhancement issue at sentencing. Defendant waived jury determination of the disputed sentencing enhancements. At that time, the government indicated it had expert reports to support its position on guilt and sentencing. The government had prepared its case under what was then this circuit's rule, short-lived and later withdrawn, that the government was obligated to produce an expert opinion as to

reality, even in the absence of any evidence to the contrary, in order to meet its burden of proof beyond a reasonable doubt. United States v. Hilton (Hilton I), 363 F.3d 58, 65-66 (1st Cir. 2004).

The court held further hearings on September 29, 2004,² and on several days in April 2005. The government offered evidence on a sample of the 234 pornographic images taken from defendant's computer. The government presented a pediatrician, Dr. Pedro Jaunarena-Perez, who testified using the Tanner scale that ten of the images obtained from defendant's computer were of children under age eighteen.

The government also presented expert testimony on the issue of whether the images were of real, non-virtual people. The court accepted Dr. Richard Vorder Bruegge of the FBI as an expert; he testified both as to the methodology to be used in looking at images to determine whether the image was of a real person and to his conclusions that Exhibits 5 through 15 and Exhibit 17 contained images of real people. The parties agree that the prosecution did not ask Dr. Vorder Bruegge his opinion as to whether Exhibit 16 was

² The withdrawal of the Hilton I rule occurred on September 27, 2004, the same day as defendant's change of plea hearing. There is no indication that the court or the parties were aware that the Hilton I rule had been withdrawn at any time during the change of plea hearing or the sentencing evidentiary hearing on September 29, 2004. The panel majority opinion was withdrawn and replaced by a per curiam opinion, United States v. Hilton (Hilton II), 386 F.3d 13 (1st Cir. 2004), which did not contain a rule requiring expert testimony. Id. at 18-19.

of an actual person. There is no suggestion the expert did not have an opinion; he simply was not asked for it.³

When the sentencing hearing resumed on April 26, 2005, defendant, relying on Free Speech Coalition, argued that as a matter of law the prosecution was required to provide expert opinion testimony that each of the ten images was of an actual child, and that the prosecution had failed to do so as to Exhibit 16 because Dr. Vorder Bruegge did not testify as to whether the depicted child was real or not. The district court rejected the argument that Free Speech Coalition imposed any such requirement. It did hold that Nolan had not been overruled and was binding precedent.

The district court later found that Exhibit 16 was of a real child which satisfied the ten-image requirement of U.S.S.G. § 2G2.4(b)(2) (2002). The court explained that it was competent to make factual findings as to whether the child in Exhibit 16 was real in light of the evidence of record before it. The district court found that the image in Exhibit 16 portrayed sexually explicit conduct and was of an actual child. The court imposed the

³ The government made clear that it would present Dr. Vorder Bruegge as an expert on whether a series of particular exhibits, including Exhibit 16, were of real children, and that the expert had examined each image. The direct examination did not entirely go image by image. For example, the prosecution jumped from Exhibits 7 and 8 to Exhibits 21 and 22, and then to Exhibit 24. Frequent jumps were made to connect later numbered exhibits to earlier ones. This happened with Exhibit 15. The prosecution then simply went on to ask Dr. Vorder Bruegge about Exhibit 17.

two-level guidelines increase, based on its own review of the image, the expert testimony of Dr. Jaunarena-Perez that the image was of a minor, and its use of Dr. Vorder Bruegge's testimony as to the methodology for distinguishing between real and virtual images; the court also noted the absence of any testimony that the images were not of actual children, to counter this evidence.

The district court, under the post-Booker advisory guidelines system, 543 U.S. 220 (2005), took into account mitigating factors and sentenced Rodriguez-Pacheco to thirty months of imprisonment and three years of supervised release.

II.

A. Effect of Free Speech Coalition

Our standard of review for legal questions, including those about the effect of Free Speech Coalition, is de novo. United States v. Dunning, 312 F.3d 528, 531 (1st Cir. 2002). The question of whether or not a particular image is of a virtual child or of a real child is an issue of fact, to be determined by the trier of fact. United States v. Farrelly, 389 F.3d 649, 654 (6th Cir. 2004), abrogated on other grounds by United States v. Williams, 411 F.3d 675, 678 n.1 (6th Cir. 2005). The standard of review for determinations of fact under the sentencing guidelines is for clear error. United States v. Rosario-Peralta 199 F.3d 552, 568 (1st Cir. 1999). We give due deference to the district court's

findings of fact under the guidelines. United States v. Duclos, 214 F.3d 27, 31 (1st Cir. 2000).

The prosecution must prove beyond a reasonable doubt that the image is of an actual child in order to establish guilt. United States v. Syphers, 426 F.3d 461, 465 (1st Cir. 2005); United States v. Hilton (Hilton II), 386 F.3d 13, 18 (1st Cir. 2004); accord United States v. Sims, 428 F.3d 945, 957 (10th Cir. 2005). The government bears the burden, by a preponderance of the evidence, to make the showing that the child is a real child for sentencing purposes. See U.S.S.G. § 6A1.3 (2002) (commentary); see also United States v. Zuleta-Alvarez, 922 F.2d 33, 37 (1st Cir. 1990).

Under Nolan, this circuit rejected a per se rule that the government must produce expert testimony in addition to the images themselves, in order to prove beyond a reasonable doubt that the images depicted were of real children. Nolan, 818 F.2d at 1018-20. Nolan involved magazine photographs which the court found to be of real children in light, inter alia, of the clarity of the photographs and the fact that the same child was in several photographs in a variety of poses. Id. at 1018. The defendant in Nolan argued that "the prosecution failed to prove that the pictures were not composite representations or otherwise faked or doctored, or . . . computer-generated" or even "fabricated using photographs of nude children taken from legitimate sources." Id.

at 1016. Nolan held that the mere possibility, unsupported by evidence, that the images could have been produced by use of technology and not using real children was not sufficient to reject a lower court's ruling founded on reasonable inferences derived from experience and common sense.

We agree with the district court that Nolan has not been overruled by Free Speech Coalition. To start, Free Speech Coalition did not arise from a criminal prosecution. Rather, the case was a civil suit seeking declaratory and injunctive relief; it concerned a First Amendment facial overbreadth attack on certain provisions of the CPPA. 535 U.S. at 243-44. The Court held overbroad and unconstitutional the provision of 18 U.S.C. § 2256(8) (B),⁴ which stated:

(8) "child pornography" means any visual depiction, including any photograph, film, video, picture, or computer or computer-generated image or picture, whether made or produced by electronic, mechanical, or other means, of sexually explicit conduct, where --

. . . .

(B) such visual depiction is, or appears to be, of a minor engaging in sexually explicit conduct.

Free Speech Coalition, 535 U.S. at 241, 256 (emphasis added). The First Amendment overbreadth issue arose from the "or appears to be" language of that section, by which Congress sought to punish

⁴ The Court also held unconstitutional 18 U.S.C. § 2256(8) (D), which extended the prohibition of child pornography to any sexually explicit image that "conveys the impression" that it depicts "a minor engaging in sexually explicit conduct." Free Speech Coalition, 535 U.S. at 242, 258.

possession of virtual images, which did not involve real children. Id. at 241.

Earlier, in New York v. Ferber, 458 U.S. 747 (1982), the Supreme Court had upheld against First Amendment attack a state child pornography statute which did not purport to prohibit virtual images, but only images of real children. Id. at 765, 773-74. The Court in Ferber upheld the state statute against First Amendment attack, even though the statute prohibited material that would not be obscene,⁵ because the production of child pornography utilizing real children necessarily harmed the children. Id. at 759-60; id. at 758 & n.9 (noting the legislative judgment that "the use of children as subjects of pornographic materials is harmful to the physiological, emotional, and mental health of the child[ren]"); see also United States v. Frabizio, 459 F.3d 80, 84 (1st Cir. 2006) (discussing the harm done to children through the production of child pornography).

In Free Speech Coalition, by contrast, the production of virtual images (the possession of which was prohibited by the CPPA) did not directly harm real children. 535 U.S. at 236 ("[T]he CPPA prohibits speech that records no crime and creates no victims by its production. Virtual child pornography is not 'intrinsically

⁵ Under Miller v. California, 413 U.S. 15 (1973), the test for obscenity is whether the work, taken as a whole, appeals to the prurient interest, is patently offensive in light of community standards, and lacks serious literary, artistic, political, or scientific value. Id. at 24.

related' to the sexual abuse of children." (quoting Ferber, 458 U.S. at 759)). As a result, Free Speech Coalition held that 18 U.S.C. § 2256(8)(B) was overbroad because of the "or appears to be" clause. Id. at 256.

_____The Court in Free Speech Coalition did not rule on the nature of the proof the government must produce to demonstrate that an image of a child was of a real child. That argument was not before the Court, which had before it only the issue of the facial constitutionality of the statute. There was also no issue as to whether the statute had been unconstitutionally applied to an image which the government had failed to prove was of a real child.

The remaining provisions of the CPPA, not struck, remain intact. The unconstitutional provisions of the Act, which expanded the prohibition against child pornography to encompass materials that did not involve the use of real children, are severable from the CPPA, and did not affect the constitutional viability of provisions regulating possession of traditional child pornography. See United States v. Kimler, 335 F.3d 1132, 1141 (10th Cir.), cert. denied, 540 U.S. 1083 (2003); United States v. Kelly, 314 F.3d 908, 911 (7th Cir.), cert. denied, 538 U.S. 1001 (2003); United States v. Hall, 312 F.3d 1250, 1259 (11th Cir. 2002), cert. denied, 538 U.S. 954 (2003). Since the Supreme Court did not address the issue before us, and since the statute as excised survives, our pre-CPPA case law, including Nolan, survives as well.

Our reading of the effect of Free Speech Coalition agrees with that of every circuit that has addressed the question. For example, in United States v. Irving, 452 F.3d 110 (2d Cir. 2006), the court upheld a jury verdict convicting defendant of possession of child pornography based on videos where the government offered no proof beyond the videos themselves that the images were of real children. Id. at 122. Rejecting the argument that Free Speech Coalition necessarily created a bright-line rule, the court noted:

Although the Supreme Court noted the possible evidentiary difficulty of distinguishing virtual and actual child pornography, it did not establish a bright-line rule requiring that the government proffer a specific type of proof to show the use of an actual child.

Id. at 121 (citing Free Speech Coalition, 535 U.S. at 254-56). Free Speech Coalition does not lay down "the absolute requirement that, absent direct evidence of identity, expert testimony is required to prove that the prohibited images are of real, not virtual, children." Kimler, 335 F.3d at 1142; see also Farrelly, 389 F.3d at 653-54; United States v. Slanina, 359 F.3d 356, 357 (5th Cir. 2004) (per curiam); United States v. Deaton, 328 F.3d 454, 455 (8th Cir. 2003) (per curiam). The same cases universally accept the proposition that juries are capable of distinguishing between real and virtual images, without expert assistance. Irving, 452 F.3d at 122 (video images); Farrelly, 389 F.3d at 654; Slanina, 359 F.3d at 357; Kimler, 335 F.3d at 1142; Deaton, 328 F.3d at 455. In a number of cases evaluating the effect of

erroneous jury instructions, the appellate courts have examined images themselves and, on that basis, determined that those images were of real children. See Becht v. United States, 403 F.3d 541, 549 (8th Cir. 2005); Hall, 312 F.3d at 1260; United States v. Richardson, 304 F.3d 1061, 1064 & n.2 (11th Cir. 2002).

B. Vitality of Nolan

This leaves the defendant's alternate argument that technology has progressed so far that we should abandon the approach that there is no per se rule that the government must provide an expert opinion that an image is of a real child. We understand the dissent to join this argument, but not to argue that Free Speech Coalition itself overrules Nolan.

A panel of this court is normally bound to follow an earlier panel decision that is closely on point, unless an exception exists to the principles of stare decisis. Williams v. Ashland Eng'g Co., 45 F.3d 588, 592 (1st Cir. 1995) (subsequent case history omitted). As a leading commentator has stated:

The doctrine of stare decisis provides that courts must abide by or adhere to cases that have been previously decided and that a legal decision on an issue of law that is contained in a final judgment is binding in all future cases on the court that made the legal decision and all other courts that owe obedience to that court. In other words, the doctrine of stare decisis incorporates two principles: (1) a court is bound by its own prior legal decisions unless there are substantial reasons to abandon a decision; and (2) a legal decision rendered by a court will

be followed by all courts inferior to it in the judicial system.

3 J. Moore et al., Moore's Manual -- Federal Practice and Procedure § 30.10[1] (2006) (footnotes omitted).

In this circuit, we have recognized two exceptions to this stare decisis rule.⁶ The first exception applies when "[a]n existing panel decision [is] undermined by controlling authority, subsequently announced, such as an opinion of the Supreme Court, an en banc opinion of the circuit court, or a statutory overruling." Williams, 45 F.3d at 592. This exception does not apply here, as there is no Supreme Court opinion, en banc opinion of this circuit, or statute that overrules Nolan.

We have also recognized a second, limited exception that permits one panel to overrule another in "those relatively rare instances in which authority that postdates the original decision, although not directly controlling, nevertheless offers a sound reason for believing that the former panel, in light of fresh developments, would change its collective mind." Id. The second exception likewise does not apply to this case. The dissent argues that we should overrule Nolan under this second exception in part

⁶ Williams cited generally to Colby v. J.C. Penney Co., 811 F.2d 1119 (7th Cir. 1987), which concerned the misapplication by a district court of stare decisis principles. Colby discussed the differences between deference due to authoritative versus persuasive decisions and the wisdom of one circuit court considering the views of other circuit courts in order to maintain uniformity in federal law. Id. at 1123. Here, of course, every circuit court to consider the issue has rejected defendant's proposed rule.

because of technological developments. But the "fresh developments" considered in Williams were not technological changes but rather fresh developments in the law in the form of the views of another circuit court. Id.; see also Carpenters Local Union No. 26 v. U.S. Fid. & Guar. Co., 215 F.3d 136, 145 (1st Cir. 2000).

We made clear the limits of the second Williams exception in Eulitt v. Maine, 386 F.3d 344 (1st Cir. 2004), stating that "[a] second exception exists when recent Supreme Court precedent calls into legitimate question a prior opinion of an inferior court." Id. at 350 (emphasis added) (citing Carpenters Local, 215 F.3d at 141 (overruling circuit precedent in light of two Supreme Court cases); Crowe v. Bolduc, 365 F.3d 86, 89, 92 (1st Cir. 2004) (overruling circuit precedent in light of a Supreme Court case)). Further, in United States v. Guzmán, 419 F.3d 27 (1st Cir. 2005), the court described the second Williams exception as applying in "instances that fairly may be described as hen's-teeth rare." Id. at 31.

The Nolan rule is that the issue on appeal of whether a pornographic image is of a real child is to be treated as a sufficiency of the evidence question, evaluating the evidence as a whole. There is no reason, much less a compelling reason based on new facts, to abandon that rule,⁷ even assuming that new fact

⁷ The dissent attempts to analogize to a drug identity case and claims that expert testimony or at least the opinion of a knowledgeable lay person is required to establish the illicit nature of a substance. This is not accurate. "Proof based on

developments may lead to abandonment by one panel of a prior circuit precedent. The Supreme Court has recognized in itself (but not necessarily in the circuit courts) the power to depart from stare decisis "to bring its opinions into agreement with experience and with facts newly ascertained." Vasquez v. Hillery, 474 U.S. 254, 266 (1986) (quoting Burnet v. Coronado Oil & Gas Co., 285 U.S. 393, 412 (1932) (Brandeis, J., dissenting)) (internal quotation marks omitted). The present rule, rather than an inflexible rule requiring that expert evidence must be provided by the prosecution, reflects a far better method to accommodate developments in technology. No occasion is presented here to depart from the principles of stare decisis based on technological developments.

Defendant and the dissent also rely on language in Free Speech Coalition indicating that Congress was concerned that new technology made it possible to produce realistic virtual images and, as technology improved, experts may have difficulty distinguishing virtual images from real images. But defendant and the dissent insufficiently appreciate language in Free Speech Coalition that refers to the continuing use of real children:

scientific analysis or expert testimony is not required to prove the illicit nature of a substance, and identification of a substance as a drug may be based on the opinion of a knowledgeable lay person." United States v. Walters, 904 F.2d 765, 770 (1st Cir. 1990) (emphasis added). In Walters, we also said that "[a]s a general matter, '[i]dentification of a controlled substance does not require direct evidence if available circumstantial evidence establishes its identity beyond a reasonable doubt.'" Id. (second alteration in original) (quoting United States v. Harrell, 737 F.2d 971, 978 (11th Cir. 1984)).

If virtual images were identical to illegal child pornography, the illegal images would be driven from the market by the indistinguishable substitutes. Few pornographers would risk prosecution by abusing real children if fictional, computerized images would suffice.

Free Speech Coalition, 535 U.S. at 254.

Whatever improvements may eventually be made in technology,⁸ the Supreme Court's observation about the market for child pornography is still correct. There is no basis to assume that the producers of child pornography have widely converted to

⁸ The dissent cites several articles on the state of technology. At most, the articles describe the kinds of photographic alterations that are possible with recent technological advances, but they do not say that images of real and virtual people are indistinguishable. See M. Aspan, Media; Ease of Alteration Creates Woes for Picture Editors, N.Y. Times, Aug. 14, 2006, at C4 (noting only that photographic alterations of real images may be difficult to detect); H. Farid, Digital Doctoring: How to Tell the Real from the Fake, 3 Significance 162, 162-66 (2006), available at <http://www.cs.dartmouth.edu/farid/publications/significance06.pdf> (describing the possibility of creating composite photographs using existing images of real people, but not commenting on the creation of realistic images of virtual people); C. Johnston, Digital Deception, Am. Journalism Rev., May 1, 2003, at 10 (discussing composite images of real people, not images of virtual people); S.L. Leach, Seeing Is No Longer Believing, Christian Sci. Monitor, Feb. 2, 2005, at 15 (describing methods of photographic manipulation, but not suggesting that current technology allows creation of virtual people that are indistinguishable from real people). The dissent also cites a law review note for the proposition that "[t]here is wide agreement that an ordinary person cannot generally tell a real image from a virtual one." T.J. Perla, Note, Attempting to End the Cycle of Virtual Pornography Prohibitions, 83 B.U. L. Rev. 1209, 1220 (2003). However, the note provides no support for this claim beyond a reference to a commercial brochure advertising virtual image rendering hardware. Id. at 1220 n.60. The brochure makes no claims as to the ability of a non-expert to distinguish between real and virtual images of people.

exclusive use of virtual pornography. Even before Free Speech Coalition, Nolan made the point that, given the proliferation and sheer number of the pornographic images available, common sense strongly suggests that many of the images on the market are of real children. 818 F.2d at 1018.

Nor is there any reason to think that the exploitation of real children to produce pornography has ceased. We know as a matter of fact that the market continues using real children to produce pornography because the cases, including this one, continue to have in them direct evidence that a real child was used. See, e.g., Frabizio, 459 F.3d at 82 & n.3; United States v. Smith, 459 F.3d 1276, 1287 (11th Cir. 2006); United States v. Mack, 452 F.3d 744, 745 (8th Cir. 2006). In this case, multiple images taken from defendant's computer were identified as depicting real children, after comparing the images to those compiled in the Child Exploitation and Obscenity Reference File and the database maintained by the FBI's Child Victim Identification Program. Defendant himself admitted that one of the images was of a real child.

Nor is there any reason to assume that particular images on which a prosecution is based have been produced by such superior technology. In this case, for example, certain of the images had been published in magazines from the 1970s or 1980s, well before there was the capacity to do any realistic form of virtual imaging.

The burden of proof remains on the government to prove the pornographic image is of a real child. The overarching legal point is the holding stated in Nolan: "[T]he prosecution was not required, as part of its affirmative case, to rule out every conceivable way the pictures could have been made other than by ordinary photography." 818 F.2d at 1020; see also United States v. Smith, 680 F.2d 255, 259 (1st Cir. 1982) ("The Government . . . need not exclude every reasonable hypothesis of innocence, provided the record as a whole supports a conclusion of guilt beyond a reasonable doubt."); 26 J. Moore et al., Moore's Federal Practice § 629.05[2] (3d ed. 2006) ("Proof beyond a reasonable doubt does not require that the government adduce evidence excluding all reasonable defense theories, thereby leaving only the conclusion of guilt independently proved.").

We should not be misunderstood: the government at all times has the burden of proof by a preponderance of the evidence at sentencing, and the defendant has no burden. There is nothing inconsistent between the government's having that burden and Nolan's statement that the defendant, while under no obligation to do so, was "free to have presented evidence of his own suggesting that the picture[] used other than real subjects. He could have called an expert to testify as to how photographs like [this one] could have been made without using real children." Nolan, 818 F.2d at 1020. If defendant had chosen to mount a defense of this type

and presented such expert testimony, and had the government not called an expert to explain why the image was not real, the government ran the risk of not persuading the trier of fact. This does not shift the burden of proof. The evaluation of the sufficiency of the evidence is done on the record as a whole, not on "bright line" tests such as the one defendant advances.

C. Unpreserved Arguments Made By The Dissent

The dissent injects new arguments into the case which were not raised by Rodriguez-Pacheco in the district court or on appeal. As such, the arguments have been waived. See United States v. Gobbi, 471 F.3d 302, 312 n.4 (1st Cir. 2006).

The dissent first makes the novel argument that the proceedings below were unfair and so the defendant was sandbagged. Defendant never made this argument at any time. If defendant thought there was procedural unfairness, he would have said so. The dissent's procedural unfairness argument is without merit in any event. The argument seems to be that defendant came to expect there would be an expert opinion on each of the ten images, and his disappointed expectations mean the case should be remanded. The argument, which has other deficiencies, ignores the fact that when the government prepared the case, the panel opinion in Hilton I required expert testimony, and so the case proceeded on that basis. Before the expert gave his testimony, the law had changed, the rule in Hilton I had been withdrawn, and the defense was well aware of

the change. Defendant knew from the outset of the sentencing hearing that the government would present an expert on the reality of the images. Yet he chose not to introduce his own expert, or offer any evidence of his own that the images were not of real children. Further, the district court's reference to "scientific, technical or other specialized skill" to help it determine the reality of children depicted in the prosecution's exhibits came when it explained its reasons for admitting Dr. Vorder Bruegge as an expert witness, over defense counsel's objection. That could not have misled defendant.⁹

The dissent next makes the novel argument that it was error for the district court not to sua sponte infer from the government's failure to ask Dr. Vorder Bruegge for his opinion on Exhibit 16, that he would have said, if asked, that the image was not of a real child. The defense did not ask for such an inference;¹⁰ its argument was that, whatever the government's reasons for not questioning the expert on Exhibit 16, only an

⁹ The dissent quotes the district court at the September 29, 2004 hearing as stating, "I can't make a finding unless I have an expert that this is a minor." The district court was obviously unaware at the time that this requirement, imposed by Hilton I, had been withdrawn by Hilton II on September 27, 2004.

¹⁰ It is clear from the prosecutor's statements at the hearing that she thought she had asked Dr. Vorder Bruegge's opinion on Exhibit 16. The prosecutor even accused the defense of misstating the record. The court was then required to go back into the record.

expert, not a court or even a jury as factfinder, could make that determination.

The dissent also gains no support from cases in which adverse inferences are requested and drawn, based on a party's failure to produce a witness at all. See, e.g., Olszewski v. Spencer, 466 F.3d 47, 61 (1st Cir. 2006). Here, there was no failure to produce a witness, only a failure to ask a particular question from a produced witness. Further, no inference can be drawn, contrary to the dissent, from the district court's failure to take over the examination of the witness when Exhibit 16 was not raised during questioning.

Finally, the dissent makes another argument which was not made by defendant on appeal. Defendant's argument on appeal is that the law requires the government to produce the opinion of an expert that an image is of a real child, and, since no such opinion was offered, therefore the evidence was insufficient, regardless of the other evidence. We have rejected that legal proposition. The dissent makes a different argument that the remaining evidence was insufficient as a matter of evidence. The dissent confuses the role of the expert with the district court's role as factfinder. That argument is also waived. Nonetheless, we discuss why the argument fails.

The government met its burden of proof by a preponderance of the evidence. The district court as finder of fact was entitled

to use Dr. Vorder Bruegge's testimony about criteria relevant to determining whether an image is real to assist it in making its own determination concerning Exhibit 16. The expert testified that computer-generated images have difficulty recreating the characteristics of human eyes and skin. He also stressed the importance of evaluating how individuals in an image interact with one another and their environment -- factors to consider included shadows, gravity, and the effect of pressure on a human body. The expert also evaluated flesh and muscle tone on human images. The district court judge adopted Dr. Vorder Bruegge's methodology, making clear that his conclusion as to the reality of the child in Exhibit 16 was "[b]ased on the testimony that [the expert] provided as to all of the other photographs [and] the criteria that he was using." Further, the judge "conclude[d] that the skin, that the tonation of the muscles, that both hands on the thighs of the male impress the Court that this is not a virtual image but it is a real image." The district court made these findings, applying Dr. Vorder Bruegge's methodology. That is sufficient. The district court had sufficient evidence, and no evidence to the contrary,¹¹ to conclude that Exhibit 16 depicted a real child.

¹¹ When the court commented on the failure of the defendant to produce an expert, and so it had to use its own judgment, it was in the context of the defendant's argument that a factfinder could not, without particular expert testimony, have an opinion as to the reality of a depicted child. The district court drew its own conclusion that the image was real, noting that it was given no testimony that the image was not real.

Having addressed the dissent's additional arguments, we note that defendant himself does not otherwise challenge the court's finding that the tenth image is of a real child.

The sentence is affirmed.

"Dissenting opinion follows"

TORRUELLA, Circuit Judge (Dissenting). Although the appellant was charged with a serious and opprobrious crime, as with any person accused under our system of justice, irrespective of the nature of the government's allegations against him, he is entitled to due process of law. The government has failed to meet its burden of establishing by competent evidence a crucial element that must be proven before the district court can apply enhanced sentencing factors. See Ashcroft v. Free Speech Coalition, 535 U.S. 234, 256 (2002) (clarifying that the government may not criminalize possession of non-obscene sexually explicit images that appear to be, but do not in fact, depict real children); United States v. Hilton (Hilton II), 386 F.3d 13, 19 (1st Cir. 2004) (same). Thus appellant has not received all the process that is due to him. Because my colleagues in the majority have concluded otherwise, I am compelled to respectfully dissent.

Succinctly put, for the sentencing enhancement established in U.S.S.G. § 2G2.4(b)(2) (2002) to be validly applied by the district court in this case, the government had to establish that Appellant David Rodríguez-Pacheco ("Appellant") possessed at least ten proscribed images. The government only properly proved that he possessed nine images of actual, real minors. Unfortunately, after the close of the evidence, the district judge erroneously proceeded to provide the missing link by concluding, without adequate foundation in the evidence, that there was a tenth

image of an actual person. Because there was no such tenth image established by adequate proof, in my opinion, we have no alternative but to disallow the resulting sentence, and to remand the case for appropriate sentencing.

As will be shown hereinafter, the district court committed three pivotal errors, related in nature, but distinct in factual and legal significance. Individually and collectively these errors inevitably lead to the outcome I suggest.

First, if we consider the district court's rulings throughout most of the sentencing process, Appellant was led to believe that the government would need to prove the reality of the persons depicted for all of the images introduced to prove the sentencing enhancement. The court's last minute change of course, whereby it effectively relieved the government of its burden, was not only a legally incorrect shifting of the burden that properly belongs to the government, see Hilton II, 386 F.3d at 18, but it also left Appellant high and dry at a point in the proceedings when it was most tactically disadvantageous. Second, although the government presented competent evidence regarding the reality of nine of the ten images introduced into evidence for the purpose of enhancing Appellant's sentence, it failed to do so regarding the tenth image, notwithstanding its opportunity and legal burden to do so. An inference was thus raised that the government was unable to prove this element as to that tenth image. This inference was

never overcome by competent evidence to the contrary, and thus the basis for the attempted sentencing enhancement fails. Third, given the state of scientific, technical, and specialized knowledge extant today in the digital reproduction of photographic images, the district judge was independently unqualified to reach a valid conclusion regarding whether the tenth image represented a real person. Because there was no proper evidentiary foundation presented as to the tenth image, the district court could not independently find a crucial fact, i.e., that the image was of a real person. Thus, the government failed to meet its burden in this respect and the district court erroneously applied the sentencing enhancement.

I. The Initial Proceedings

A Superseding Indictment charged Appellant with a single count of possessing prohibited visual depictions in violation of 18 U.S.C. § 2252(a)(4)(B). In its relevant portions, this statute prohibits the knowing possession of matter which contains any visual depiction if "(i) the producing of such visual depiction involves the use of a minor engaging in sexually explicit conduct; and (ii) such visual depiction is of such conduct."¹² The statute

¹²18 U.S.C. § 2252(a)(4)(B) states in full:

(a) Any person who--

(4) either--

(B) knowingly possesses 1 or more books, magazines, periodicals, films, video tapes, or other matter which contain any visual depiction that has been mailed, or has been shipped or

defines "minor" as "any person under the age of eighteen years," 18 U.S.C. § 2256(1), and "sexually explicit conduct" as conduct specified in 18 U.S.C. § 2256(2) (A).¹³

Appellant pled guilty to the charged violation pursuant to a straight plea. See Hr'g on Change of Plea Tr. 2, Sept. 27, 2004.¹⁴ For purposes of that plea, Appellant admitted to possessing "at least one photograph which traveled in interstate commerce by use of a computer and [that] those depictions represent a minor engaging in sexually explicit conduct." Id. at 28; see also id. at

transported in interstate or foreign commerce, or which was produced using materials which have been mailed or so shipped or transported, by any means including by computer, if--

(i) the producing of such visual depiction involves the use of a minor engaging in sexually explicit conduct; and

(ii) such visual depiction is of such conduct.

¹³18 U.S.C. § 2256(2) (A) states in relevant part that: "sexually explicit conduct" means actual or simulated--

(i) sexual intercourse, including genital-genital, oral-genital, anal-genital, or oral-anal, whether between persons of the same or opposite sex;

(ii) bestiality;

(iii) masturbation;

(iv) sadistic or masochistic abuse; or

(v) lascivious exhibition of the genitals or pubic area of any person.

¹⁴The date on the cover of the transcript reads "27th day of February, 2001." This is an obvious error as Appellant was not indicted until July 9, 2004. This is one of several errors found throughout a confused and deficient transcript record. The corrected date of September 27, 2004 is corroborated by Docket Entry No. 51.

29, 37, 53, 74,¹⁵ 76, 78-81. He contested "[e]verything else." Id. at 37. Specifically, he refused to accept two sentencing allegations charged in the indictment, id. at 22-23, 37-39, 48-49, each of which would result in a two-level increase under the sentencing guidelines: (1) that he knowingly possessed images of a prepubescent minor engaging in sexually explicit conduct, U.S.S.G. § 2G2.4(b)(1) (2002), and (2) that he knowingly possessed at least ten images of a minor engaging in sexually explicit conduct, id. § 2G2.4(b)(2).

The district court, after extensive interchanges with Appellant, his lawyer, and government counsel, accepted the plea as entered by Appellant and subject to the caveats expressed by Appellant and his lawyer. Hr'g on Change of Plea Tr. 37, 81, Sept. 27, 2004. The court issued an order setting a hearing in which the government would be required to prove that "a number of images, more than ten, (for the enhancement to be potentially applicable), consist[] of real images, of minors of prepubescent age engaging in sexually explicit conduct." Order 6, Feb. 8, 2005; see also Evidentiary Hr'g Tr. 47, 54, 58, Sept. 29, 2004. Relying on these rulings, Appellant waived a jury trial on the enhancement issues. See Hr'g on Change of Plea Tr. 50-54, Sept. 27, 2004.

¹⁵Although included in the transcript dated September 27, 2004, the testimony beginning on page 73 apparently took place on September 29, 2004.

Appellant's explicit refusal to accept these two critical allegations put the government on notice early on that it would have to establish by competent evidence (1) that the persons depicted in the images engaging in sexually explicit conduct were less than eighteen years of age and prepubescent, and (2) that at least ten of the depictions in Appellant's possession were of actual real persons engaging in such conduct. See Free Speech Coalition, 535 U.S. at 244, 256; Hilton II, 386 F.3d at 19.

The district court clearly understood "competent evidence" regarding the age of those depicted in the images to mean expert testimony. The district judge stated twice during the course of the proceedings, "I can't make a finding unless I have an expert that this is a minor." Hr'g on Change of Plea Tr. 77, Sept. 27, 2004; Evidentiary Hr'g Tr. 66, Sept. 29, 2004. The court's understanding of "competent evidence" as to the second element, the actual reality of the persons depicted in the images, was equally clear:

The ruling of the Court, pursuant to Rule 702, states, scientific, technical or other specialized knowledge will assist the trier of fact to understand evidence or determine a fact in issue. And in this case there is a fact in issue, and that is whether or not these are authentic, real images or whether they are virtual images. So scientific, technical or other specialized skill is needed.

Sentencing Hr'g Tr. 18-19, Apr. 7, 2005 (emphasis added); see also Hr'g on Change of Plea Tr. 44, Sept. 27, 2004 ("[APPELLANT'S

COUNSEL]: And they would have to bring an expert to testify as to that. THE COURT: Yes, they will.").

These are the premises under which the government proceeded to present its sentencing enhancement case, see, e.g., Evidentiary Hr'g Tr. 53, Sept. 29, 2004 ("[GOVERNMENT COUNSEL]: The requirement that exists is that we have to establish real children. The Court has to enter specific findings."), and these are the premises relied upon by Appellant before the rug was pulled out from under him when it was too late to do anything about it, id. at 54.¹⁶

¹⁶Counsel for the defense, in what turned out to be a prophetic interchange with the district judge, stated during the course of the September 29, 2004 hearing:

[APPELLANT'S COUNSEL]: If we're having the sentencing hearing today does this preclude the government coming in January and trying to present -- suppose they don't prove ten photographs does that preclude the government from coming in January and trying to prove ten photographs then?

THE COURT: No. I am holding the hearing as to the enhancement today. That's it.

Evidentiary Hr'g Tr. 60, Sept. 29, 2004. The import of this and surrounding discussions was that the government would have to establish by expert witnesses the relevant ages of the persons depicted and that they were real persons, and that failure to do so would mean the enhancements would not be applied.

II. The Government's Sentencing Enhancement Case

At the sentencing hearing, the government chose to meet its burden¹⁷ by calling two separate expert witnesses: (1) one expert to establish that the images depicted persons within the parameters of the statutory definition of minors and that at least one such depiction was of a child of prepubescent age, and (2) a second expert to establish that the depictions were of real children.

A. Dr. Pedro Jaunarena Pérez -- The Government's Expert on Age Determination

The government called Dr. Pedro Jaunarena Pérez ("Dr. Jaunarena"), a pediatrician, to testify as to the ages of the persons depicted in Exhibits 6 through 8 and 10 through 16 -- ten images in total. The government established that Dr. Jaunarena earned his undergraduate and medical degrees at the University of Puerto Rico, and did his internship at the Albert Einstein Medical Center in Philadelphia, thereafter completing his residency in pediatrics at the university hospital in the Puerto Rico Medical Center. He has been a practicing pediatrician since 1962, and in

¹⁷This was another area in which the district court showed considerable equivocation, allowing Appellant to proceed under the assumption that the government would have to prove the age and reality of the persons depicted in the images by proof beyond a reasonable doubt, see Hr'g on Change of Plea Tr. 54, Sept. 27, 2004; Evidentiary Hr'g Tr. 59-60, Sept. 29, 2004; Sentencing Hr'g Tr. 37, Apr. 13, 2005, rather than by a preponderance of the evidence as properly required, see United States v. Woodward, 277 F.3d 87, 91 (1st Cir. 2002).

private practice since 1967, when he became board certified in pediatrics by the American Board of Pediatrics and the Board of Medical Examiners. He is a member of the Puerto Rico Medical Association, the Asociación Puertorriqueña de Pediatría, and the American Academy of Pediatrics, in which he belongs to its section on child abuse. As a member of the latter, he has attended and participated in numerous seminars and presentations on child abuse and receives a monthly journal on that subject. He was a pediatric director of the Tyndal Air Force Base Hospital for several years, and in addition to his present private practice, is an attending pediatrician at Hospital Auxilio Mutuo in San Juan, Puerto Rico. Sentencing Hr'g Tr. 3-6, 29-30, Apr. 13, 2005.

In his practice, Dr. Jaunarena "only see[s] children from newborn to age 21." Id. at 7. During the course of this practice he has examined "over one fourth of a million children." Id. at 8.

Dr. Jaunarena has testified as an expert in seven to eight cases before the present one, where he was asked to determine the ages of children in pornographic pictures or images shown to him. The medical criteria used by Dr. Jaunarena to reach his conclusions included sexual maturity scales, the best of which in his opinion is the Tanner scale, a method of determining the maturity of children, adolescents, and adults,¹⁸ and his own

¹⁸See Hilton II, 386 F.3d at 15; see also David T. Cox, Litigating Child Pornography and Obscenity Cases in the Internet Age, 4 J. Tech. L. & Pol'y 1, 143-44 (1999). But see Arlan L. Rosenbloom & James M. Tanner, Letter to the Editor, Misuse of

experience. He had to view over one thousand images portraying children in those cases. Id. at 8-9, 20.

Based on these qualifications, the district court concluded "that [Dr. Jaunarena] has enough experience for the Court to accept him as a pediatrician and from reading images, determining the age of persons." Id. at 11.

Dr. Jaunarena then proceeded to testify in detail regarding the methodology used in the determination of the chronological age of children. See id. at 24-29. Based on his experience as a pediatrician, observation of physical characteristics, depending on the sex of the individual, and use of the Tanner scale, Dr. Jaunarena testified that he was able by just seeing a naked child to reach an opinion as to the age range of that child "within . . . one year, plus or minus." Id. at 28-29.

Thereafter, using this methodology, Dr. Jaunarena examined a series of images which the government alleged had been taken from Appellant's computer,¹⁹ namely, Government's Exhibits 6, 7, 8, 10, 11, 12, 13, 14, 15, and 16, giving his expert opinion regarding the age of the person depicted in each image, and substantiating his opinion in each case in accordance with the

Tanner Puberty Staging to Estimate Chronological Age, 102 Pediatrics 1494 (1998) (stating that the Tanner scale is properly used to estimate sexual maturation, not for the purpose of estimating specific chronological age).

¹⁹The images had been previously identified by Héctor X. Colón, an FBI computer forensic expert. See Evidentiary Hr'g Tr. 2 et seq., Sept. 29, 2004.

methodology upon which he relied. Id. at 32 (Exhibit 6), 35 (Exhibit 7), 34-35 (Exhibit 8), 35-36 (Exhibit 10), 36 (Exhibit 11), 38 (Exhibit 12), 39 (Exhibit 13), 39-40 (Exhibit 14), 40 (Exhibit 15), 40-41 (Exhibit 16). In the case of all ten exhibits, Dr. Jaunarena testified that the images depicted minor persons and that at least nine of them were of prepubescent children. Id.

B. Dr. Richard Vorder Bruegge -- The Government's Expert on Real/Virtual Imaging

On the question of the reality of the images presented to prove the second enhancement for possession of ten or more prohibited images, the government called as a witness Dr. Richard Vorder Bruegge,²⁰ an FBI image analyst with impressive credentials. Dr. Vorder Bruegge has worked for the FBI for the last twenty years and is presently assigned to the FBI's forensic audio, video, and image analysis unit as an examiner of questioned photographic evidence. Part of his work involves "image authentications, determining such things as whether a person depicted in an image is real or whether an image has been altered in some way." Sentencing Hr'g Tr. 6, Apr. 7, 2005. Dr. Vorder Bruegge also conducts research in his field of expertise, provides instruction to others in law enforcement and forensic science, and serves on internal and

²⁰The transcripts indicate that the witness's last name is spelled "Vorder Brugge," but this is apparently a mistake. Appellant's Brief indicates that it is "Vorder Bruegge." I adopt the latter spelling, including in quoting the transcripts.

external committees developing guidelines for the use of images in law enforcement. Id. at 4-6.

Dr. Vorder Bruegge received his formal training at Brown University, where he earned a bachelor of science degree in engineering, and thereafter a master of science degree and a doctorate in geological sciences. Ten years ago he entered a two-year training program within the FBI laboratory designed to train examiners of questioned photographic evidence. The training included instruction in basic photography, laboratory photography, and forensic photography; courses at the Rochester Institute of Technology in digital imaging, digital image processing, and the use of Adobe Photoshop, a software tool, in an engineering or technical environment; video training at the Sony Institute; and training in the use of a forensic platform called Avid. The FBI also hired Professor Peter Ratner from James Madison University, who "runs a program that is geared at creating computer-generated people and creating computer-generated animations, . . . [to] come in and teach a one-week class on how one goes about creating 3-D people, as well as how one goes about seeing where the flaws are in 3-D computer-generated people so it's possible to discriminate between what is a computer-generated person and what is not." Id. at 6-7, 12 (emphasis added).²¹

²¹I will explain the reason for the emphasis below.

The most important part of Dr. Vorder Bruegge's training, however, was on the job, working on cases while being supervised by a qualified senior examiner. About 30% of his everyday practice deals with image authentication, which for the most part involves child pornography cases. Dr. Vorder Bruegge has worked on over a dozen such cases, in connection with which he has reviewed more than 10,000 images. Id. at 7-9, 12.

Dr. Vorder Bruegge's expertise in this field has been recognized by his peers. He has been named a fellow of the American Academy of Forensic Sciences, which is the highest level of membership in the Academy and makes him eligible to be an official of the Academy. Dr. Vorder Bruegge is also a member of the International Association for Identification, and at the time served as chair of the scientific group of imaging technology ("SWGIT"). SWGIT is an organization of state, federal, and international law enforcement agencies, as well as members of academia, whose mission is the development of guidelines and best practices for the use of photography and imaging sciences in law enforcement. See also Scientific Working Group on Imaging Technology, International Association for Identification, <http://www.theiai.org/guidelines/swgit/index.php>. Other relevant professional and scientific organizations to which Dr. Vorder Bruegge belongs include the American Society for Photogrammetry and Remote Sensing, the International Society for Optical Engineering,

the Tau Beta Pi engineering honor society, and the Sigma Xi honor society of research scientists. Sentencing Hr'g Tr. 7-8, Apr. 7, 2005.

Based upon these qualifications, the court ruled that Dr. Vorder Bruegge was qualified as an expert under Rule 702 because his "scientific, technical or other specialized knowledge will assist the [district judge] to understand evidence or determine a fact at issue." Id. at 18-19 ("I find that this gentlemen has training and can use his past education. And by that, I mean his doctorate. Even in the field of his doctorate, he has experience in that he has 10,000 photographs evaluated. He seems to have skills, and he has acquired knowledge. So, therefore, the Court will admit him as an expert."). The district judge decided that given the posture of the case and the court's prior rulings, "there is a fact in issue, and that is whether or not these are authentic, real images or whether they are virtual images . . . [and thus] scientific, technical or other specialized skill is needed." Id. at 19 (emphasis added). It is important to note that this ruling was made immediately after, and in the context of, Dr. Vorder Bruegge's testimony that he had taken a course given by Professor Ratner on the creation of computer-generated virtual persons. See supra text accompanying note 10.

In authenticating an image, Dr. Vorder Bruegge testified, there is a "sort of triage system in place." Sentencing Hr'g Tr.

9, Apr. 7, 2005. First, the expert determines if there are any known victims, individuals who have previously been identified in images, or if the image is from a known database, such as the Child Exploitation and Obscenity Reference File ("CEORF"), which is a database of images found in magazines that were published in the 1970s and 1980s. The CEORF was created by Dr. Vorder Bruegge's unit in the FBI. The expert's identification of a known victim or image serves the double purpose of identifying the victim and determining the approximate date when the image was created. If the image is of a person in the CEORF, it is possible to discount the possibility that it is not of a real person, as such technology did not become available until long after the time period covered by the CEORF. Id. at 9, 28-29. Two other important databases of known victims are the FBI's Child Victim Identification Program and the National Center for Missing and Exploited Children's related, but separately maintained, database. Id. at 28-30.

Once the available databases are checked, if the image is not found therein, a scientific protocol has been established to determine whether the image is real, has been altered, or was computer-generated. Dr. Vorder Bruegge testified in detail regarding the methodology used in determining whether an image depicts a real person. The analysis comprises two parts: One involves determining whether the image depicts a real person, and the other, whether the image has been manipulated. Id. at 20.

The question of whether an image has been manipulated is analyzed first. This is done by visual inspection. Computers enable Dr. Vorder Bruegge and others who do this work to inspect the images in a highly magnified manner for signs of manipulation. "For example, if a head is cut off one picture and superimposed on another, there may be signs of that cutting and pasting operation and by analyzing the [magnified] image, it's possible to look for defects that would indicate this type of manipulation." Id.

In looking for signs of manipulation, there are a number of features that the expert checks. These include making sure that the light in the scene is consistent; checking for differences in color within the scene;²² looking for consistency in the patterns in a scene, such as variations in the paneling of the walls in a courtroom; checking for variations in the texture or grain of the image -- which are detected when the image is magnified -- which would demonstrate that two different types of film were used; and comparing the focus, or depth of field, across an image. Id. at 20-22.

Second, to determine whether there is a real person depicted in the image, the expert looks at the characteristics of the people in question. A computer-generated person created by a state-of-the-art computer today does not have totally realistic

²²"[S]kin tones are something that is very difficult to recreate and match . . . and so one [needs to go] through the process of examining all parts of a body to look for variations." Sentencing Hr'g Tr. 21, Apr. 7.

human features, as there are certain characteristics, such as the eyes and skin, that are difficult to recreate from scratch with a computer. Id. at 23.

The skin is a real problem because a great deal of detail is required to make it look real. Three dimensional animation only creates a static model, and as the character is moved to another position, to be realistic, it must be "painted by hand Each picture, to be realistic, has to be hand altered. There is a checklist of skin features" that the expert must consider in determining whether a person in an image is real or computer generated. Id. at 24-25.

Another area that requires special attention in the determination of whether an image depicts a real person is that of the attachment of the limbs to the torso. With human beings, the attachment of the limbs to the torso occurs in a very supple way, which is very difficult to recreate on a computer. The expert therefore looks for "crimps" at the intersections where arms or legs meet the body as evidence that an image is a 3-D recreation. Id. at 25.

The expert also looks for "defects like moles, freckles, scars, even the fine wrinkles in the mouth [and] ears. Ears are something that computer artists have an incredibly hard time getting right because they think that an ear is just something that you slap on the side of the head, but an ear actually has a lot of

detail to it and it can move[;] . . . it can shift as you are talking" Id. at 26.

How individuals in a picture interact with one another and their environment is also "very critical in assessing the reality of the image." Id. This is reflected in a number of ways, including whether shadows realistically fall across the body of another person depicted, such that it is "[n]ot just a shadow painted on a two-dimensional object but the shadow has to conform to the three-dimensional nature of the person or the environment behind it." Id. As another example, "if you have a person sitting on a couch or on a bed, the material underneath the person should react in a realistic fashion to the presence of that person. . . . You have to basically program gravity into it and that isn't something that is easy to do." Id. at 26-27.

In sum, the expert methodology

consists of going through this checklist of all the things that make an image appear to be real and then make human beings appear to be real, and determining if there is any violation of those observations that would indicate that there is something wrong with the image and lead one to the conclusion that this is not an accurate image of a real person.

Id. at 27-28.

Dr. Vorder Bruegge further testified that if there are multiple images of one person of "sufficient quality, then based on the fact that there are many images of the same person, the quality

exceeds that possibility to create in an artificial manner, then we will conclude that it is a real person." Id. at 31. However, "if we have only a single image, we do not . . . positively conclude that that [sic] is a real person because the state-of-the-art of image processing is such that someone . . . with a sufficient, significant amount of skill, time and willingness to spend the time can create a perfect fake image -- it is possible that someone could create one single fake image" Id. at 30-31 (emphasis added).

In addition to following an established methodology, Dr. Vorder Bruegge's reports regarding authentication of images are subject to peer review. Every report that is written in Dr. Vorder Bruegge's laboratory "must be peer reviewed and a second qualified examiner must sign off on the conclusions and report," thus validating the reports by agreeing that the evidence supports the conclusions therein. Id. at 33.

After obtaining testimony regarding standard methodology, the government proceeded to elicit Dr. Vorder Bruegge's expert opinion regarding the images depicted in Government's Exhibits 5 through 17, all of which he had examined on a prior occasion and which had been duly identified with his initials.

Dr. Vorder Bruegge testified that in his expert opinion Exhibit 5 depicts a real child. Id. at 38-39; Sentencing Hr'g Tr. 7-8, Apr. 8, 2005. He reached this conclusion based on the high

degree of detail in the picture, as well as the fact that there are other pictures of this individual. Sentencing Hr'g Tr. 8, Apr. 8, 2005.

As to Exhibits 6, 7, 8, and 9, Dr. Vorder Bruegge's opinion that the images depict real children was based in part on the fact that the same individuals and scenes are depicted in magazines known to have been published prior to April 1986. His conclusion also depended on his expert examination of the quality and level of detail in the images, and that there are multiple pictures depicting the same individuals and scenes. Id. at 9-11, 16-17.

Exhibit 10, which Appellant had already admitted as representing an image of a real child as part of his change of plea colloquy, was nonetheless testified to by Dr. Vorder Bruegge as representing, in his expert opinion, a real person and events. Id. at 19.

Dr. Vorder Bruegge next testified regarding Exhibits 11 through 15, stating generally that "it is [his] opinion that these pictures all depict real people and events." Id. at 20. He was then individually quizzed as to each of these images: Exhibit 11, id. at 23 (agreeing "that the image depicts real people with real events"); Exhibit 12, id. (same); Exhibit 13, id. at 23-24 (same); Exhibit 14, id. at 24 (same); and Exhibit 15, id. (same). Dr. Vorder Bruegge alternatively based his opinion regarding

Exhibits 11 through 15 on the fact that they were all part of the "Helen series" in one of the databases, id. at 25-26, and that "they are high quality images with a lot of detail and there are many of them. That is the basis, being able to look at those images and say, this is the same person and location and events, [that] enabled [Dr. Vorder Bruegge] to reach the opinion that they are real." Id. at 27.

The government then jumped to Exhibit 17, proceeding to question Dr. Vorder Bruegge regarding this image in the same manner as it had regarding Exhibits 5 through 15, and establishing that of the two persons depicted in the image, the girl laying below depicted a real person, but the individual above her had been manipulated in some way. Id.

No questions were asked of Dr. Vorder Bruegge by the government (nor anyone else) regarding Exhibit 16, and of course, neither did he testify that the image in said Exhibit 16 depicts a real person, and thus, the government was short one image to prove the enhancement sought against Appellant.

It is important to point out that immediately before Dr. Vorder Bruegge was cross-examined by the defense, a discussion arose regarding the status of Exhibits 1 through 19, that is, whether they had been admitted into evidence, during which the following exchange took place:

THE COURT: There is no admission as to the matter of being under age and having been real images.

[APPELLANT'S COUNSEL]: They're admitted in the sense that they were images taken from my client's computer.

THE COURT: For those purposes they have been admitted. For this matter [i.e., the enhancement hearing], they have not been admitted. . . .

[GOVERNMENT COUNSEL]: Except, of course, Exhibit No. 10[, which was part of the plea].

Id. at 29.

Thus, there can be no question in anyone's mind that as to all these exhibits the government had tendered (that is, Exhibits 1 through 19, including 16, but except Exhibit 10), the government had the burden of establishing that the images depicted real persons. At that point, of course, Dr. Vorder Bruegge was still available to the government, and in fact, was still on the stand, under oath, and the defense had not even commenced cross-examination.

Why the government failed to ask their expert, Dr. Vorder Bruegge, whether or not the image depicted in Exhibit 16 represented a real person is totally irrelevant. What is relevant -- the only sure, cold fact on the record -- is that notwithstanding the fact that Dr. Vorder Breugge was available to testify, that he had undisputably examined Exhibit 16 prior to taking the stand, and that he testified to exhaustion as to all of

the other government exhibits, giving his expert opinion based on the methodology described at length above, Dr. Vorder Bruegge did not speak when it came to Exhibit 16, the critical tenth image.

I shall presently discuss the legal consequences of the inference raised by this silence. Suffice it to say for the present that the negative inference that is raised against the government by its failure to inquire of Dr. Vorder Bruegge his opinion of the image in Exhibit 16 is compounded by the fact that even after the defense's cross-examination of Dr. Vorder Bruegge, the government had a second opportunity to ask Dr. Vorder Bruegge about this critical missing link when it engaged in redirect examination of him, yet again failed to do so. Id. at 43-44.

Appellant's counsel conducted a tactically deliberate cross-examination of Dr. Vorder Bruegge, avoiding mention of Exhibit 16 like the plague. Id. at 31-43. He was, of course, perfectly entitled not to inquire about a subject not raised in direct examination and as to which the government had the burden of proof. See Hilton II, 386 F.3d at 18. He was also entitled to count on the district court not coming to the aid of the government, a subject which I shall cover in more detail presently. However, what is worth mentioning at this time is that not only did the government fail to inquire from Dr. Vorder Bruegge about Exhibit 16, but the district court judge also did not at any time avail himself of Dr. Vorder Bruegge's expertise, although obviously

it had plenty of opportunity to do so before the expert was excused after a friendly farewell. See Sentencing Hr'g Tr. 45-56, Apr. 8, 2005.

In actual sequence, Dr. Jaunarena's testimony followed that of Dr. Vorder Bruegge, with his taking the stand on April 8, 2005, and finalizing his testimony on April 13, 2005. Before resting its case, the government recalled Héctor X. Colón, an FBI agent that had testified on direct examination back on September 29, 2004 regarding retrieval of the images from Appellant's computer, see Evidentiary Hr'g Tr. 2, Sept. 29, 2004, to allow him to be cross-examined by Appellant, see Sentencing Hr'g Tr. 57-58, Apr. 8, 2005. We need not discuss his testimony further as it is not relevant to the issue of this appeal. Suffice it to say that eventually the government rested its case without presenting any evidence that Exhibit 16 depicted a real person. See Sentencing Hr'g Tr. 12-13, Apr. 20, 2005. Appellant's lawyer wisely did not fill the lacuna left open by the government.

Even at this late date in the proceedings, there was much equivocation and backtracking by both the government and the district court on the evidence that had to be produced by the government to prove that the images were of real children:

[GOVERNMENT COUNSEL]: It is our understanding that it remains after Ashcroft versus Free Speech, that [it] is [an] element of the offense that the children portrayed in the child pornography images are correct.

THE COURT: That is the law. You still have to prove that they're real. But they backed off from Hilton [I] And now additional evidence is not required. That is what I understand.

[GOVERNMENT COUNSEL]: . . . [A]nd now we're back to Nolan again. The United States versus Nolan would still be good law, which stood for the premise that a fact-finder can make a determination without the requirement of presenting expert witness testimony.

THE COURT: That's right. In other words, I don't even need him, the doctor.²³ I don't even need him.

[GOVERNMENT COUNSEL]: That's correct.

THE COURT: But you do need experts for the real images?

[GOVERNMENT COUNSEL]: No, Your Honor.

THE COURT: I don't?

[GOVERNMENT COUNSEL]: No, Your Honor.

THE COURT: In other words, I can also conclude the real images?

[GOVERNMENT COUNSEL]: Yes, Your Honor.

Sentencing Hr'g Tr. 98-99, Apr. 13, 2005 (footnote added). The government then argued that several circuit courts have decided since the Ashcroft decision that expert testimony is not required to establish that images depict real persons. Id. at 99-101. The conversation continued:

[APPELLANT'S COUNSEL]: I do believe that after Hilton [II] the Court is required

²³Dr. Jaunarena was the doctor then on the stand.

to have certainty beyond a reasonable doubt this is a person.

THE COURT: If it's an element of the offense. If it's an element of the offense, it is by the most strictest [sic] of standards, which is beyond a reasonable doubt . . . and they have decided that it is an element of the offense that the images be real.

[APPELLANT'S COUNSEL]: How is the Court to determine that, except by an expert who says that they are?

THE COURT: The expert can be used.

Id. at 101-02.

The district court then went on to point out that in the withdrawn Hilton I opinion, which overruled Nolan, "[i]n addition to the images, something else had to be presented," a requirement which was absent from the "new" Hilton II opinion. Id. at 102. Compare United States v. Hilton (Hilton I), 363 F.3d 58, 64 (1st Cir. 2004) (overruling United States v. Nolan, 818 F.2d 1015 (1st Cir. 1987)), with Hilton II, 386 F.3d at 18-19. The district judge added: "Nonetheless, I have been provided two experts, one as to real images and the other one as to the ages." Sentencing Hr'g Tr. 103, Apr. 13, 2005.

The next day of the hearing, on April 20, 2005, the court stated:

THE COURT: . . . I'm reading Hilton [III] in that I do not necessarily need an expert to make a determination as to either real images or as to minority and/or prepubescent age.

. . .
[GOVERNMENT COUNSEL]: . . .
Nonetheless, in this case we did submit that
the expert testimony of ---.

THE COURT: But there were certain
photographs that you did not produce an
expert, so I'm going to have to see all 15 of
them again. . . .

[APPELLANT'S COUNSEL]: Your Honor, I
have an issue with all of this. Number one, I
think that under Hilton [II], you need an
expert.

Sentencing Hr'g Tr. 18, Apr. 20, 2005.

**III. The Crossing of the Rubicon:
The District Court Applies the Enhancements**

The issue presented by this appeal came to a head on
April 26, 2005, when the court called a wrap-up hearing "to examine
each photograph to determine whether or not [it had] a real image
and to determine whether or not . . . one of the 10 images [was] of
prepubescent age." Sentencing Hr'g Tr. 2, Apr. 26, 2005. All went
well for the government as to Exhibits 6, 7, 8, 10, 11, 12, 13, 14,
and 15. Id. at 10-18.

Two problems arose, however, the first with Exhibit 9 and
the second with Exhibit 16. The government needed at least one of
these two to go into evidence to meet the minimum ten images
required for the sentencing enhancement.

The government ran into problems with Exhibit 9 early on.
Although Dr. Vorder Bruegge testified that this exhibit was an
image reflecting real people and real events, this exhibit was not

shown to Dr. Jaunarena. Id. at 13-15. That being the case, the district judge concluded that "for the time being" he would make no determination as to the age of the person. Id. at 14.

But later on, the district judge stated with respect to Exhibit 9: "[Dr. Jaunarena] jumped 9. The Court will [therefore] not make a finding as to this one. I have doubts." Id. at 23. The judge then went on to say: "So notwithstanding, I have 10 real images, and one prepubescent age. [The][t]en real images are 6, 7 and 8. That's three. 10, [four]; 11, [five]; 12, [six]; 13, [seven]; 14, [eight]; 15, nine; and 16, [ten]." Id. (emphasis added). The trouble with this arithmetic is, of course, that Exhibit 16 suffered from the same defect as Exhibit 9, except in the inverse.

Dr. Jaunarena had examined Exhibit 16, given his expert opinion, and been subject to cross examination regarding Exhibit 16, but not regarding Exhibit 9, which was thus excluded. The opposite was the case with respect to Exhibit 16: Dr. Vorder Bruegge, although he examined Exhibit 9, subjected it to his expert methodology, and gave his opinion regarding its contents, gave no evidence as to the crucial Exhibit 16, notwithstanding having examined it in accordance with established scientific methodology, and additionally, notwithstanding his being within the control of the government as its full-time employee. Of course, since he did not testify on the question of the reality of the image depicted in

Exhibit 16, he was not subjected to the crucible of cross-examination, or even to questioning by the court.

Counsel for Appellant made the best of what was obviously a bad situation for his client, the district court having made an apparent mid-course change based on its interpretation of the law. The district judge concluded his factual determination:

16 is real and a minor. The argument as to 16 is that I have no proof that it's real. He's right. I've examined the record, and other than the photography, do not have an expert. He's right.

All right. He's right. There is no expert. . . . Nolan has not been overturned now.

So the Court, because there was no evidence that it was not real, then I have to use my judgement whether it was real or not, and I conclude that it is real.

Based on what? Based on the testimony that the doctor provided as to all of the other photographs, the criteria that he was using. I'm going to borrow those criteria and state that I conclude that 16 is also a real image. That's it.

. . .
For me the critical matter was that I received no evidence whatsoever that it was not real. I see it, it looks real, and I use the criteria of Dr. Vorder Bruegge . . . and that's the end of the ballgame.

Id. at 38-39 (emphasis added).

IV. The Rest of the Ball Game

A. Burdens, Inferences, and No-Hitters

Of course, it was hardly the "end of the ball game," for the burden was on the government to affirmatively prove that the image in Exhibit 16 depicts a real person. Hilton II, 386 F.3d at 18 ("It bears repeating that the government is not released from its burden of proof by a defendant's failure to argue, or by an absence of evidence otherwise suggesting, the artificiality of the children portrayed. That the children in the images are real amounts to an element of the crime which the government must prove, the burden of which should not be displaced to the defendant as an affirmative defense."). Appellant was not required to prove or even raise the reality issue.²⁴

Not only did the district court inappropriately shift the burden, but it also lulled the defense into believing that the

²⁴Contrary to the majority's position, Nolan's statement that the defendant is free to present evidence that the image in question is not real is inconsistent with the fact that the government has the burden to prove that an image is real. Requiring the defendant to come forward with evidence on an element for which the government has the burden of proof is an impermissible shifting of the burden to the defendant. "It is now generally recognized that the 'presumption of innocence' is an inaccurate, shorthand description of the right of the accused to remain inactive and secure, until the prosecution has taken up its burden and produced evidence and effected persuasion" Taylor v. Kentucky, 436 U.S. 478, 483 n.12 (1978) (internal quotation marks omitted). As I explain in more depth below, the probability that an image is not real is high enough to require the government to present some evidence to the contrary. Otherwise, as a matter of law, the government's evidence is insufficient to meet its burden of proof.

burden was fully on the government to prove by expert testimony that ten images were real. The defendant based his defense strategy on that belief. But on the last day of the sentencing hearing, as described above, the district court suddenly switched gears, permitting itself as the factfinder to make its own determination without any expert help.

Furthermore, the district court's error in failing to place due weight on the government's burden was compounded in this case because Dr. Vorder Bruegge's failure or refusal to testify regarding the reality of Exhibit 16 raises an inference, unrebutted by competent evidence, that the reality of Exhibit 16 was in doubt. See United States v. Charles, 738 F.2d 686, 698 (5th Cir. 1984) ("In general, the failure to produce a favorable witness or other evidence when it is peculiarly within a party's power to do so creates an inference that the witness' testimony will be unfavorable."); see also Graves v. United States, 150 U.S. 118, 121 (1893) ("[I]f a party has it peculiarly within his power to produce witnesses whose testimony would elucidate the transaction, the fact that he does not do it creates the presumption that the testimony, if produced, would be unfavorable."); United States v. Ariza-Ibarra, 651 F.2d 2, 15-16 (1st Cir. 1981) (permitting an adverse inference from a witness's failure to testify if "the evidence shows that the witness is available to testify on behalf of the party, that the testimony of the witness would be relevant and

noncumulative, and that the witness is not prejudiced against the nonproducing party"); Olszewski v. Spencer, 466 F.3d 47, 61 (1st Cir. 2006) (same); United States v. Davis, 261 F.3d 1, 57 (1st Cir. 2001) ("The evidence must be 'specially available' to the non-producing party"); United States v. West, 393 F.3d 1302, 1309 (D.C. Cir. 2005) ("A missing-evidence instruction is appropriate if it is peculiarly within the power of one party to produce the evidence and the evidence would elucidate a disputed transaction."); United States v. DeVita, 526 F.2d 81, 83 (9th Cir. 1975) ("Indeed, from the government's failure to produce a single item of evidence from the surveillance in support of founded suspicion, the only rational inference was that the informant was unreliable at the time he gave the second tip.").

In this case:

(1) Dr. Vorder Bruegge, an FBI expert of questioned photographic evidence with impeccable credentials, was available to testify regarding the image in Exhibit 16;

(2) Dr. Vorder Bruegge had Exhibit 16 in his possession and it was therefore available for inspection, study, and analysis in accordance with the scientifically recognized methodology to which he testified;

(3) Dr. Vorder Bruegge gave his expert opinion regarding nine other government exhibits, which were similar in nature to

Exhibit 16 and which he also had in his possession and inspected, studied, and analyzed in accordance with the mentioned methodology;

(4) Dr. Vorder Bruegge testified that in his opinion the nine other exhibits depict real persons and incidents;

(5) Dr. Vorder Bruegge failed to testify regarding whether or not the image and scene depicted in Exhibit 16 is real.

In view of these unassailable facts, the rational inference arising from the record before the district court is that had Dr. Vorder Bruegge testified regarding Exhibit 16 on the issue of the "disputed transaction," i.e., whether or not the image depicts a real person, his testimony would have been unfavorable to the government's contention that it depicts a real person. See West, 393 F.3d at 1309. Yet the district court nowhere addressed this inference or the fact that the government offered no appropriate evidence to overcome the inference, and in fact no such evidence was available on the record before the district court.

B. The Majority's Galileo Conundrum

In making its present contention that expert testimony is unnecessary for a factfinder to determine whether or not a photograph depicts a real person, the government blithely chooses to overlook the paper trail that it has left and in which it took a diametrically opposed position. Unfortunately for the government, it is a trail that is not easily hidden and cannot be

facilely bypassed, for it runs through, and has been noted in, high places, as well as places that are not so high.

When before the Supreme Court in Free Speech Coalition, arguing in favor of the constitutionality of the statutory provision that banned virtual pornographic reproductions of children as well as real images, the government contended that "[v]irtual images . . . are indistinguishable from real ones . . . [and even e]xperts . . . may have difficulty in saying whether the pictures were made by using real children or by using computer imaging." 535 U.S. at 254 (emphasis added). We took note of the government's position on this very point when we decided Hilton II. 386 F.3d at 17 ("The government's second argument [in Free Speech Coalition] was that eliminating actual child pornography necessitates the prohibition on virtual pornography because virtual images are indistinguishable from real ones." (emphasis added)).

That virtual and real child pornography images are indistinguishable, and that even experts have difficulty determining what is real and what is virtual, are not only undeniable scientific judgments promoted by the government in Free Speech Coalition and Hilton II, they are also conclusions which were unquestionably verified in the present case by the government's own actions, including the testimony of its own expert witness, Dr. Vorder Bruegge. Sentencing Hr'g Tr. 30-31, Apr. 7,

2005 ("[T]he state-of-the-art of image processing is such that someone . . . can create a perfect fake image . . .").

Considering the evidence presented by the government itself, I think it is proper to ask: Why would the FBI have a scientific laboratory (as testified to by Dr. Vorder Bruegge), with experts (such as Dr. Vorder Bruegge) dedicated to engaging in complex scientific analysis pursuant to an established methodology designed for the purpose of determining whether photographic evidence in its possession depicts real or virtual images, in the process of which the government undoubtedly spends considerable amounts of public funds, if anyone, as the government now claims, even someone without scientific, technical, or specialized knowledge, and without engaging in the scientific methodology described by Dr. Vorder Bruegge, can determine the reality of questioned photographs merely by looking at the images alone?

It is also worth noting that the government's other expert, Dr. Jaunarena, a pediatrician since 1962, who has examined over 250,000 children, and who was able to testify about the ages of those depicted in the exhibits presented by the government, including Exhibit 16, was apparently not considered sufficiently qualified to render an opinion as to the reality of those exhibits, including Exhibit 16. Cf. Hilton II, 386 F.3d at 18-19 (rejecting the government's argument that it was "commonsensical" that because an expert pediatrician testified that the images depict minor

children, this testimony was sufficient to establish the further element of reality). If an expert pediatrician is unqualified to render an opinion as to the reality of an image depicting children, how is it possible for a district judge to do so without any personal expertise on the subject, without the aid of expert opinion to help him reach a conclusion as to the reality of that photograph, and without the benefit of peer review?

This was substantially what Appellant's lawyer argued to the district court:

You are quite an accomplished lawyer, but you are not an expert, the Court is not an expert on identification. . . . [A]s the Court is probably aware, I'm basically making my appellate record here.

But the Court has not the curriculum vitae of Dr. Vorder Bruegge, the Court has not taken the continuing education on virtual photography that Dr. Vorder Bruegge took, the Court has not examined the three databases which Dr. Vorder Bruegge used.

The Court has no experience in addressing colors, tones, the patterns on the picture, texture of the image, quality of the film, consistency of photos. The Court doesn't have the parameters to determine whether the eyes, the skin, muscle tone and skeletal structure are consistent. The Court doesn't have any of the qualifications that Dr. Vorder Bruegge said were indispensable for him to reach a conclusion. The Court has not been cross-checked by another expert like Dr. Vorder Bruegge says he has.

The Court has no standards upon which to base this determination, that photograph 16 is . . . a real image of a person.

Sentencing Hr'g Tr. 24-25, Apr. 26, 2005. He forgot to add that the Court was not -- and could not be -- subjected to cross-examination.

The lack of expert testimony as to Exhibit 16 specifically, which would have allowed the factfinder to then reach its own conclusion as to the reality of the image, could not be remedied by the district court's simplistic and conclusory analysis:

I conclude that [Exhibit 16] is real. Based on what? Based on the testimony that the doctor provided as to all of the other photographs, the criteria that he was using. I'm going to borrow those criteria and state that I conclude that 16 is also a real image. That's it.

Id. at 38-39 (emphasis added).

Well, that's not it at all, for all the reasons argued by Appellant's counsel. That kind of bootstrap operation employed by the district court was totally inappropriate.

C. The Stare Decisis Red Herring

The government proposes that notwithstanding the present state of scientific knowledge, as well as the Supreme Court's ruling in Free Speech Coalition, we are bound by United States v. Nolan, 818 F.2d 1015 (1st Cir. 1987). It further argues that several of our sister circuit courts who have passed upon the issue before us since Free Speech Coalition have also concluded that the district court, or jury, as the trier of fact is capable of reviewing the evidence to determine whether the government has met

its burden and established that the images depict real children, without the need for expert testimony. See United States v. Slanina, 359 F.3d 356, 357 (5th Cir. 2004) (per curiam) ("[T]he Government was not required to present any additional evidence or expert testimony to meet its burden of proof to show that the images downloaded by Slanina depicted real children, and not virtual children."); Becht v. United States, 403 F.3d 541, 549-50 (8th Cir. 2005) (citing United States v. Deaton, 328 F.3d 454, 455 (8th Cir. 2003) (per curiam)); United States v. Sims, 428 F.3d 945, 956-57 (10th Cir. 2005) (citing United States v. Kimler, 335 F.3d 1132, 1142 (10th Cir. 2003)); United States v. Farrelly, 389 F.3d 649, 653-54 (6th Cir. 2004), abrogated on other grounds by United States v. Williams, 411 F.3d 675, 678 n.1 (6th Cir. 2005); United States v. Hall, 312 F.3d 1250, 1260 (11th Cir. 2002) (citing United States v. Richardson, 304 F.3d 1061, 1064 & n.2 (11th Cir. 2002)).

There are several reasons why adherence to Nolan by this panel regarding the specific issue before us -- i.e., whether the government needs an expert witness to establish that the person depicted is real -- is not required, the first two reasons being related to the year in which Nolan was decided, 1987.

First, it is clear that Nolan was dealing with images reproduced before 1986. See 818 F.2d at 1016 ("The parties stipulated that on June 3 and 6, 1985, United States Customs mail specialists discovered Swedish parcels mailed to Nolan, containing

a number of [child pornography] publications"). According to the testimony of the government's witness in the present case, Dr. Vorder Bruegge, the Nolan images could not have been anything but real -- and therefore there was no need for expert testimony in that case -- because it was not "until long after" the FBI created the CEORF database in 1986 that the technology became available to create a virtual image of a person. Sentencing Hr'g Tr. 26, Apr. 7, 2005. Thus, the government's need for an expert witness to establish the reality of the images in Nolan is, by today's scientific standards, a non-issue. But there is more to this.

We said in Nolan that "the test for a factfinder's power to judge evidence without expert help is . . . whether the subject is within the range of normal experience and knowledge." 818 F.2d at 1018. As the government's conduct clearly establishes, as Dr. Vorder Bruegge's testimony strongly reinforces, and further, as both Free Speech Coalition and Hilton II recognize, determining whether an image is real or virtually created is not only no longer within the "range of normal experience and knowledge" of the average person, but it may also very well be "difficult" for even experts "[to say] whether the pictures were made by using real children or by using computer imaging." Free Speech Coalition, 535 U.S. at 254. Additionally, the Supreme Court was not just relying on the arguments of the parties in Free Speech Coalition; it specifically said that "[t]he new technology, according to

Congress, makes it possible to create realistic images of children who do not exist." Id. at 240 (emphasis added).

The fact is that Nolan is today scientifically unsound, and slavish insistence upon its outmoded dogma is the equivalent to insisting on a modern day Galileo conundrum.²⁵ The scientific evidence available today is overwhelmingly contrary to that which existed in Nolan's day, and in the present case, it is clearly established by the uncontradicted testimony of the government's own expert witness, Dr. Vorder Bruegge, Sentencing Hr'g Tr. 12, 30-31 Apr. 7, 2005 (testifying about a course the expert took at the FBI laboratory taught by Professor Peter Ratner, who runs a program at James Madison University on creating computer-generated people, and also testifying that "the state-of-the-art of image processing is such that someone . . . with a sufficient, significant amount of skill, time and willingness to spend the time can create a perfect fake image."), as well by the pronouncements of Free Speech Coalition and Hilton II. There is simply no question that today it is possible to create virtual images of humans that are indistinguishable from the real thing.²⁶

²⁵Galileo was tried by the Inquisition in 1633 on suspicion of heresy for his defense of heliocentrism, Copernicus's theory that the earth revolved around the sun, rather than that the earth was the center of the universe.

²⁶Suggested reading includes: Hany Farid, Digital Doctoring: How to Tell the Real from the Fake, 3 Significance 162 (2006), available at <http://www.cs.dartmouth.edu/farid/publications/significance06.pdf> ("Today's technology allows digital media to be altered and manipulated in ways that were simply impossible twenty

Furthermore, Nolan's ruling that the government need not call a photography expert "to negate the mere speculative possibility of such fakery," 818 F.2d at 1018-19, cannot stand against the present record. First of all, Nolan conceded that the pictures were "on their face, representations of what looked like minors engaging in sexually explicit conduct." Id. at 1017. That is not the present case. Here, counsel for Appellant refused to allow his client to be boxed in to such an unwarranted predicament. In entering a straight plea to the Superseding Indictment,

years ago."); Susan Llewelyn, Seeing Is No Longer Believing, Christian Science Monitor, Feb. 2, 2005, at 15 ("Today, with the advent of inexpensive software, the manipulation of digital images is easier, faster, and harder to detect. . . . The human eye can now rarely detect [photographic tampering]. That becomes critical in the court room, where digital photographs are used as evidence"). Perhaps a good starting point for the technically impaired (*i.e.*, most judges) is Timothy J. Perla, Note, Attempting to End the Cycle of Virtual Pornography Prohibitions, 83 B.U. L. Rev. 1209 (2003), which among other things contains an excellent overview and explanation of the technical aspects of this entire area in fairly understandable terms, and which states:

There is wide agreement that an ordinary person cannot generally tell a real image from a virtual one. Most commentators also agree that technology is quickly evolving to the point where even an expert will not be able to differentiate real and virtual images.

Id. at 1220; cf. Maria Aspan, Media; Ease of Alteration Creates Woes for Picture Editors, N.Y. Times, Aug. 14, 2006, at C4 (demonstrating that even professional photo editors are increasingly duped by altered photographic images); Cheryl Johnston, Digital Deception, Am. Journalism Rev., May 1, 2003, at 10 (same).

To the extent the majority suggests that the above articles do not stand for my proposition, I simply rest on the text of the articles and suggest that the articles be read more carefully.

Appellant only admitted to possessing one photograph whose "depictions represent a minor engaging in sexually explicit conduct" -- he contested "everything else." Exhibit 16 was, of course, not the one admitted to by Appellant. Thus, contrary to what the court in Nolan expected of that defendant, id. at 1020 n.4 ("The defense produced no expert of its own to show that the pictures were fakes or other than what they appeared to be."), under the present state of the law, "[a]fter Free Speech Coalition, the government must prove that an image depicts actual children[,]. . . [and] the government is not released from its burden of proof by a defendant's failure to argue, or by an absence of evidence otherwise suggesting, the artificiality of the children portrayed. That the children in the images are real amounts to an element of the crime which the government must prove, the burden of which should not be displaced to the defendant as an affirmative defense." Hilton II, 386 F.3d at 18 (citing Free Speech Coalition, 535 U.S. at 256). In this the government failed and the district court was unwarranted in filling the gap.

Because the legal and scientific underpinnings of Nolan are no longer with us, we should allow that case to rest in peace without further ado. See Vásquez v. Hillery, 474 U.S. 254, 266 (1986) ("Our history does not impose any rigid formula to constrain the Court in the disposition of cases. Rather, its lesson is that every successful proponent of overruling precedent has borne the

heavy burden of persuading the Court that changes in society or in the law dictate that the values served by stare decisis yield in favor of a greater objective."). I believe this is an occasion like that in Carpenters Local Union No. 26 v. United States Fidelity & Guaranty Co., in which we stated:

When emergent Supreme Court case law calls into question a prior opinion of another court, that court should pause to consider its likely significance before giving effect to an earlier decision. . . . Let us be perfectly clear. We value finality, stability and certainty in the law, particularly in the field of statutory construction. But stare decisis is neither a straightjacket nor an immutable rule; it leaves room for courts to balance their respect for precedent against insights gleaned from new developments, and to make informed judgments as to whether earlier decisions retain preclusive force.

215 F.3d 136, 141-42 (1st Cir. 2000) (citations omitted); see also Eulitt v. Me. Dep't of Educ., 386 F.3d 344, 349 (1st Cir. 2004); Stewart v. Dutra Constr. Co., 230 F.3d 461, 467 (1st Cir. 2000), rev'd, 543 U.S. 481 (2005); Williams v. Ashland Eng'g Co., 45 F.3d 588, 592 (1st Cir. 1995); Gately v. Massachusetts, 2 F.3d 1221, 1226 (1st Cir. 1993).

We are no longer bound by Nolan.

D. On the Question of Our Sister Courts of Appeal

Although the views of other courts of appeal are usually heavily persuasive, I submit, with all due respect, that on the issue before us the other courts of appeal that have considered this matter have not reached the correct conclusion. Again with

due respect to those who differ from me, arithmetic is not determinative of scientific truth. It made no difference how many cardinals said that the sun revolved around the earth, it did not make this asseveration a scientific truth. And it is scientific truth that trumps the day on the issue before this court. It is now beyond scientific dispute that it is possible to create virtual photographic images that can only be detected (with difficulty) by experts. Thus, experts are required before factfinders can make their findings on this issue.²⁷ I do not recall any mention of this scientific knowledge, one way or another, in any of the appellate opinions cited in opposition to my views.²⁸

²⁷It is not unusual to require expert testimony -- or at least testimony of an appropriately knowledgeable lay person -- in other areas of the law when an opinion is based on specialized knowledge and the assistance of an expert is indispensable. See, e.g., Fed. R. Evid. 701, 702; United States v. Walters, 904 F.2d 765, 770 (1st Cir. 1990) (requiring expert testimony or the opinion of a knowledgeable lay person to establish the illicit nature of a substance); United States v. Dixon, 185 F.3d 393, 406 (5th Cir. 1999) (holding that expert testimony would be needed to explain a defendant's medical records in order to show that he satisfied the test for insanity); Reed v. Sullivan, 988 F.2d 812, 819 (8th Cir. 1993) (finding that expert testimony was needed to establish whether a disabled person could perform certain sedentary jobs); Salem v. United States Lines Co., 370 U.S. 31, 32 (1962) (requiring expert testimony to prove negligence on the part of a ship owner who had failed to provide railings on a ladder leading to a crows nest).

²⁸Some of the cases respond to the argument that due to technological advances, Free Speech Coalition requires the use of expert testimony to prove that an image is real by claiming that the Supreme Court in that very case said that the hypothesis that real images are indistinguishable from virtual images is "somewhat implausible." See Kimler, 335 F.3d at 1142; United States v. Farrelly, 389 F.3d at 655. These cases, however, misquote Free Speech Coalition. The "hypothesis" that the Supreme Court found

For the reasons stated above, I respectfully dissent. I would reverse and remand this case for resentencing.

implausible is that "virtual images promote trafficking in works produced through the exploitation of real children," not that real images are indistinguishable from virtual ones. 535 U.S. at 254.