

"The Use of Voice as a Forensic Tool"

by Steve Cain

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This is the first of two articles on the use of the voice as a forensic tool by prosecutors. This article deals with the use of voiceprints in linking suspects to a crime or crime scene. A subsequent article will deal with tape enhancement and forensic tape authentication.

The caller on the 911 line was requesting an ambulance because, he said, he thought the woman in Apartment 204 was badly injured or perhaps dead. The caller did not identify himself.

The case turned out -to be murder and later, when the police had a suspect, the district attorney used a spectrograph to check the suspect's voice with the tape-recorded voice of the 911 caller.

Bingo! The voiceprints matched and now the DA had some evidence to work with.

Many murder cases that hinge on the matching of voiceprints involve tape-recorded 911 calls, according to Steve Cain, one of the nation's leading experts on voiceprint (or spectrograph) technology.

"Often it's the murderer who calls," he says, "because he feels sympathy for his victim and he calls to get an ambulance there before the victim dies. Or he may call to taunt the police and say, 'Hey, you s.o.b.s, that's one more I killed and you can't catch me.' Quite often the only clue the police have is that 911 call, with a tape from a recorder of not good quality. And we've got to clean it up, take out the extraneous noise and then get a sample of the suspect's voice, for comparison. The suspect cannot refuse to provide a voice sample. Under the law he's required to do it. All you need is a court order. Then we make the match and go to court and testify against him."

Cain is president of Applied Forensic Technologies International of Chicago and Lake Geneva, Wisconsin, which specializes in voiceprint and audio tape analysis, tape authentication, polygraph examinations and analysis of questioned documents. He has more than 25 years experience in forensic science, including service as an agent in both the U.S. Secret Service and Internal Revenue Service. He was chief of the voiceprint units and senior document examiner for

both the Secret Service and IRS as well as chief polygraph examiner for the IRS, with extensive courtroom testimony experience, including California's notorious Hillside Strangler case.

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As Cain explained in an article he wrote for the Criminal Division of the U.S. Department of Justice — in collaboration with Lonnie Smrkovski, chief of the voiceprint unit of the Michigan State Police and Mindy Wilson, a psychologist and private examiner practicing in Lansing, Michigan — the fundamental principle of voice identification rests on the fact that like a fingerprint, every voice is unique and "individually characteristic enough to distinguish it from others through...analysis." Fingerprints are identified through literal analysis; voices are identified through comparative voiceprints. Cain points out that uniqueness in human speech is the product of two general factors.

"The first," he says, "lies in the sizes of the vocal cavities such as the throat, nasal and oral cavities and the shape, length and tension in an individual's vocal cords located in the larynx. The vocal cavities are resonators, much like organ pipes, which reinforce some of the overtones produced by the vocal cords, which produce formats or voiceprint bars. The likelihood that two people would have exactly the same size and configuration (is) very remote. "The second factor in determining voice uniqueness is the manner in which the "articulators" or muscles of speech are manipulated when an individual is talking. The articulators include the lips, teeth, tongue, soft palate and jaw muscles, "whose controlled interplay"— Cain explains — "produces intelligible speech...The likelihood that two persons could develop identical use patterns of their articulators also appears to be very remote."

While Cain agrees that "there is disagreement in the so-called 'scientific community' on the degree of accuracy with which examiners can identify speakers under all conditions, there is agreement that voices can, in fact, be identified."

Several studies have been published on the reliability of voice identification. A Federal Bureau of Investigation survey of its own performance in the voiceprint examination of 2,000 forensic cases revealed an error rate of 0.31 percent for false identifications and 0.53 percent for false eliminations.

The process of identifying voices visually involves translating the wave patterns produced by the voice into a pictorial display called a spectrogram. The spectrogram serves as a permanent record of the words spoken and facilitates

the visual comparison of similar words spoken by an unknown and known speaker's voice.

Is it possible for a person to "fool" a spectrograph (the device that produces the spectrogram)?

Not really, Cain says.

"You can disguise your voice," he notes, "but you're not fooling the spectrograph; you're just not giving a parallel sample. If you distort your natural speaking voice to the point that you're not giving parallel voice samples you're really not comparing apples and apples. You're comparing apples and oranges. An experienced operator would notice this immediately. If I see this I won't stand for it and I will tell the court I will not accept such a sample and often they'll throw the defendant in jail for failing to comply with the district attorney's request for a natural, undisguised sample."

Cain says that it's essential that speech samples contain exactly the same words and phrases as those in the questioned sample, because only identical speech sounds are used for comparison. He says the suspect should not be allowed to read the phrases from a transcript but should repeat each phrase after it is spoken by someone else. To avoid an unnatural response, the suspect should repeat the first phrase and proceed in the same manner with each successive phrase.

What are the limits of the accuracy of voiceprints?

'The limits," says Cain, "generally are the quality of the evidence it self. It's like any other pattern-matching skill, such as handwriting. You have to have good samples."

Do voiceprints compare in accuracy to fingerprints?

"If done properly, yes, in my opinion," says Cain, who adds, "However, with fingerprints you have static images that don't change unless some damage is done to the fingerprint ridge detail. In voiceprints these are dynamic qualities. For example, when you say good morning to your wife or husband early in the morning before you've had your first cup of coffee and then say it again later in the morning there will be some changes in the pitch of your voice and how you stress certain vowels. That's why we get several repetitions of a speaker's voice, saying the same thing, so we can find the range of variation."

Courts have repeatedly held that requiring a suspect to submit to voice samples for the purpose of comparison does not violate the suspect's Fifth Amendment rights. The definitive case is U.S. v. Wade, 388 US. 218, 87 S Ct. 1926 (1967) which held that the privilege against self-incrimination offers no protection from

compulsion to submit to speaking for voice identification or to writing, photographing, fingerprinting and measurements.

Voiceprints are gaining progressively more approval in the federal courts. The second, fourth, sixth and seventh circuits already have approved and the ninth has given a tentative OK. Voiceprints are not admissible in California state courts, Cain notes, because, he says, "The proponents made stupid errors in overstating the accuracy of the tests in a hypothetical that a good defense attorney posed for them. This was a mistake and it has plagued us for years."

Steve Cain's advice to district attorneys contemplating the use of voiceprints in cases where such evidence is admissible and would be valuable:

"Have the FBI or someone like myself in private practice examine the tape and extract all the extraneous noises and clean it up, so you get a clean, clear sample. And by all means have an experienced examiner take the voiceprints."

Second Article Tape Enhancement "[NDAA Bulletin January 1992 Vol 110 No 6](#)"