

FORENSIC SPEECH AND AUDIO ANALYSIS WORKING GROUP TERMS OF REFERENCE FOR FORENSIC SPEAKER ANALYSIS			
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Aims and objective

1) The purpose of this document is to provide the Forensic Speech and Audio Analysis Working Group (FSAAWG) members guidelines for forensic speaker analysis (F.S.A.) in order to successfully present their reports or testimonies in a court of law.

2) The F.S.A. guidelines are directed towards:

1) Methods:

- a) methods for F.S.A.,
- b) the effectiveness degree of every F.S.A.,
- c) samples analysis,
- d) samples admission criteria,
- e) decision statements,
- f) evaluation of methods;

2) Expert profile;

3) Quality Assurance.

3) The FSAAWG Business Meeting decides upon a detailed list of Aims and Objectivities which will be updated periodically.

1. METHODS

a) Methods for F.S.A.

F.S.A. is currently approached through different compatible methodological alternatives. These methodologies provide a high level of reliability when properly implemented.

b) The effectiveness degree

The effectiveness degree of every F.S.A. technique will depend primarily on three factors:

- i) Nature or condition of samples,
- ii) Expert profile,
- iii) System performance (suitability) for each specific case.

Currently, F.S.A. Methodologies involve different approaches that deal with several types of speech parameters (acoustic, phonetic, linguistics etc.).

Assessments for analysis and calculation of data can be undertaken or complemented through semi-automatic or fully-automated software (Automatic Speaker Recognition Systems - ASR).

Given the particular characteristics commonly associated to forensic audio recordings, each F.S.A. methodology and its corresponding training programs must be adapted to the needs and goals of the forensic arena.

c) Samples analysis

Forensic speech recordings are often affected by a wide range of unfavorable factors. To attain better conditions in comparison tasks, under the assumption of dealing with samples of a minimum level of quality and sufficient duration, samples and speaker data bases used should be produced in the most similar format possible: language, speak manner, transmission & recording systems, quality, duration (SRAS), etc.

Commonly, inter-sample variability factors between the suspect's recordings, the questioned material and the speech data bases will have a negative effect on the accuracy of comparison results. In some cases, when evaluating the quality of samples, this type of mismatch could lead to a decision not to proceed with further comparison analysis.

In general terms, regardless of the technique used, the following are regarded as unfavorable conditions when carrying out any F.S.A. comparison task:

- Limitations due to short frequency range, amplitude range, duration;
- Errors in playback or recording speeds;
- Poor SNR;
- Speech samples that include any type of distortion or other interfering sounds, reverberations, etc.;
- Critical alterations of voice quality, speaking manner (rate, stress, disguise, whispering, shouting, effects of drugs, alcohol etc.);
- Noticeably differences between samples as a result of channel mismatch, coding or compression formats, etc.

When possible, those parameters considered for comparison purposes must be properly evaluated in relation to their corresponding population references.

d) Samples admission criteria

Every forensic audio laboratory must follow a set of criteria for admission of samples (quality and durations margins, languages, etc.) regardless of the corresponding protocols for handling of evidence, chain of custody, proceedings for recording and preparing exemplars, etc.

e) Decision statements

Reporting of conclusions in F.S.A. should always be expressed through confidence or support ranges (whether using verbal probability scales or Likelihood Ratios).

Restricted or positive decision statements must be avoided.

Any limitations regarding methodology used, along with analysis options and tools chosen, should be clearly detailed both in expert reports and court testimony, if required.

f) Evaluation of methods

Bearing in mind the diversity of existing F.S.I. alternatives, the setting up of a single standard evaluation protocol will be a difficult goal to achieve.

Nevertheless, it is strongly recommended that every methodology be subjected to an appropriate evaluation process.

When available, evaluation tests should be carried out by qualified official institutions in the field, unrelated to the candidate laboratory.

2. Expert profile

a) Education

Forensic Audio Scientist (F.A.S.) practicing F.S.A. must be able to prove their specific and, preferably, multi-disciplinary education in the field of audio or speech related sciences.

b) Documentation

F.A. S. must continuously update his knowledge in the field by:

1. Reading the relevant research literature and/or
2. Attending at relevant forensic audio meetings (workshops, seminars, conferences etc.)

c) Training

F.A. scientists' training must be regularly updated through attendance at specialized courses.

d) Research

F.A.S. can/must maintain their competence in the field through scientifically research activities, participation in associations, publication of articles in peer-reviewed journals that support his approach in forensic audio.

Conditions (a) and (b) are minimum mandatory requests, must be combined with (c) and/or (d) and should be documented per scientist, per year.

At least one senior scientist per laboratory (Ph.D. or M.S. in audio or speech related sciences) is strongly recommended. Bachelor degree is a minimum requirement.

When carrying out F.S.A. comparison task, the supervision of a F.A. scientist is required for each of the three main stages of analysis:

1. Filter for admission of samples,
2. Evaluation of comparison tests,
3. Reporting of conclusions.

Degree of expert's contribution at every stage of analysis will be linked primarily to the requirements of the used method.

3. QUALITY ASSURANCE

How to get the best performance from a given F.S.A. method in every case

In most cases, F.S.A. methodologies combine different analysis approaches. They also include several criteria for selection and evaluation of samples, parameters, analysis tools and even comparison results.

The characteristics of each particular case will often conduct to the best specific analysis protocol to achieve the best perspective on the issue.

F.S.A. methodologies will attain their optimum performance when four coordinates are brought into harmony:

- A) Qualification & Background of F.A. Scientists,
- B) F.S.A. Method Used By Scientists,
- C) Format or Characteristics of Speech Samples for Analysis,
- D) Legal System and Customer's Requirements.

Nevertheless, an optimum system performance, in and of itself, is not a guarantee of providing the highest level of reliability.