

## **Weakening Forensic Science in Spain: from expert evidence to documentary evidence**

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### **Abstract**

In 2002, the Spanish Criminal Procedure Law was amended converting expert reports regarding nature, amount and purity of drugs from official laboratories into legal documents whose objectivity and reliability is assumed by default. This movement from expert evidence to documentary evidence has advantages both for the prosecution and the experts who avoid in-court testifying in most cases, and could likely expand in Spain to other scientific evidence, being the legislator who establishes what types of evidence are objective and reliable. However, Forensic Science is under a major redefinition, dealing with the evidence of errors in real cases and trying to move forward to a true scientific framework. Under the light of the recent NAS report entitled “Strengthening Forensic Science in the US” and other well known documents, we will review the Spanish situation of criminalistics, and suggest possible directions for better justice.

### **Introduction**

The so-called *traditional* fields of expertise in criminalistics as lophoscopy, ballistics, and handwriting examination, which have played an important role in many relevant criminal cases in all countries, have spread the use of categorical statements about identity in conclusions. The untested claim that a forensic practitioner can link an unknown mark to a unique source, a faulty probabilistic intuition equating infrequency with uniqueness [1], has been a key determinant to achieve convictions, as prosecutors and Law Enforcement Agencies have relied on reporting results including categorical statements about identity to base their theses.

In Spain, the Supreme Court considers to be enough to identify people comparing latent prints with unquestioned fingerprints when forensic experts report 8 or 10 common minutiae, that is, equal topography (minutiae set in the same places) and morphology (types of minutiae), and ridge numbers between minutiae. Besides, there should be no natural dissimilarity between the latent print and fingerprint being compared<sup>1</sup>. In case of several *latent print-fingerprint* comparisons from the same person, the Supreme Court acknowledges higher degree of certainty about identity<sup>2</sup>. It was a consequence of how Spanish forensic experts had reported in Courts for years, and that rule was considered a great success by crime investigators. But it is a paradox that a rule like that which determines the limits of reasonable doubt in fingerprint identification could be used to wrongfully involve innocent

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<sup>1</sup> Spanish Supreme Court sentences: [Ar. means Aranzadi] 15/06/1988, Ar. 5024; 04/07/1988, Ar. 6477; 25/11/89, Ar. 9319; 04/07/1990, Ar. 6220; 15/03/1991, Ar. 2156; 02/12/1992, Ar. 9903; 02/11/1994, Ar. 8382; 04/11/94, Ar. 8563; 18/09/1995, Ar. 6379.

<sup>2</sup> Spanish Supreme Court sentence: 25/11/1989, Ar. 9314.

people [2]. However, individualization continues to be the key task of many forensic experts in many countries all around the world.

The scientific community has refuted the individualization paradigm for decades from philosophical, logical and statistical points of view [1][3][4][5][6][7][8][9]. As E.T. Jaynes wrote [6]<sup>3</sup> - attributing to H. Jeffreys [4] the merit of the statement -, it is important in forensic identification to be aware of the role of induction in science and, consequently, the role of statistics in science.

On the other hand, identification fallacies, such as the often published prosecution fallacy, continue to be unknown or misunderstood by some forensic experts, prosecutors and judges all over the world [7]. Since scientists and statisticians started to explain and publish those fallacies in scientific journals or books very different reactions have been noted specially among European countries and laboratories [10]<sup>4</sup>.

We will focus on the role of science in the evaluation of evidence for forensic scientists and its implications on Spanish law. Other important roles of forensic science as investigative or intelligence tool are omitted. Questions such as: what does scientific methodology consist of, what methodological requirements should be asked in any forensic report, what does objectivity mean in science [11][12][13], how should data obtained from experiments or observations be interpreted as evidence [5], what is the role of forensic experts evaluating evidence [7], as well as many others, do not have simple answers. Using words from [14]<sup>5</sup> it is absolutely necessary *to provide the essential building blocks for the proper assessment and communication of forensic findings*. There will be some remarks about how accreditation and suitable statistical interpretation of evidence are pillars to guarantee the reliability requested by Courts and crime investigators in reporting results.

Differences between the judicial and scientific contexts with respect to essential aspects of science applied to solving criminal cases will be shown. The massive and always increasing number of requests for expert reports received by official laboratories and the chronic lack of human and material resources have led to the following measures in order to speed up criminal proceedings: defense of forensic reports by videoconference, only one expert in certain kinds of proceedings, and also legal reforms in Spain as for instance the addition in 2002 of a second paragraph to the Article 788 of the Criminal Procedure Law - we will use the acronym LECrim (Ley de Enjuiciamiento Criminal) from now on - converting scientific evidence on the determination of the nature, weight and purity of drugs into documentary evidence [15]. Since 2002, based on the above law amendment, some sentences have been ruled by different Spanish Courts applying the analogy of drug examinations – the consideration as documentary evidence – to other forensic fields. Consequences of such a judicial change are relevant for evidence interpretation and Court, prosecutor and lawyer's work, and needless to say, this reform was carried out without previous scientific debate.

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<sup>3</sup> Section 10.6, Induction revisited: *“The role of induction is not to tell us which predictions are right, but which predictions are indicated by our present knowledge...Moreover, it is only when our inductive inferences are wrong that we learn new things about real world”*, Cambridge University Press, 2003.

<sup>4</sup> The Swedish National Laboratory of Forensic Science (SKL) announced in 2009, after years of internal debate, its decision to unify the way conclusions are drawn – regardless the fields of expertise involved – in order to provide the same kind of information to Courts whatever the type of evidence involved.

<sup>5</sup> *Reporting Results* Section, p. 6-3, Washington (USA), 2009.

Whether by means of case law or law, the work by Spanish official forensic experts in fingerprint comparisons or drug examinations for years is finally considered to be “scientifically reliable”. While, for instance, in the United States [14] or United Kingdom [16] technical committees give professional advice to law commissions before discussing bills in Parliament related to giving scientific evidence in Courts, in Spain the priority is given to the official forensic expert’s independence. The official character of such a forensic expert and their belonging to Public Institutions give Courts a guarantee of scientific competence, therefore controversies such as those that recently happened in the United States are simply unthinkable.

It is relevant to perceive where the controversy arose from [17][18][19][20], and to contribute with proposals about how an efficient procedural justice could be made compatible with a rigorous scientific method for presenting conclusions in forensic reports, without changing the true nature of evidence in criminal proceedings. In Europe, the history of the so-called Voiceprint methodology to recognize people by voice could be reproduced again in many forensic fields because of the absence of such a previous controversy. The National Academy of Sciences (NAS) of the United States published a technical document in February of 1979 [20] previously requested by the FBI in order to analyze the scientific foundations of such a methodology. Once published, the FBI decided not to use it making categorical identity conclusions, but other forensic experts continued to use categorical statements in many countries. So, the opportunity of strengthening Forensic Science not only in the United States could be lost if the necessity of establishing the fundamentals of the scientific method as applied to forensic practice is ignored.

This paper is organized as follows: Section I is a panoramic view on criminalistic identification will help us to put the Spanish case in the global context knowing what is happening nowadays in forensics all over the world; Section II deals with the role of science in criminalistic identification pointing out the discussion in these three words: objectivity, transparency and testability; Section III shows a detailed analysis of the Spanish legal reform converting scientific evidence into documentary evidence, including implications for interpretation of evidence in Courts by experts; finally, Section IV provides some opinions and possible solutions to make compatible the Spanish legal reform objectives with science demands.

### **Section I: A panoramic view on criminalistic identification**

The criminalistic environment is extremely complex. It involves both private and public laboratories, the latter including Public Institutions (belonging to Ministries or Governmental Departments of Interior, Justice, Health, Customs, Commerce, Treasury, Defence, and others) such as Law Enforcement Agencies, Secret Services, Prosecutor Offices, Forensic Medicine or Toxicology Institutes, among other possible ones. The so-called ‘Fragmented system’ in the United States in [14], is not far away from what is happening in the rest of the world. In Spain there are five official laboratories belonging to ENFSI (European Network of Forensic Science Institutes), two of them dependent on the Ministry of Interior (National Police and Guardia Civil), two on Regional Governments (Ertzaintza in the Basque Country, and Mossos d’Esquadra in Catalonia), and one more on the Ministry of Justice (Toxicology and Forensic Sciences). There is hardly any technical coordination among them about interpretation in forensic reports, and even different departments in each laboratory report on different ways about the strength of their findings.

However, while some scientists already in eighties and nineties [21][22][23][24] warned to avoid ‘fallacies’ or pitfalls when forensic experts assessed analytical results, nowadays

these ‘fallacies’ are ignored, more or less consciously, in quite a few laboratories in many countries [7][14]. The individualization paradigm [1] continues to be widely spread, and categorical statements in reporting results are supported by many forensic experts and laboratories.

In Europe, ENFSI is undergoing its self-transformation within each Working Group (WG). In spite of being aware of this scientific problem since the very first conference of the European Academy of Forensic Sciences (1997 - Switzerland), only a few of those WG’s have reached a consensus about how to interpret evidence in Court. As shown in [16], those experts are trying to solve problems outside their fields of expertise<sup>6</sup>. This explains why the ENFSI Board strongly supports initiatives such as on-line training of statistics applied to forensic fields, research in interpretation of evidence, or the successful FORSTAT Workshops<sup>7</sup> in order to improve the statistical background of the European forensic experts.

The forensic scientific community should consider itself lucky since the appearance of the *Standards for the Formulation of Evaluative Forensic Science Expert Opinion* [25]. Its scope is defined as “*Forensic Expert Opinion formulated in the Evaluative or Evidential mode across all scientific disciplines*”. Probabilistic inference in forensic science has reached enough scientific maturity due to satisfactory proposals specifying terminology, logical framework, and the role of the forensic expert evaluating evidence. The mentioned *Standards* are just an example. Also, in [16]<sup>8</sup> it is written that “*scientific knowledge is continuously advanced as more empirical research is undertaken, so it is inevitable that some hypotheses will come to be modified or discarded*”, and “*special caution is also needed where expert opinion evidence is not just relied upon as additional material to support a prosecution but is fundamental to it*”, therefore it is worth being aware of the growing concern in the international scientific and judicial communities about how evidence is being tendered in Courts.

It has to be acknowledged that categorical statements have been usually welcomed by the legal system. In Spain, handwriting examinations have been relevant to achieve convictions in terrorism cases. For instance, in the bomb-production training courses for terrorists, manuals were often handwritten by some of them. When Law Enforcement Agencies arrested suspects and handwritten notebooks were seized, categorical statements of authorship clearly helped to achieve convictions for belonging to a terrorist organization, turning into a minimum imprisonment of six years and one day. Therefore, the strength of the evidence assessed in terms of categorical statements by forensic experts has always had extraordinary importance for the efficiency of any Law Enforcement and Justice system, making difficult to fight against this misconception.

Of course, fingerprint examinations and DNA analyses have played a similar role in terrorism and other criminal organization investigations, but while DNA procedure was tested in depth from a scientific point of view from its inception, fingerprinting has not been tested to a similar extent [26]. Nevertheless, categorical statements about identity have been

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<sup>6</sup> Part 2, from 2.16 to 2.19, *R. & Clark*, pp. 11-12.

<sup>7</sup> [www.ies.krakow.pl/conferences/forstat2009/](http://www.ies.krakow.pl/conferences/forstat2009/)

<sup>8</sup> Part 1, from 1.17 to 1.19, pg. 6, 2009.

defended by fingerprint experts all around the world for decades. Undoubtedly, the so-called *DNA paradigm* marks a new era in the assessment of evidence in Courts [14][27].

In our opinion, it is not possible to avoid a strong confrontation between the *traditional* criminalistic context and the likelihood paradigm [5] (see Section II) coming from the scientific community. Terminology and logical framework problems related to the evaluation of evidence for forensic scientists have been a discussion point within laboratories, as it is clearly addressed in [14]<sup>9</sup>. This confrontation explains to a certain extent a controversial recommendation recently given in the United States [14]<sup>10</sup>, suggesting the separation of forensic laboratories from law enforcement agencies. In our opinion, such a radical option is not necessary if the appropriate steps are taken in official labs, apart from other quality assurance procedures, to fully integrate the likelihood paradigm in their daily reasoning and reporting work.

## Section II: The role of Science in Forensics

### What science can really do?

As R. Royal wrote [5]<sup>11</sup>, the most important task of science regarding reporting results – after carrying out the relevant analyses according to accredited procedures – is to provide objective methods for evaluating evidence.

We have to admit scientific problems along the last century [5]<sup>12</sup> interpreting data as evidence by statisticians. The Neyman-Pearson-Wald decision-making and the Fisherian

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<sup>9</sup> Chapter 6: Improving Methods, Practice, and Performance in Forensic Science, Section: Reporting Results: “*There is a critical need in most fields of forensic science to raise the standards for reporting and testifying about the results of investigations. For example, many terms are used by forensic examiners in reports and in court testimony to describe findings, conclusions, and the degrees of association between evidentiary material (e.g., hairs, fingerprints, fibers) and particular people or objects. Such terms include but are not limited to “match,” “consistent with,” “identical,” “similar in all respects tested,” and “cannot be excluded as the source of.” The use of such terms can have a profound effect on how the trier of fact in a criminal or civil matter perceives and evaluates evidence. Yet the forensic science disciplines have not reached agreement or consensus on the precise meaning of any of these terms. Although some disciplines have developed vocabulary and scales to be used in reporting results, they have not become standard practice. This imprecision in vocabulary stems in part from the paucity of research in forensic science and the corresponding limitations in interpreting the results of forensic analyses*”, p. 6-3, Washington (USA), 2009.

<sup>10</sup> Recommendation 4: “*To improve the scientific bases of forensic science examinations and to maximize independence from or autonomy within the law enforcement community, Congress should authorize and appropriate incentive funds ... for the purpose of removing all public forensic laboratories and facilities from the administrative control of law enforcement agencies or prosecutors’ offices*”, Washington (USA), 2009.

<sup>11</sup> Preface: “*Science looks for statistics for help in interpreting data. Statistics is supposed to provide objective methods for representing scientific data as evidence and for measuring the strength of that evidence. Statistics serves science in other ways as well ... But its most important task is to provide objective quantitative alternatives to personal judgment for interpreting the evidence produced by experiments and observational studies. In this role statistics has made fundamental contributions to science*”.

<sup>12</sup> Preface: “*... All is not well, however. Standard statistical methods regularly lead to the misinterpretation of results of scientific studies ... These misinterpretations are not a consequence of*

prevailing paradigms for the last century were applied to the interpretation of data as evidence when choosing among alternative courses of action.

Categorical expressions about identity are often found in forensic reports all over the world [14]<sup>13</sup>. Even though in the last two decades forensic statisticians and scientists have emphasized the importance of avoiding fallacies in reporting conclusions [7], and some international forensic institutions as ENFSI have made efforts to avoid these errors, nowadays there are official laboratories in Europe – even members of ENFSI – using categorical frameworks to interpret data as evidence, mainly in the so-called *traditional* fields of expertise as fingerprints, ballistics or handwriting examinations.

The “individualization” paradigm has been harshly criticized in [28], where the author emphasized that this “individualization” paradigm should be always avoided in the forensic science community as we do not need it to be useful, not even in DNA. It is a very crucial question to understand what philosophers of science, experts in logic and probability theory, and forensic statisticians, among others scientists, have published in the last decades about how to make inference evaluating evidence to be aware that “individualization” implies an unjustified *leap of faith* [3][9]<sup>14</sup>.

Once clarified that interpretation of data as evidence is the main task of forensic experts in trials, how should evidence be evaluated in practice? The so-called *likelihood paradigm* by R. Royall [5] solves the problem, and as an example, the above mentioned *Standards for the Formulation of Evaluative Forensic Science Expert Opinion* [25] from the AFSP do what R. Royal recommends. In essence, what is necessary to distinguish is the difference among the following questions once happened an observation: what do we believe?, what should we do?, and what does that observation tell us about A versus B, being A and B generally simple hypothesis? How should we interpret this observation as evidence regarding A versus B? [5].

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*scientists misusing statistics. They reflect instead a critical defect in current theories of statistics. These problems exist because the discipline of statistics has neglected a key question for which it is responsible: when does a given set of observations support one hypothesis over another?. That is, when is it right to say that the observations are evidence in favor of one hypothesis vis-à-vis another?.”*

<sup>13</sup> Chapter 1: Introduction, Section: Pressures on the Forensic Science System, Paragraph: Questionable or Questioned Science: “Some forensic science methods have as their goal the “individualization” of specific types of evidence (typically shoe and tire impressions, dermal ridge prints, toolmarks and firearms, and handwriting). Analysts using such methods believe that unique markings are acquired by a source item in random fashion and that such uniqueness is faithfully transmitted from the source item to the evidence item being examined (or in the case of handwriting, that individuals acquire habits that result in unique handwriting). When the evidence and putative source items are compared, a conclusion of individualization implies that the evidence originated from that source, to the exclusion of all other possible sources. The determination of uniqueness requires measurements of object attributes, data collected on the population frequency of variation in these attributes, testing of attribute independence, and calculations of the probability that different objects share a common set of observable attributes. Importantly, the results of research must be made public so that they can be reviewed, checked by others, criticized, and then revised, and this has not been done for some of the forensic science disciplines”.

<sup>14</sup> As Kaye D.H. comments in the footnote number 39: There is a nonzero risk of error in accepting any inference about any population parameter. “The gap between the sample and the population will always require a leap of faith.” PHILLIP I. GOOD & JAMES W. HARDIN, COMMON ERRORS IN STATISTICS (AND HOW TO AVOID THEM) 74 (2003). The only issue worth debating is the length of the leap.

## Objectivity

Experimental science claims to be objective knowledge. *Objectivity* has a double meaning in epistemology: inter-subjective validity and something belonging to the real world. The first one entails that scientific methods and results are valid for any person, whatever personal convictions. Both meanings are related to each other. They are included as two aspects of the same characteristic: *universalism* [29].

The scientific inter-subjectivity can not be interpreted as perfect logical demonstration, that is, scientific demonstrations can not be formulated using only logical links. Epistemologists speak about *contextual demonstrations*, emphasizing their dependency on the *context of the objectivation*<sup>15</sup> adopted. As Artigas M. [30] defines, *objectivation* is a set of theoretical and practical procedures used to make scientific objects, and asserts that *objectivation* is the key to establish inter-subjectivity in science.

However, objectivity understood as non-personal influence in forensic findings is illusory [12][13]. The belief in the ability of statistics to inject and guarantee objectivity takes root in the already mentioned paradigms for the last century.

In this sense, difficulties can be predicted for those who want to understand reporting results given by forensic experts in non-intuitive disciplines<sup>16</sup>. Unlike *traditional* criminalistics, the newer disciplines tackle complex phenomena whose results cannot be easily interpreted by lay people. Even if results from intuitive disciplines could be easily understood by everybody, the inference process to evaluate evidence from data, as we have above mentioned repeatedly, is not trivial and it can be full of misunderstandings. Therefore, the apparent objective character of a forensic report does not imply that it is easy to be understood by anyone in the same way, nor to be really objective. The problem of *interpretation* will be always present, even in the so-called factual reports [25].

Objectivity understood as aspiration, from the accreditation point of view<sup>17</sup>, has to do with validated methodologies, calibrated and verified equipment, detection and quantification thresholds, certified reference material, and uncertainty, accuracy and precision estimation when measuring. It is also related to guarantee the repeatability and reproducibility of results, and selectivity, specificity, and traceability of procedures, to take part in proficiency tests and to be subjected to internal and external audits by accredited experts and national organizations for test accreditation. Some scientists have summarized all those requirements in two words: *transparency* and *testability* [27].

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<sup>15</sup> We use the concept of *objectivation* here in the same sense as Evandro Agazzi does. For example, in Agazzi, E., *Proposta di una nuova caratterizzazione dell'oggettività scientifica*, Itinerari: "For example, if we agree to investigate reality using a precision scale, a chronometer, or a rigid rule to verify propositions with predicates as 'mass', 'long' or 'length' according to standardized measurement procedures, then we can establish the immediate truth or falseness of a number of base-statements and will formulate empirical assertions of the classical mechanic" (translation made by authors), 1979, n° 1-2 (April-August), p. 121.

<sup>16</sup> We define "intuitive" forensic science disciplines as those whose results are supported on descriptions or audiovisual means which make easier lay people to understand, frequently after some practice, scientific reasons given by scientists in their reports.

<sup>17</sup> ISO 17.025.

## Scientific reliability in the Spanish judicial system

Taking into account the four options to evaluate evidentiary reliability in the common law quoted in [16]<sup>18</sup>, and focusing exclusively on the issue at hand about scientific reliability, the *principle of free assessment of evidence* in the Spanish judicial system would fit into the first one. Therefore, both pros and cons about the scientific reliability are contained in case law or sentences, but the above-mentioned legal reform in 2002 of the Spanish Criminal Procedure Law provided a new way for considering some forensic reports (determination of nature, amount and purity of drugs) as scientifically reliable. In this case, scientific reliability has been legally established, and there have already been Court sentences spreading this scientific reliability condition to other types of forensic reports.

If the Spanish legislator is who establishes which forensic reports should be qualified as scientifically reliable, such a qualification comes only from the official laboratories – main providers of forensic services within a legal system based on the Continental law –, true sources of arguments used by Courts in sentences. Therefore, the key to consider which forensic reports are reliable and which others are not is just the opinion held by those official laboratories. This was exactly what happened with the Supreme Court in Spain with respect to the above mentioned legal validity of fingerprint examinations, but in that case through its case law.

## Section III: The legal and scientific status of forensic evidence in Spain

### Spanish model for incriminating evidence [31]

Article (Art. from now on) 741 of the LECrim establishes an incriminating evidence model according to which only the actions taken in accordance with the principles of orality (right of the accused to be heard, oral testimony of the witnesses, oral deliberations etc.), contradiction, immediacy (presence of the parties and their witnesses at the trial) and publicity (public trial) can be referred to as such. According to constitutional case law, the only means of proof that can be used to invalidate the presumption of innocence are those used at the trial, in addition to evidence existing before trial, i.e. impossible or difficult to produce at the trial. This does not imply the denial of the value as evidence of police and legal inquiry proceedings conducted as required by the Spanish Constitution and procedural law, but these are to be reproduced at the trial under conditions that give the defence lawyer the opportunity to contest them or to tacitly accept their content, so that the probative value of the evidence existing before trial can be recognized.

An exception to the rule is advance evidence and evidence existing before trial, as long as defence and contradiction rights are granted. When reports are drawn up by the officially appointed experts, they are regarded as *objective, impartial and independent*, which in principle gives them value as evidence without procedural contradiction. The aforementioned experts must be members of a professional body; as civil servants, they are granted tenure of their posts; they must not be related to the case in question; they must be

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<sup>18</sup> Part 4, Introduction, 4.3: (1) *Exclusionary discretion without guidance*; (2) *Exclusionary discretion with guidance*; (3) *An admissibility rule requiring consensus amongst experts in the field*; (4) *An admissibility rule requiring the trial judge to assess the evidentiary reliability of the tendered evidence*, pg. 24.



highly specialized and attached to agencies equipped with the expensive means required by modern analysis techniques. However, their reports can be contested, either by asking in writing for extensions or explanations so that they can be accepted at the trial as documentary evidence, or by demanding the experts' presence during the proceedings.

This evidence is regarded as evidence existing before trial because of the nature of the procedural system, since it is not possible for the experts working for the above mentioned official institutions, departments or laboratories to be always present at the trial to ratify their reports. Although value as evidence is given to the expert reports drawn up by official laboratories, the defendant is not left without defence as he/she can still dispute the impartiality of the expert (challenge), the validity of the analysis or question him/her during the trial.

Expert evidence is considered a special means of proof because it does not adduce facts to the process, like witness and documentary evidence and depositions, as established by the LECrim, but it is used by the judge as an auxiliary means to duly interpret certain facts that are already part of the process, provided through other means of proof. Moreover, it is a necessary element, since the judge does not have the technical knowledge necessary to solve the problem.

The fact that an expert is needed does not mean that his report is binding on the judge: it would be impossible to solve a case when reports are contradictory<sup>19</sup>. According to case law, if there are several expert reports on the same issue, it is the impartial organ -the court presiding over the evidence- that decides which will prevail; elements from different reports could also be used. Should there be only one expert report, it would not be binding on the judge because they are not in themselves an incontrovertible truth.

The value as evidence of expert reports relies neither in the statements nor in the authors' position and standing, but in their scientific basis and grounds. The statements or conclusions of a greater rational quality will prevail, not forgetting other auxiliary criteria as the coincident majority or their not being related to the interests of the parties.

In any trial, witness, documentary and expert evidence is usually examined; the results might be mutually contradictory, both within- and between- types. Expert reports, like the other means of proof, are submitted to the principle of free appraisal of the proof, which basically requires a joint assessment, without giving more value a priori to one of them.

Thus, if different evidence has been examined in relation to a specific issue, apart from the expert report, and with different results, the Court has the authority to make a joint appraisal of the evidence that makes it possible to ascertain that the truth of the facts to be clarified is not the truth set out in the expert report, but the truth offered by the other means of proof. Therefore, the expert does not adduce facts to the process, but opinions, neither does he/she inform about the existence or not of the facts.

Expert reports -opinions about certain facts- can be finally accepted or not by the Court. According to case law – what it is said in this paragraph is jurisprudence from the Spanish Supreme Court - , the Judge can diverge, with previous reasoning, from the conclusions of the expert reports, especially when the report does not express a certainty, but a possibility,

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<sup>19</sup> A clear paradox of categorical statement reporting is that contradictory categorical statements are possible to be found in Court, which should be impossible if the disciplines are, as claimed, scientific.

and an alternative possibility rather than exclusion. The Court can only diverge from the conclusions drawn by the expert when there are objective reasons that allow or justify it. The reasons that have led the Court to diverge from the expert reports should be clearly specified in order to avoid the risk or the suspicion of arbitrariness.

To sum up, expert evidence is not binding on the Judges. An expert report is practical or scientific advice that provides a better insight of the reality underlying a problem submitted to the consideration of the Judges; in accordance with case law, it is impossible for the Judge to relinquish his/her evaluating role.

### **A critical review of the Spanish legal reform to evaluate the nature, weight and purity of drugs in criminal proceedings**

In 2002, on the occasion of the endorsement of the Organic Law 9/2002 of 10 December, amending the Spanish Penal and Civil Codes, regarding child abduction, the Spanish Criminal Procedure Law is amended by adding a second paragraph to Article 788. According to this principle “*the expert report can be presented by a single expert. Within this procedure, it will be considered as documentary evidence any report issued by an official laboratory in relation to the nature, amount and purity of drugs as long as the fulfilment of the scientific protocols approved by the relevant standards has been specified*”. In other words, in the scope of the Spanish brief procedure certain expert reports are subjected to a legal consideration appropriate for documents, i.e. it transforms expert evidence into documentary evidence.

The legislator justifies this reform based on the statement that expert reports prepared by official institutions regarding the weight, amount and quality of drugs are not scientific testing strictly speaking. Their repetition and execution according to some scientific procedures (official protocols), they say, makes it necessary to consider them as documents of an objective reality. It has to be added, it is said, the unbiased and irremovable character of the relevant officers in charge (Spanish Supreme Court sentence of 3 February 2009). However, this is not the only point, but instead the fact is that through this reform some experts will not have to attend the trial, which will prevent the judge to decide between interrupting the proceedings – in case of non-appearance – or rendering the evidence invalid to nullify the presumption of innocence [14]<sup>20</sup> [32].

It is commonly accepted by Spanish jurists to distinguish between two different expert reports: those scientifically objective and those based on opinions [33]. By means of testing (e.g. DNA tests), a scientifically objective report intends to verify the accuracy of a statement or to establish the certainty of some facts. An opinion report does not intend to verify but rather to assess or evaluate a fact or some circumstances of a fact (e.g. a psychological report). Then, the legislator has decided that the analysis of drugs, which falls in his opinion into the scope of the scientifically objective reports, should not keep this consideration in the Spanish brief proceeding and it has to be dealt with as documentary evidence.

Nevertheless, the legislator does not take into consideration that:

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<sup>20</sup> pp. 120-121.

1. According to the Art. 456 LECrim, the judge agrees with the production of an expert report whenever scientific or artistic knowledge is needed to get to know or understand any fact or relevant circumstance. Instead, a document intended for criminal proceedings is something different: it is an item (*corpus*) which shows or displays something (*docuit*) but additionally it is “strange” to the process – as the document should not be produced on the basis of the process (*estraneità*).

In our case, scientific expertise is needed to determine the nature, amount and purity of the substances. That is the reason why the judge requires an expert (a person who is an outsider to the process and has the appropriate specific training) to produce an expert report (scientific testing). We are clearly speaking of expert evidence, not just documentary evidence.

2. Even if we were confronted with scientifically objective reports, careful consideration is strongly advised for their interpretation (not only with regard to the conclusion as such – nature, amount and purity of the substances – but also regarding to whether the official protocols have been fulfilled). The expert should transmit this interpretation to the judge, who is a lay person in this field<sup>21</sup>.
3. When testing is carried out there is also – or there may be – a variability regarding the conclusions. Suffice it to observe the test organised by ENFSI on the detection of the nature and purity of several drugs which is discussed in the Appendix.

On the one hand, it is our opinion that analyses on drugs are expert reports (forensic evidence), as other types of scientific evidence (e.g. fingerprints, DNA, handwriting ...) and they cannot be considered as simple documents (documentary evidence). On the other hand, as the likelihood paradigm is still not used in most official departments in official laboratories, there exists a wide variability in terms of conclusions. This variability could cause problems in the interpretation of conclusions; therefore we think that it has to be done by the expert and not by the own judge by simply reading the report.

In spite of this, the legislator has unrealistically considered the expert evidence as documentary evidence. This is a relevant question due to the fact that it is not only a change of designation, but it implies a change in the approach to the reports submitted during the process. In that respect, our opinion is the following:

1.- since this reform, it is neither necessary to have the expert appointed by the judge nor to have the officers appear before the judge in order to accept this appointment. Likewise, the principles to reject experts are debatable as well (see Art. 467 and ff, 662, 663 and 723 LECrim).

2.- at the evidence proposal stage, it is not needed anymore to specify the name and surname of the expert who is going to make a statement on that case (Art. 656 LECrim). However, we think that it is necessary that the party concerned proposes the relevant

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<sup>21</sup> See for example Madrid Provincial Court sentence num. 26/2004 of 29 April. The Public Prosecution proposes as documentary evidence the reading of page 104, where the techniques used to carry out the analysis are explained: “*Colour R., organic solvents extraction, CCT, EIA, GC-SM, HPLC. Besides this statement, it also includes an explanation of the terms expressing the richness of each product analysed*”. It is obvious that based only on this, a judge – who is a lay person in this field – will not be able to infer that the analyses were carried out in compliance with the scientific protocols approved by the relevant standards.

evidence so the judge can take into account the test results in his/her judgment. Ex officio evidence is not allowed when article 726 LECrim – related to documentary evidence – establishes that “*the Court itself will examine the books, documents, papers and other pieces of conviction...*”. This principle is contained in Article 728 LECrim – at a party request – and it makes possible ex officio evidence with the exceptions quoted in Article 729 LECrim [14]<sup>22</sup>.

3.- the way of giving evidence in Courts is modified as well: in the case of documentary evidence, the expert does not attend the trial to ratify his/her report or to answer/clarify any question related to such report. As we noted above, this is a relevant point because it may not be easy to interpret the conclusions of the analysis. Moreover, it is possible that the report is not even read during the hearing (Art. 726 “the Court itself will examine...”).

Additionally, the rejection of the analysis will not necessarily imply the presence of the experts during the hearing. In those cases where any party challenges the report (see e.g. Spanish Supreme Court sentences of 27 September 2006, 2 July 2008 and 3 February 2009) case law appoints at several solutions according to all possible circumstances. Thus:

1. The experts will not appear during the trial if the party rejects the report without a solid ground. The analysis, however, will be assessed as evidence for the prosecution.
2. When the party rejects the report and proposes the expert’s appearance without proper justification, the Court will not accept it and once more the analysis could be assessed as evidence for the prosecution.
3. If the expert’s appearance is requested based on solid grounds, the Court will accept it if appropriate. Then, the Tribunal will assess the expert’s statements.
4. Finally, it is possible that a party rejects the report and submits a contradictory report. Both reports should be assessed by the Court according the rules of “*sane criticism*”<sup>23</sup>.

If, as a general rule, the evidence valid to plead presumption of innocence is the one exercised according to the principles of orality, contradiction, immediacy and publicity, it seems obvious to the authors that translating the expert evidence into documentary evidence will imply the contravention of the publicity and immediacy principles, along with strong limitation to the contradiction principle as well.

Furthermore, translating expert evidence into documentary evidence will also have an impact on the appeals against the judicial decisions. Thus, as regards to the appeals to the Supreme Court (*appeals for cassation*) we will need to consider that analyses on drugs are “*documents*” according to the second paragraph of Art. 849 LECrim. As regards to appeals,

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<sup>22</sup> pp. 175 and ff.

<sup>23</sup> The so-called system of “sane criticism” (*sana crítica*), i.e. a judge-based assessment of the value of the evidence brought up in a particular trial.

it would also be important whether the analyses are considered documents or expert evidence – evidence of personal nature. Note that judgements of acquittal – and some aggravating convictions too – will be almost impossible to observe when the mistake affects the assessment of evidence of personal nature [34].

In conclusion, by virtue of practical or operational factors, the legislator pursues a fiction: to change the nature of certain expert reports to turn them into documents, in spite of the prejudice for the judicial guarantees.

We disagree with this reform for the reasons abovementioned. Additionally, the aim pursued – to avoid experts attending the trials to prevent a negative effect on their work – could have been reached by other means while preserving the expert nature of evidence. In this regard, expert substitution is widely accepted, meaning that if the expert who carried out the analysis is not available, he/she can be replaced by other expert. Videoconference<sup>24</sup> is other possible technique to allow the expert to make a statement without moving to the Court facilities.

### **A recent drug analysis proficiency test by ENFSI**

We have observed that the same type of reasoning has been expanded to other expert evidence areas by Spanish Courts (see the next paragraph), and it is possible that by case law or new law amendments, most or all expert evidence areas, when reports have their origin in official laboratories, could receive the category of documentary evidence. Drug analysis was selected as a pioneer technique because of its “objectivity”, but even in this area have arisen no small controversy, as a recent proficiency test from ENFSI on nature and purity estimation of drugs have recently shown (details in the appendix).

Experimental data variability is not only explained by the proper nature of what is being observed, but by the applied observation methodology among other variability sources. When the weight of drug samples is measured, the weight measurement uncertainty depends on errors due to calibration processes of the precision scale, to biases of the precision scale, and the own weight procedure. The ISO standard titled “Guide to the Expression of Uncertainty in Measurement – 1993” is recommended by the international scientific community to calculate the weight of drug samples by means of precision scales. Therefore, any forensic expert who would want to weight drug samples from seizures should include as well the associated uncertainties to their measurements. However, some drug official forensic reports have lacked of uncertainty calculations, while quiet a few disparity of results have been observed among different European official laboratories, and even some substances were not detected to some of them (for more information on the variability expected when determining nature and purity of drugs from European official laboratories and some other contributors involved in the ENFSI Working Group of Drugs when they participated in a proficiency test held in late 2008 [35], see the Appendix).

This example, anyway, has been artificially scheduled by the organizers. Drug forensic cases have huge variability. Active principle quantification is the first stage for any analysis to be a success because, for example, seized drug is often mixed with other substances or

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<sup>24</sup> In 2009, 65% of the appearances in Court of the Civil Guard forensic experts to give evidence were carried out by videoconference.

could be concealment; environmental or case conditions could bias the analysis results; uncertainty measurements from weight and purity analytical processes have to be correctly combined and interpreted; sampling criteria has to be clearly determined and justified, and so on. Consequently, the claimed objectivity in such analyses is not synonym of easiness, but rather it is full of intellectual obstacles. It seems to make no sense to deal with any drug case applying the same criteria, and those criteria should be explained or defended in Court.

On the other hand, this example is showed to illustrate probable interpretation problems with the so-called factual conclusions [25]. Of course, a drug forensic report should include information about homogeneities of large drug seizures, type of range that could be expected, and whether if the results obtained are much probable if one alternative hypothesis is true (for instance, the probability of observing these quantitative results if the purity is above a certain level) over another one, following the likelihood paradigm. Therefore, it is not primarily the analytical result what it is important, but what it may means in the context of the case.

### **Implications in other forensic examinations and possible future consequences**

Since 2002, some sentences have been pronounced by different Spanish Courts applying the analogy of drug examinations – the consideration as documentary evidence [15]<sup>25</sup> – to psychological, psychiatric, and veterinarian forensic reports, fingerprint examinations, and forensic reports made by medical examiners.

Based on simple arguments which serve to classify as objectives these other types of forensic examinations, and guarantying the independence of official forensic experts because they belong to Public Institutions, the scientific discussion about how to evaluate data as evidence has been set aside. Practical reasons to speed up proceedings - a benefit for the laboratories as well because forensic experts do not need to travel to the Court so often to make statements - justify the support given to this change of judicial treatment of forensic reports by jurists, directors or senior officials in public laboratories, and even by forensic experts.

This policy may lead to a future application of this principle to any kind of expert report. Therefore new legal reforms in that direction could be proposed. So, though the US scientific community tries “*to promote the development of forensic science into a mature field of multidisciplinary research and practice, founded on the systematic collection and analysis of relevant data*”, as the Recommendation 1 of the NRC 2009 Report states, one of the fields which needs a greater improvement in daily forensic practice all over the world is simply ignored. On the contrary, conclusions of official forensic reports are shielded and problems about interpretation of evidence are subordinated to the ability of lawyers.

### **Section IV: A change of paradigm?**

#### **The origin of the problem in Spain (and most European countries)**

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<sup>25</sup> Second part, Section I, III, G), c), 3. Risks, Tirant lo blanch Ed., Valencia, 2008.

Under the paragraph titled “*Challenges Facing the Forensic Science Community*” [14]<sup>26</sup>, it is said that in spite of the advances of the forensic science for decades, admission of erroneous or misleading evidence has been produced with possible wrongful convictions of innocent people. Certainly, such comments have not come from the forensic community after an exercise of self-criticism. On the contrary, Congress of the United States ordered the National Academy of Sciences of the United States to undertake the study because *significant improvements* were considered to be needed in forensic science. The contents of such significant improvements had to do with previous controversies expressed by the academic world and the public opinion in the United States for years [17]<sup>27</sup>.

Therefore, one of the problems to have an European equivalent to the US NRC 2009 Report comes from the absence of such a previous controversy in most European countries<sup>28</sup>. That partially explains the very different reactions in the European laboratories since the release of this report, and the very different speeds to insert the new paradigm in the daily forensic practice. The ENFSI Board scheduled a comprehensive program of activities to announce it during 2009<sup>29</sup>, but this report should be deeply studied within each European laboratory, after discussed together with each national judicial system, and perhaps we could expect future results affecting the judicial scene.

In order to avoid the serious risk of minimizing the strength of the current sensitivity about the necessity of improving the evaluation of evidence in Court, the academic and scientific communities should be involved in each country to guarantee a sound and effective discussion. In countries where almost all forensic reports are made by official institutions in criminal proceedings, that risk is maximum, and therefore the academic and scientific involvement and/or the internationalization of the debate are absolutely necessary.

### **How to change the paradigm**

On one hand, we have quoted the controversy among statisticians along the last century and its impact on science. On the other hand, we have also mentioned the relevance of many

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<sup>26</sup> Chapter 1: Introduction, Paragraph: Challenges Facing the Forensic Science Community: “*For decades, the forensic science disciplines have produced valuable evidence that has contributed to the successful prosecution and conviction of criminals as well as to the exoneration of innocent people... Those advances, however, also have revealed that, in some cases, substantive information and testimony based on faulty forensic science analyses may have contributed to wrongful convictions of innocent people. This fact has demonstrated the potential danger of giving undue weight to evidence and testimony derived from imperfect testing and analysis. Moreover, imprecise or exaggerated expert testimony has sometimes contributed to the admission of erroneous or misleading evidence*”, page S-3, Washington (USA), 2009.

<sup>27</sup> pg. 1625.

<sup>28</sup> There should be mentioned the initiative carried out in England and Wales by the House of Common’s Science and Technology Committee during 2004 and 2005 publishing the Seventh Report titled *Forensic Science on Trial*, in which the Association of Chief Police Officers agreed on the necessity of a protocol for the validation of scientific techniques prior to their being admitted in Court.

<sup>29</sup> For example, in the 21<sup>st</sup> Annual Meeting held in Ankara (Turkey) in May 2009, and the *One-Day-One-Issue-Seminar* which was carried out on August 24<sup>th</sup> and 25<sup>th</sup> at the Bundeskriminalamt in Wiesbaden (Germany).

common ways of reporting conclusions and their consequences in Courts and even laws. How can we now change mentalities tried and tested under old paradigms, mainly inside law enforcement agencies or prosecutor's offices long used to considering some scientific proofs with the property of infallibility? And how can we explain the Courts that so far some evidences were safe, and from now on the same evidences will be uncertain? In fact there is no need to be a prophet to predict which kind of reactions will be expected. The current situation in many laboratories is that it is not difficult to find *generalized inconsistencies* in the ways of reporting conclusions among different fields of expertise in the same laboratory, or within the same field.

Recently, the Swedish National Laboratory of Forensic Science (SKL) announced in the already mentioned V Conference of the European Academy of Forensic Science its decision to unify the way of drawing conclusions – regardless the fields of expertise involved – in order to provide the same kind of information to Courts [10]. In our opinion this would be the first step that every laboratory should take in order to change mentalities. Of course, like this laboratory has previously done, all the staff of the laboratory (forensic experts) should be absolutely convinced about the necessity to do that. The Swedish laboratory needed years just to achieve this objective.

Other institutions have made important efforts to train judges and prosecutors to understand the new paradigm to interpret evidence in trials<sup>30</sup>. However, there is no official indication about the corresponding law enforcement agencies shifting any paradigm, making clear that their laboratories should react in the first place.

In the meanwhile, our opinion about how forensic laboratories should act when legal reforms about evaluation of evidence in criminal proceedings are being studied by jurists consists of reporting about the need of a paradigm shift as the scientific community is insistently supporting for the last two decades. The NRC 2009 Report has been a solid and strong call for changes in the traditional way of thinking in evaluating data as evidence within the whole forensic community.

### **Possible alternative solutions for the Spanish Criminal Procedure Law reform**

The Spanish legal reform objectives have to be compatible with science demands. The law amended by adding a second paragraph to Article 788 was preceded by neither previous scientific debate nor reference to the international state of the art. Spain runs the risk of keeping away its evidence legislation from Europe if scientists do not take part of law commissions before reforming the criminal proceedings or the debate is not immersed in the global forensic paradigm shift.

Following examples in other countries as [14][16][25], any nation will find a good way to adapt evidence regulation to current scientific state-of-the-art.

In the meanwhile, the above mentioned technology and procedural measures for speeding up proceedings could be provisional solutions. Of course, those measures alone are absolutely insufficient, therefore legal reforms will be necessary but always preserving both judicial and scientific requirements.

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<sup>30</sup> Some European Universities and Laboratories have started some seminars, courses, conferences, and so on, about evaluation of scientific evidence for Judges and Prosecutors during the last years.



## **Conclusions**

In this paper, we have shown why any legal reform about dealing with scientific evidence in Court needs to both preserve the legal and constitutional guarantees and align with the state-of-the-art scientific knowledge. The very nature of forensic evidence reliability has been challenged in the last decades, and a new paradigm is spreading firmly across countries in a move to solid and well-grounded forensic science. However, the 2002 Spanish Criminal Procedure Law reform walked in the opposite direction, attributing objectivity and reliability to evidence provided by official laboratories through giving the status of documentary evidence, instead of the classical expert evidence, to official reports on weight, purity and nature estimations on seized drugs, a status which could be expanded by law or case law to other forensic evidence areas. We believe that the objectives of the reform on efficiency and simplicity of laboratory procedures for reporting and testifying in Court can and must be met satisfying simultaneously both legal guarantees and international scientific standards.

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## 8. APPENDIX: ENFSI Proficiency Test on drug analysis.

In this test, there were four different sources for drug samples: A. Heroin mixture; B: Cannabis (Hashish); C1&C2: 3-CPP tablets with traces of amphetamine; D: amphetamine mixture. The organizer asked participants for the nature and purity of drugs. The sample number 3 had two different drugs, each of them in very different proportional quantity.

Homogeneous pieces of samples<sup>31</sup> to be analysed were distributed to all participants. ENFSI had 54 members (all of them European official laboratories) when the collaborative test was carried out. However the organizer numbered up to 71 possible participants in the test.

The main techniques used by participants were HPLC-DAD to quantify active principles, and GC-MS to detect mainly the nature of them.

The organizer summarized results providing the following data per sample: mean, standard deviation, RSD, median, highest and lowest value when numeric values were given by participants (purity); and quality information (“+”: hit; “-“: fail; “(+)”: hit with some objections) when were not given those numeric data (nature). Table 1 summarizes purity results from the four tests<sup>32</sup>. Below some comments are made regarding samples.

**Table 1**

<b>Purity</b>	Sample A	Sample B	Sample C1	Sample C2	Sample D
<b>No. of labs<sup>33</sup></b>	56	48	30	15	55
<b>Mean</b>	32,5	5,33	14,85	0,93	13,99
<b>Median</b>	33,4	4,95	14,85	0,4	14,2
<b>SD<sup>34</sup></b>	3,98	1,64	2,16	1,56	1,77
<b>Highest</b>	39,8	12	21,8	6,3	18,2
<b>Lowest</b>	9,6	2,6	11,6	0,1	7,9
<b>RSD<sup>35</sup></b>	12,2%	30,7%	14,5%	167,8%	12,7%

Comments:

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<sup>31</sup> Samples were homogenized first by a “Grindomix” mill and second by mortar and pistol.

<sup>32</sup> There were errors in SD and RSD of Sample C1, and RSD of sample C2, and they have been corrected

<sup>33</sup> The number of laboratories here counted refer to those gave purity results.

<sup>34</sup> Standard deviation.

<sup>35</sup> Relative percentage between standard deviation and mean.

Sample A: 61 laboratories submitted results. 5 of them only provided quality information (nature). There were 5 outliers. 12,2 % of RSD. This sample was the most and deeply studied by participants.

Sample B: 61 laboratories submitted results. 13 of them only provided quality information (nature). There were 4 outliers. 30,7 % of RSD.

Sample C1: 59 laboratories submitted results. 27 of them only provided right quality information (nature), one was wrong and other with some objections. There were 2 outliers (purity). 14,54 % of RSD.

Sample C2: 59 laboratories submitted results. 15 of them submitted numeric data (purity), 5 a maximum limit, and 9 of them only provided quality information (nature). The remainders (30) were not able to detect it. There were 2 outliers. 166,9 % of RSD.

Sample D: 61 laboratories submitted results. 6 of them only provided quality information (nature). There were 3 outliers. 12,7 % of RSD.

Four laboratories obtained 2 outliers each one, and eight more only one. Below five box plots are shown for details. Though four labs concentrate 50% of outliers, there are 12 of them involved.

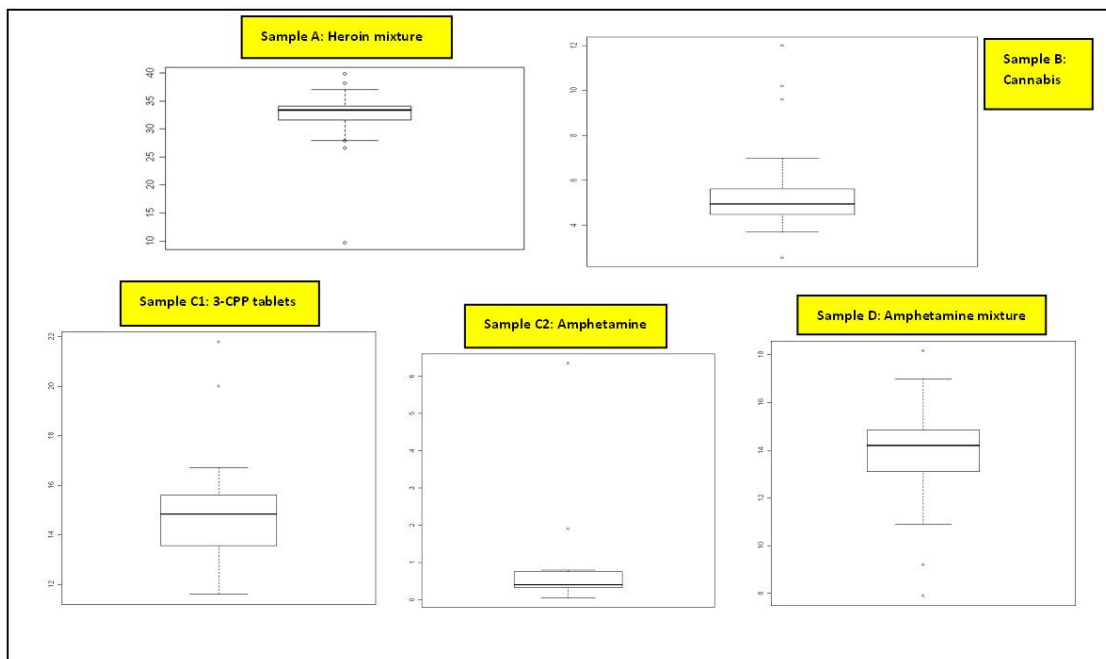


Table 2 shows results about purity once outliers were removed.

**Table 2**

<b>Purity</b>	Sample A	Sample B	Sample C1	Sample C2	Sample D
<b>No. of labs</b>	51	44	28	13	52
<b>Mean</b>	33,06	5,03	14,42	0,44	14,12
<b>Median</b>	33,4	4,88	14,70	0,4	14,25
<b>SD</b>	1,93	0,81	1,43	0,22	1,34
<b>Highest</b>	37,03	7	16,73	0,8	16,99
<b>Lowest</b>	27,93	3,7	11,6	0,05	10,9
<b>RSD</b>	5,8%	16,1%	9,9%	50%	9,4%

Though RSD,s have clearly improved once outliers are removed, their figures are not negligible. In the proficiency test, the participants were not asked to provide data about uncertainty measurements of purity. Threshold criteria established by case law or law to declare proved the commitment of crimes against public health when it is possible to discriminate self-consumption from illegal traffic once weighted the active principles, could be difficult to be self-assessed by Courts in such conditions.