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Criminal Process faced with the Challenges of Scientific and Technological Development

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Abstract

This work examines some current-time challenges to the basic principles concerning fact-finding in criminal proceedings. The starting point of the analysis is that, no matter the theoretical model adopted in a criminal justice system, the essence of fair trial is that each party shall enjoy an effective chance to tell its story and to challenge the story and the theses proposed by the counterparts.

This approach to criminal proceedings, that we can synthetically define as inspired by the art of doubt, seems nowadays under attack, because of the recent developments at the scientific and technological levels, and of their implication to fact-finding models at trial. In particular, in a cultural and legal framework showing a decreasing sensitivity to the rights of the defence, the "doubt-based" or Socratic traditional approach seems defied by three factors: the digital revolution; the raise and spreading use of neurosciences; and the increasing employment of artificial intelligence in adjudicating cases. The thesis here submitted is that the traditional bases of fact-finding at trial can endure even against these challenges, as far as lawyers and scholars will be able to keep a critical and doubt-oriented approach to the new scientific and digital evidentiary instruments made available by the current development of technology.

1 Raising Reasonable Doubts in the New Scientific and Technological Scenario

As the protagonist of a famous movie wisely reminds, *"in a courtroom, whoever tells the best story wins"*[1]. This holds true regardless of the theoretical model to which a criminal process is inspired, either accusatorial, inquisitorial or mixed.

Certainly, criminal trial always aims to ascertain the truth necessary for adjudicating the case. However, fact-finding at trial is always structurally imperfect and limited, no matter how much effort is made to dissipate all the uncertainties. At trial, the parties, with a substantial role played by the judge in continental systems, work to verify the hypotheses (charges) supported by the prosecutor against the elements brought by the defendant. No matter how corroborated by evidence a set of hypotheses may be, trial fact-finding is structurally affected by doubts. In only one scenario such doubts, yet conceivable, are unreasonable, in the light of the evidence produced, and the judge (or the jury) can declare the defendant guilty. In all other cases, where a reasonable doubt remains, the only possible outcome is a judgment of acquittal (or a not-guilty verdict). It is relevant to outline that alternative explanations on how the facts took place are always possible, even in cases of conviction: here however, although possible in theory, they are simply not considered reasonable, meaning that, in light of the evidence admitted at trial, the only reasonable explanation is the defendant's guilt.

Philosophers and scholars usually affirm that the reasoning (and the ascertainment) conducted in a criminal trial is abductive or retroductive, as opposed to the inductive method typical of "hard sciences". Indeed, the thesis presented by the parties at trial cannot be tested in the same way an experiment verifies or falsifies a scientific theory. At trial, facts to be ascertained belong to the past, and, far from being properly reconstructed through the evidence presented by the parties, they can only be evoked[2]. Put it differently, the evidence "subdetermine" fact-finding in criminal proceedings[3]: the factual outcome of criminal proceedings is always open to a certain margin of uncertainty, no matter how

1 The phrase is pronounced by the character of John Quincy Adams in *Amistad* (1997), directed by Steven Spielberg.

2 F. Caprioli, '*L'accertamento della responsabilità penale "oltre ogni ragionevole dubbio"*', *Rivista italiana di diritto e procedura penale*, 2009, p. 51 seqq.

3 P. Ferrua, *La prova nel processo penale. Struttura e procedimento*, Giappichelli, 2nd ed., 2017, p. 86.

strong the evidence may appear at the moment of its assessment by jurors or judges.

Of course, apart from such theoretical deficiencies, fact-finding in criminal proceedings is easily affected by other factors, perhaps less intriguing to abstract speculation but much more recurring in practice. Tunnel vision; police, prosecutor's and defence's biases (and mistakes); statutory limitations; media pressure; finality principle (at a certain point, the trial need to end with a final judicial decision); limitation imposed by the legal definition of the crime (legal provisions impose to focus only on the facts that are relevant according to the law, and to disregard other aspect that could be important in an historical recollection of the event): all these critical aspects, just to mention a few, could potentially undermine the reliability of what is adjudicated in a courtroom[4].

This is why fact-finding at trial is based on a sceptical approach toward the theses presented by the parties, and, ultimately, especially in the criminal trial, it is methodologically driven by the criterion of the reasonable doubt. If we wanted to express in very short terms what is the essence of the modern conception of criminal proceedings, as developed after the Enlightening reforms, we could easily identify it in the art of doubt, that is the power, acknowledged by law to each of the protagonists of the trial, to raise doubts on the factual and legal arguments proposed by the others.

Like in Plato's dialogue, any story told in a courtroom is challenged by the prosecutor and the defence – alternatively playing the role of Socrates and of his interlocutor – with the purpose to detect wrong assumptions, false recollections of memory, hidden biases of storytellers (witnesses and experts), and mistakes in the reconstruction, description and explanation of the facts.

From the above considerations, we may draw two well-known consequences. The first is that, to have a fair trial, each party must be given an effective chance to tell its story, as well as to challenge the one presented by the others. To this aim, a certain level of orality is indispensable, to allow the prosecutor, the defence and the victims, as well as other potential private parties, to prove their case (and undermine the others'). Without any oral confrontation between witnesses and parties, chances of undermining the story presented by the antagonist at trial decreases under the minimum acceptable threshold: in such circumstances, the trial risks to become a stage where the investigations'

4 M. Godsey, 'The Human Factor in Wrongful Convictions Across National Borders', in L. Luparia (ed.), *Understanding Wrongful Convictions*, Wolters Kluwer, 2015, p. 16 and seqq.

results, far from being scrupulously tested and challenged, are merely and passively confirmed[5].

The second consequence, is that the rights of the defence, especially access to a counsel, need to be, as far as possible, unrestricted. As Langbein very well explains in his masterpiece on the origins of the adversary trial[6], starting from the Eighteen Century the evolution of modern adversary proceedings was mainly achieved through the ever-increasing powers conferred to defence counsel.

There is reason to believe that these basic principles of criminal proceedings, such as the right to counsel and the presumption of innocence, are under attack in the current times. In particular, two seem to be the main factors that concur in undermining the pillars on which fair trial is based. The first is represented by the somehow reductive approach to fundamental rights held since 2011 by the European Court on Human Rights (ECtHR), especially with regard to the right to counsel, and to the right to examine and cross-examine witnesses. The second factor is constituted by scientific and technological development, and by its increasing influence on fact-finding in criminal trial.

After having recalled shortly the restrictive approach to the defence's rights undertook by the ECtHR jurisprudence, I will focus mainly on the problematic aspects related to the scientific and technological advancement, and particularly on three profiles. They consist, as emerging in most recent studies[7], in the increasing use of new forms of surveillance; in the rising recourse to neuroscience; and in the increasing role attributed to systems of artificial intelligence (AI). The aim of this work is not to argue that the admission in criminal proceedings of these new investigative or evidentiary tools, made available by scientific and technological development, should be excluded. Quite the opposite, the purpose here is to think about how they could be used, while respecting at the same time the basic principles of fair trial as previously described.

2 Defence Rights Crisis

In the last years, defence rights seem to enjoy a remarkable diminished level of protection before the European Court on Human Rights in comparison with

5 G. Illuminati, 'The Accusatorial Process from the Italian Point of View', 35 *North Carolina Journal of International Law and Commercial Regulation*, 2010, pp. 297–318.

6 J. H. Langbein, *The Origins of Adversary Criminal Trial*, 2005, Oxford Un. Press, especially from Chapter 2.

7 For bibliographical references see at paras. 4 and following.

the first decade on the new Millennium[8]. This appears to be true with regard to both investigations and trial, in particular as far as the dialectical role played by the defence counsel is concerned. Indeed, the attendance of defence counsels in crucial passages of the proceedings, as well as their chances to challenge witnesses presented by the prosecutor, have been considered progressively as elements that can be balanced with other factors, to the detriment of the Socratic method. In particular, with regard to the right to examine or have examined witnesses, the ECtHR reversed its consolidated jurisprudence on the "sole or decisive" test, replaced, since the *Al-Khawaja and Tahery v. U. K.* decision (2011)[9], with a new approach inspired to the overall examination of the proceedings[10]. At the end of 2018, in *Murtazaliyeva*, the Court confirmed the approach based on the analysis of the overall fairness of the proceeding in a decision concerning the refusal to call a witness of the defence[11]. The Court concluded that, in the light of the "overall fairness as the final benchmark for the assessment of the proceedings", the trial conducted against the applicant could not be considered in violation of art. 6 ECHR, taking into account that the defence accepted that the previous statements of the same witness were read before the court, and considering furthermore the "general passivity of the defence" during the questioning of the police officers about the events surrounding the alleged charged raised against her by the prosecution. As it was brightly observed by Judge Pinto de Albuquerque in his dissenting opinion, "Murtazaliyeva was a golden occasion for the principle of immediacy to regain ground in the Court's case-law. Unfortunately, the contrary has occurred"[12].

A similar restrictive approach was developed with regard to the right of access to a counsel, in the well-known case *Ibrahim and others v. U. K.*[13] (2016). In that case, the Grand Chamber considered that a conviction based, among

8 Many of the considerations conducted in this paragraph were developed in my previous 2017 editorial: M. Caianiello, 'You Can't Always Counterbalance What You Want', 25 *European Journal of Crime, Criminal Law and Criminal Justice*, 2017, pp. 283–298.

9 *Al Khawaja and Tahery v. U. K.* [GC], nos. 26766/05 and 22228/06, 15 December 2011. See M. Biral, 'The Right to Examine or Have Examined Witnesses as a Minimum Right for a Fair Trial. Pitfalls and Trends', 22 *European Journal of Crime, Criminal law and Criminal Justice* (2014), pp. 331–350.

10 The overruling was confirmed, few years later, by *Schatschaschwili v. Germany*, no. 9154/10, 15 December 2015.

11 *Murtazaliyeva v. Russia* [*GC*] – 36658/05, Judgment 18.12.2018.

12 *Murtazaliyeva v. Russia* [*GC*] – 36658/05, Judgment 18.12.2018, Dissenting opinion of Judge Pinto de Albuquerque, at § 1.

13 *Ibrahim and others v. U. K.* [GC], nos. 50541/08, 50571/08, 50573/08 and 40351/09, 13 September 2016. See A. Soo, *Divergence of European Union and Strasbourg Standards on*

other evidence, on police interrogation conducted without the attendance of the counsel (or even a simple consultation with him) did not constitute, as such, a violation of Article 6 ECHR, with regard to the right to remain silent or the right to a counsel[14].

The framework emerging from the reported cases, that were abundantly examined and criticised in various academic works[15], leads to think that, at least in the interpretation of the ECtHR (it is too early to draw analogous conclusions with regard to the CJEU case-law), defence rights are progressively perceived as negotiable, even shrinkable, if that is necessary to promote other political objectives, especially the fight against terrorism (also, if we look at the *Murtazalyeva* case, in a preventive dimension). In other terms, defence rights seem to be considered as an obstacle to the quest for the truth. Such an obstacle is worth been tolerated – although perhaps with increasing reluctance – only as far as the stakes are not too high. On the contrary, when risk to national security increases, some abandoning of traditional prerogatives of the defence, such as access to counsel at the first interrogation, or the right to orally examining a witness to test her/his credibility, may be appropriate.

What indirectly emerges from this case-law is that the role of the defence, and the Socratic method as such, risk to be considered no (more) really instrumental or helpful to find the truth, testing the prosecution's case. More generally, in the last decade, it is the approach inspired to the art of doubt that appears relevantly fading in the jurisprudence of Strasbourg.

Defence Rights in Criminal Proceedings? Ibrahim and the others v. the UK (*13th of September 2016*), 25 *European Journal of Crime, Criminal law and Criminal Justice* (2017), pp. 31–51.

14 This decision represented probably an overruling of *Salduz v. Turkey* [GC], no. 36391/02, 27 November 2008, capable to undermine the consolidated ECtHR jurisprudence on the matter and, perhaps, the potentialities of the EU directives on access to counsel and on the presumption of innocence, given their heavy relying on the Strasbourg case-law. See about it A. Soo, 'Article 12 of the Directive 2013/48/EU: A Starting Point for Discussion on a Common Understanding of the Criteria for Effective Remedies of Violation of the Right to Counsel', 25 *European Journal of Crime, Criminal law and Criminal Justice* (2017) 31–51; A. Tinsley, 'Protecting Criminal Defence Rights Through EU Law: Opportunities and Cha*llenges'*, 4 *New Journal of European Criminal Law* (2013), 465. With regard to the potentialities of the Defence Rights EU directives, see A. Klip, 'Violations of Defence Rights' Directives', 26 *European Journal of Crime, Criminal Law and Criminal Justice 2018*, pp. 271–281; J. Ouwerkerk, 'EU Competence in the Area of Procedural Criminal Law: Functional *vs.* Self-standing Approximation of Procedural Rights and Their Progressive Effect on the Charter's Scope of Application', 27 *European Journal of Crime, Criminal Law and Criminal Justice* 2019, pp. 89–96.

15 See the authors mentioned in the previous footnotes.

Indeed, not even the consideration that fact-finding in criminal trial is inevitably tainted by structural uncertainties – because of its retroductive reconstruction of facts – seems far from being acknowledged by the ECtHR. On the contrary, what seems to constitute the rationale behind the recent case-law development, is that a partial and doubtable guilt proven by the prosecutor is, after all, better than nothing. This attitude, that is arguable *per se*, risks in addition to open the path to an uncontrolled domination of new sources of evidence deriving from scientific and technological development. To say it differently, the more legal culture gives up on the art of doubt when it comes to the field of traditional evidence, the more it will be unprepared to challenge also the new powerful investigative techniques offered by scientific and technological modernity.

3 Unprepared to Deal with the Digitalisation of Criminal Evidence and Criminal Investigations? The Case of Italy

One field of criminal procedure in which unpreparedness to deal with new technological challenges often emerges is surveillance. Despite the fact that its origins date back very long ago – being rudimental form of surveillance extremely old – the recent digital revolution made new forms of intrusion on individual privacy possible, which were simply unthinkable just a few years ago. Furthermore, even old forms of interference with fundamental rights – such as searches or interception of communications – can be performed today much more efficiently because of the widespread digitalization occurred in the second decade of new millennium. At any moment, individuals leave digital tracks of their life, that from a technical perspective, can very easily be detected, collected and used for criminal investigations and adjudication.

For instance, tracking individual positions, and/or retroactively recollecting movements is always possible thanks to the increasing use of cell phones and other things devices, such as GPS/RFID respondent tools installed in cars, watches, shoes, shirts, domestic appliances etc. The same is true for banking monitoring, being most of official banking data – no matter how small a bank may be – digitalised. On line searches are also easily performable – both by private individuals and law enforcement agencies – because of the constant internet connection in which we are living. Interceptions – of both phone and live conversations – can be conducted rather straightforwardly with different instruments, thanks to ever-more efficient software. The situation is likely to increase in a few years, with the development of the new 5G connectivity.

In many cases, legal systems seem to be both unprepared to deal with this new digital world, and attracted almost exclusively by the new potential of detection that technology makes available.

A "good" example of digital illiteracy along with an excessive craving for exploiting new intrusive technological potentials seems to be the Italian legislation on the use of Trojan horses. In 2016, a case was adjudicated by the Italian Supreme Court: a defendant, investigated for being associated in a criminal organisation, had been intercepted for a while thanks to a spyware (a Trojan horse) introduced in both his phone and IPad. The Court, asked to rule on the admissibility of such intrusive investigative technique, in lack of clear criteria provided for by the law, opted for a partial admissibility of Trojan horses in conducting criminal investigations. In particular, according to the Court, spywares may be used only in cases involving organised crime, where the law already provides for more flexible criteria to intercept communication. Furthermore, their adoption should remain confined only to interception of communication, and should not be extended to other intrusive activities potentially performable with Trojans horses (for example, to online searches and seizures of data). One year later, the legislator confirmed the interpretation of the Supreme Court, amending the code of criminal procedure[16] and expressly providing for the legitimate use of Trojan horses for interception of communication within the limits drafted by the judgment of the Supreme Court. More recently, the use of malware software to intercept communication was extended by the Parliament also to corruption cases[17].

Many scholars warned of the risks inherent to such an extensive possibility to employ spywares that allow police and prosecutors to interfere with private life. Once introduced in a digital device, Trojan horses can indeed be used not just to intercept communication, but also, among others, for conducting online searches, extracting data; cloning hard disc, etc.

Reality showed, in recent times, how underestimating new digital potentials may undermine the respect of fundamental rights, as well as citizens' confidence in the administration of justice. On March 29, 2019, a non-profit

16 S. Renzetti, 'Una riforma (radicale?) per tornare allo spirito originario della legge: la nuova disciplina acquisitiva delle intercettazioni tra legalità, diritto vivente e soft law', in http://www.lalegislazionepenale.eu/una-riforma-radicale-per-tornare-allo-spirito-originario-della-legge-la-nuova-disciplina-acquisitiva-delle-intercettazioni-tra-legalita-diritto-vivente-e-soft-law-silvia-renzetti/.

17 With the Parliamentary Act January 9, 2019, no. 3, adopted to improve the fight against corruption, the Parliament introduced the possibility to use spywares to intercept communications in corruption cases, amending Article 266 and 267 of the Italian Code of Criminal Procedure.

company named *Security Without Borders* identified a new Android spyware platform called *Exodus*, composed of two stages (*Exodus 1* and *Exodus 2*)[18]. The Company collected numerous samples of this spyware, spanning from 2016 up to early 2019. The spyware was disguised as an app in Google Play Store (in April 2019, also an iOS compatible version was discovered)[19]. According to the Security Without Borders Report

> "Exodus is equipped with extensive collection and interception capabilities. Worryingly, some of the modifications enforced by the spyware might expose the infected devices to further compromise or data tampering".[20]

The Report informed that

> "According to publicly available statistics, as well as confirmation from Google, most of these apps collected a few dozen installations each, with one case reaching over 350. All of the victims are located in Italy"[21].

On these grounds, an investigation was launched by the Naples Prosecution Office[22]. It came out that *Exodus* had been developed by a private firm, but used by various Public Prosecution Offices around Italy (at present, the identity and the number of the Offices that used the spyware has not been disclosed yet)[23]. At the same time, however, the firm which developed the spyware, also made autonomous use of the latter, to intercept communications and intrude in private devices of citizens who were not under investigation, outside of any judicial control (whether this happened on purpose or because of negligence, it is yet to be verified). In a few weeks, the prosecutors investigating on the case discovered that the number of Italian citizens intercepted by *Exodus* raised over 1,000 persons[24].

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18 https://securitywithoutborders.org/blog/2019/03/29/exodus.html.

19 https://www.cybersecurity360.it/nuove-minacce/spyware-exodus-scoperta-la-variante-ios-della-famigerata-app-spia-per-android-che-ce-da-sapere/.

20 https://securitywithoutborders.org/blog/2019/03/29/exodus.html.

21 https://securitywithoutborders.org/blog/2019/03/29/exodus.html forse basta idem?

22 http://www.procura.napoli.giustizia.it/comunicato-stampa-del-1-aprile-2019/.

23 https://www.repubblica.it/tecnologia/sicurezza/2019/03/30/news/molte_centinaia_di_italiani_intercettati_su_cellulare_per_errore_da_hacker_di_stato-222865990/.

24 https://www.repubblica.it/tecnologia/sicurezza/2019/03/30/news/molte_centinaia_di_italiani_intercettati_su_cellulare_per_errore_da_hacker_di_stato-222865990/ forse basta idem?

On March 30, 2019, the President of the Italian Data Protection Authority (*Garante per la protezione dei dati personali*) released a public statement to the press, affirming that

> "What happened is appalling. The fact that hundreds of people having no connections whatsoever with criminal investigations have been intercepted because of a flaw in a Trojan used for those investigations is quite worrisome. More in-depth inquiries are necessary into this incident, and the Garante will also step in as appropriate.
>
> The exact circumstances of the case have yet to be clarified and the chain of events must be brought to light. Nevertheless, what is unquestionable is that tools like these Trojans are quite dangerous: they can help investigations, but are also liable to give rise to unacceptable breaches of citizens' freedoms if they are deployed without the barest technical safeguards. We had drawn the Government's attention to these issues when we gave our opinion both on the draft legislative decree amending the interception laws – which also introduced regulations on the use of Trojans – and on the draft implementing decree that was supposed to lay down the appropriate safeguards in selecting the software for those purposes.
>
> There is a lesson to be drawn from this case: we must be resolute in preventing similar breaches from occurring in future, being aware that no mistakes may be allowed for in such a sensitive area – where investigational powers go hand in hand with no less strong technological applications. Investigational tools such as those at issue must be kept at the disposal of law enforcement bodies, as provided for by the law, but only if they are coupled with robust safeguards to protect citizens' freedom"[25].

Spywares are not the only technology with which the Italian legislator shows disregard for the dangers potentially brought by modernity to private life of individuals.

Another field is represented by the collection of telephone data. Italian law admits such collection on the sole basis of a warrant issued by the prosecutor. It is worth observing that with regard to telephone data, the law does not provide for strict criteria to limit the prosecutorial powers. Therefore, in this

25 https://www.garanteprivacy.it/web/guest/home/docweb/-/docweb-display/docweb/9101790.

field the duty to state reasons represents a very feeble limit to the prosecutorial discretion.

The Italian legislator followed a similar approach, when implementing the Budapest Convention on cybercrime. In particular, computer searches, acquisition of e-correspondence and computer cloning where all equalized to ordinary searches and seizures, for which a prosecutorial warrant is sufficient and where really flexible criteria are provided for by the law[26].

Lastly, other forms of "technological" investigations – such as GPS surveillance – are considered by the Italian jurisprudence in the same way as traditional police shadowing, for which not even a prosecutorial warrant is required[27].

The Italian case reflects rather clearly how cultural unpreparedness to deal with digital revolution, on the one side, and lack of adequate legislation, on the other, may affect both the effective protection of fundamental rights, and the dialectic approach to criminal trial. The result is that police and prosecutors are permitted to interfere in a broad(er) manner with the private individual sphere, and that collected data are directly produced at trial, without a substantial chance for the defence to challenge the way in which they were gathered.

4 Adapting Old Principles to New Legal Challenges in the Field of Surveillance

Of course, other approaches are possible, and deserve to be sustained in a comparative and transnational perspective. The first case worth to be mentioned is without any doubt the 2008 judgment by the German Supreme Court (*Bundesverfassungsgericht*). In that pivotal decision, the Court observed that

> "the secret infiltration of an information technology system is in principle to be placed under the reservation of a judicial order. The statute granting powers to perform such an encroachment must contain precautions in order to protect the core area of private life"[28].

26 F. Iovene, 'Perquisizione e sequestro di computer: un'analisi comparatistica', *Rivista di diritto processuale*, vol 6: 1607–1616, p. 1615.

27 F. Iovene, 'Pedinamento satellitare e diritti fondamentali della persona', *Cassazione penale*, vol. 10: 3556–3565, p. 3562.

28 Judgment of 27 February 2008 – 1 BvR 370/07. See a short English abstract of the decision at the website: https://www.bundesverfassungsgericht.de/SharedDocs/Entscheidungen/EN/2008/02/rs20080227_1bvr037007en.html.

A similar path was followed by the Court of Justice, starting from the famous case of *Digital Rights Ireland and Seitlinger and Others*[29], where the Court stated that, in order to respect the principles expressed in the EU Charter of Fundamental Rights (EUCFR), national systems should regulate the matter of data retention providing strict legal limits to the power of the investigating authorities to gather telephone data. First of all, the law should provide for objective criteria. Moreover, the Court affirmed that the law should entrust a judge or *an administrative independent authority* with the power to issue a warrant for collecting phone data (and, in this perspective, there is reason to doubt that the Italian public prosecutor is an independent authority in the sense expressed by the European Court of Justice)[30].

Finally, inspiration should be taken by the evolution of the US Supreme Court, where a stream of judgments adapted the principles enshrined in the Bill of Rights to the challenges raised by digital revolution. First, in *Jones*, the US Supreme Court applied for the first time the safeguards of the IV Amendment to the US Constitution to the instalment of a device for a GSP shadowing[31]. Secondly, in *Carpenter*, the Court expanded the protection of the IV Amendment against the Governmental collection of individual data to retroactively reconstruct individual movements. In *Carpenter*, the Court affirmed that the Government violates the IV Amendment by accessing historical records containing the physical locations of cell phones without a search warrant. The Court in particular observed that

> "The location information obtained from Carpenter's wireless carriers was the product of a search [... Prior to the digital age, law enforcement might have pursued a suspect for a brief stretch, but doing so "for any extended period of time was difficult and costly and therefore rarely undertaken.". For that reason, "society's expectation has been that law enforcement agents and others would not—and indeed, in the main, simply could not—secretly monitor and catalogue every single movement of an individual's car for a very long period." Allowing government access to cell-site records contravenes that expectation. [...] Mapping a cell phone's location over the course of 127 days provides an all-encompassing record of the holder's whereabouts. As with GPS information, the timestamped

29 EU Court of Justice, April 8, 2014, cases no. C-293/12 and C-594/12.

30 See M. Caianiello, 'Increasing Discretionary Prosecutor's Powers: The Pivotal Role of the Italian Prosecutor in the Pretrial Investigation Phase', in D. K. Brown, J. I. Turner, and B. Weisser (eds.), *Oxford Handbook Online on Criminology*, Oxford Un. Press, 2019, pp. 1–27.

31 *United States v. Jones*, 565 U.S. 400 (2012).

> data provides an intimate window into a person's life, revealing not only his particular movements, but through them his "familial, political, professional, religious and sexual associations. [...] Unlike the bugged container in *Knotts* or the car in *Jones*, a cell phone—almost a "feature of human anatomy," *Riley*, 573 U. S., at ___ (slip op., at 9)—tracks nearly exactly the movements of its owner. While individuals regularly leave their vehicles, they compulsively carry cell phones with them all the time. A cell phone faithfully follows its owner beyond public thoroughfares and into private residences, doctor's offices, political headquarters, and other potentially revealing locales. [...] Accordingly, when the Government tracks the location of a cell phone it achieves near perfect surveillance, as if it had attached an ankle monitor to the phone's user. Moreover, the retrospective quality of the data here gives police access to a category of information otherwise unknowable."[32]

The reasoning was similar to that expressed in a previous case, *Riley v. California*[33], where the US Supreme Court extended the safeguards of the IV Amendments to (otherwise warrantless) police cell phone searches incident to arrest[34]. Similarly to *Carpenter*, the Court observed in *Riley* that modern cell phones "differ in both a quantitative and a qualitative sense from other objects that might be carried on an arrestee's person", because they have an immense storage capacity (millions of pages of text, thousands of pictures, or hundreds of videos), unthinkable just a decade ago and whose search bears relevant privacy consequences.

All the reported judgments have in common the methodological approach, aimed to translate – as it was brightly defined by Washington and Richards[35]- traditional principles and safeguards in the environment created by scientific and technological development. This has positive consequences, with regard to fair trial rights and the equality of arms principle: Digital evidence ceases to be undisputable, and can be discussed, criticised, opposed in various terms.

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32 *Carpenter v. United States*, 585 U.S. ___ (2018), p. 11 and seqq.

33 *Riley v. California*, 573 U.S. __ (2014).

34 G. Lasagni, 'Tackling phone searches in Italy and in the US. Proposals for a technological re-thinking of procedural rights and freedoms', 2018 *New Journal of European Criminal Law*, 2018, 9, pp. 386–401.

35 M. Washington – N. Richards, 'Digital Civil Liberties and the Translation Problem', in D. K. Brown, J. I. Turner, and B. Weisser (eds.) *The Oxford Handbook of Criminal Process*, Oxford Un. Press, 2019, pp. 365–391 8esp. pp. 367 and seqq.)

The need for an independent supervision (preferably judicial, in my opinion[36]), as imposed by the rulings of the US, German and EU Court, implies not only a higher standard for the protection of individual privacy, with regard to the impartiality of the organ issuing the judicial warrant, and of compliance with the rule of law. It furthermore permits parties, and especially the defence, to challenge the real necessity to adopt the intrusive measure as such (that is, to challenge the occurrence of the probable cause, from an American perspective; or to deny, or raise doubts about the proportionality of the measure adopted, in the European approach).

Once taken this first step (challenging the legality of the digital evidence), keeping a critical approach toward the probative value of the information introduced at trial (even though these two passages are not necessarily interrelated) becomes easier.

5 Devolving the Responsibility to Adjudicate to Science and Technology

The propensity to devolve the responsibility to adjudicate to science and technology is impressively increasing[37].

Two appear the main ways in which such devolution takes place, if we look at the potential future development of criminal justice. The first, perhaps less troublesome[38], is the influence of neurosciences, and the rising recurrence to the latter. The second, is the progressive use of artificial intelligence systems

36 However, experts observed that judicial supervision is not always feasible, and sometimes even not the best structural safeguard. See on the point the interesting contribution of G. Malgieri – P. De Hert, 'European Human Rights, Criminal Surveillance, and Intelligence Surveillance: Towards "Good Enough" Oversight, Preferably but Not Necessarily by Judges', in D. C. Gray – S. Henderson (eds.), *The Cambridge Handbook of Surveillance Law*, New York, 2017, p. 509–523.

37 See on the topic the essay of A. Garapon – J. Lassègue, *Justice digitale*, puf, Paris, 2018, especially pp. 204 and seqq.

38 At least for now neurosciences are introduced at trial through the oral testimony of a medical expert witness, a kind of evidence judges and lawyers are rather familiar with. This is why at the time being neurosciences do not constitute yet, per se, a threat to the dialectic method in criminal trials. However, in the long run the tendency to rely only on neuroscientific tests' outcome, doing without the examination of medical expert witnesses at trial, could increase (especially if the jurisprudence of the European Courts will continue to frame the right to examine and cross-examine witnesses as balanceable and renounceable).

(AI) to adopt judicial decisions, favoured also by the blurring of boundaries between preventive and traditional (repressive) criminal justice.

With regard to neurosciences, it is well known that they can play a useful and innovative role in the administration of criminal justice (for example to assess the defendant's dangerousness, or to prove insanity, when this defence is raised at trial).

Among their multiple potentialities, for the purposes of this essay it may be worth mentioning their employment to assess witnesses, victims and defendant's credibility. Case-law already exists, in fact, where courts opted for the use of neuroscientific tests to check to which extent the recollection and description of facts by witnesses may be trusted. The adjudication was then strongly influenced by the outcome of neuroscientific experiment.

In an interesting 2011 Italian case, concerning charges of sexual harassment,[39] the court, at the end of the trial, admitted *ex officio* two neuroscientific experiments to test the victim's and defendant's credibility (having they given opposite versions of the facts, and lacking any other evidence to overcome the uncertainty). Both the victim and the defendant were submitted to the Implicit Association Test (IAT)[40] and to the Timed Antagonistic Response Alethiomete (TARA)[41] test. At the end of the medical examination, and after having heard as expert witnesses at trial the doctors who conducted the experiments, the court opted for convicting the defendant, considering reliable the testimony of the victim (and unreliable the defendant's version).

Some years previously, the same test was used to convict the defendants of a murder case in India. At the end of the medical neuroscientific experiment conducted, the "story" of the defendants was found unreliable, because their brain reactions during the IAT test showed their knowledge of both the venues where the crime took place, and of some details, which had been denied by the defendants during their examination at trial.

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39 Trib. Cremona, July 19th, 2011. The conviction was confirmed by the Supreme Court (Court of Cassation -S.C.), 3rd Sect., March 13th, 2014, no. 15178 S.M. The judgment was published in *Rivista italiana di medicina legale e dir. sanitario,* 2012, 2, pp. 748.

40 The Implicit Association Test (IAT) is a reaction time based categorization task that measures the differential associative strength between bipolar targets and evaluative attribute concepts as an approach to indexing implicit beliefs or biases (See *Neural Patterns of the Implicit Association Test*, Graham F. Healy, Lorraine Boran and Alan F. Smeaton, in https://www.frontiersin.org/articles/10.3389/fnhum.2015.00605/full).

41 A. Corda, 'Neuroscienze forensi e giustizia penale tra diritto e prova (Disorientamenti giurisprudenziali e questioni aperte)', in *Archivio penale*, 2016, vol. 3, pp. 1–41.

Beside for the (already raised) issues related to the privilege against self-incrimination[42], it is interesting to observe how neuroscientific tests show some potential to replace the role traditionally played by examination and cross-examination by the parties.

Indeed, the dialectic approach to testimonial evidence pursues the goal of discovering potential, and both objective and subjective, flaws in the witnesses' statements. Cross-examination, in particular, is precisely conceived to favour the emerging of witness' biases, perception problem, expressive or descriptive limits, etc.

Neuroscientific tests may, in the long run, tend to replace the old Socratic approach to testimonial evidence with more scientific-based medical operations. Currently, though, the extinction of the old dialectic approach adopted in courtrooms appears rather remote still. Today medical tests are indeed used in addition to more traditional fact-finding methods, and not in their place.

In the Italian case illustrated above, for example, both the victim and the defendant had been previously examined before the court, and the tests were only issued to solve some doubts left despite the oral examination by the parties. Besides, the test was introduced in court by an expert witness, who was himself subject to examination and cross-examination by the prosecution and the defence. Furthermore, the judgment of the court was based not only on the medical tests, but on an overall examination of the evidence admitted at trial. The traditional dialectic approach to trial fact-finding, therefore, far from being abandoned, was simply applied in a more reliable fashion, while the court took advantage of all the evidentiary elements made available by the best science and knowledge.

However, the risk that, in the future, some other court may use neurosciences to find a shortcut in adjudicating cases more quickly does not seem remote.

6 Risks of Algorithms

The other field in which technology may strongly influence judicial adjudication is that of Big Data and Artificial Intelligence (AI). The progressive use of data and artificial intelligence to adopt judicial decisions represents another risk to the traditional approach toward the administration of criminal justice.

42 See on this topic D. Fox, 'The Right to Silence as Protecting Mental Control', in M. Freeman (ed.), *Law and Neuroscience*, Oxford Un. Press, 2011, pp. 335 and seqq. (esp. pp. 337–338).

According to some scholars, we already live in an algorithmic society[43], that is a society "organized around social and economic decision making by algorithms robots, and artificial intelligence agents"[44].

In criminal justice, algorithms are today mainly used for predictive policing, in two different ways. On the one side, algorithms elaborate data to map potential risks of crimes commission, in relation to a determined geographical area or to a certain kind of offenders and victims. Police, indeed, is increasingly using such systems to identify where certain crimes could take place, what kind of potential victims may be exposed to risk, and who could the potential offenders be. On the other side, algorithms are used to assess the level of potential danger of specific individuals, mainly related to the risk of recidivism. For example, in the *Loomis* case[45], the Supreme Court of Wisconsin sustained the Circuit Court decision to use at sentencing the assessment based on a risk assessment tools. The case concerned the decision to admit a COMPAS report for determining the appropriate sentence with regard to probation and parole (terms, conditions, supervision). According to the Supreme Court's judgment

> "COMPAS risk assessment does not predict the specific likelihood that an individual offender will reoffend. Instead, it provides a prediction based on a comparison of information about the individual to a similar data group". This conclusion was accompanied by the warning that PIR (Presentence Investigation Reports) based on algorithms should be used properly, following certain limitations and cautions. Firstly, COMPAS risk assessment should not be used to determine the severity of a sentence or weather an offender is incarcerated. Secondly, COMPAS should always constitute merely one tool available to a court, that need to be confirmed by "additional sound information".

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43 See G. Contissa – G. Lasagni, 'The Role of Predictive Algorithmic Systems in Criminal Investigations: Which Effective Remedy To (New) Fair Trial Lacunas?',2019, forthcoming publication.

44 J. M. Balkin, 'The three laws of robotics in the age of big data', 78 *Ohio State Law Journal*, 2017, pp. 1217–1241.

45 *Loomis v. Wisconsin*, July 13, 2016 (*Tate v. Loomis*, 881 N.W.2d 749 – Wis. 2016). See a comment in 130 Harvard Law Review 2017, pp. 1530–1537. See M. Gialuz, 'Quando la giustizia penale incontra l'intelligenza artificiale: luci e ombre dei risk assessment tools tra Stati Uniti ed Europa', *Diritto penale contemporaneo*, 29 May 2019 (https://www.penalecontemporaneo.it/d/6702-quando-la-giustizia-penale-incontra-l-intelligenza-artificiale-luci-e-ombre-dei-risk-assessment-too); S. Quattrocolo, 'Equità del processo penale e automated evidence alla luce della Convenzione europea dei diritti dell'uomo', *Revista Ítalo-Española de Derecho Procesal*, Vol. 2, 2019, pp. 17 and seqq.

The Court then observed that due process safeguards imply that algorithmic methods are used with caution, taking into account that

> "risk assessment scores are based on group data, they are able to identify groups of high-risk offenders——not a particular high-risk individual. Accordingly, a circuit court is expected to consider this caution as it weighs all of the factors that are relevant to sentencing an individual defendant".[46]

In conclusion, the Court affirmed that, as far as the judicial decision is not based exclusively on algorithmic risk assessment, and the court uses the caution necessary to handle such predictive systems, the use of algorithms at the sentencing stage does not violate the defendant's due process rights. It is worth to outline that the Supreme Court sustained the Circuit Court decision, regardless of the fact that the methodology used to produce the assessment by COMPAS was unknown both to the Wisconsin Court itself and to the defence.

If the first way of using Big Data – as a mean to calculate or predict crime risks in a certain area – although presenting some serious concerns, is not the most problematic with regard to fundamental rights, being after all an instrument to support police expertise, the same does not seem true for the seconds way of using algorithms, that is for predictions on specific individual's dangerousness. This operation, rather obviously, bears greater potential, and greater risks for the respect of basic principles of criminal justice.

Criminal proceedings present a large number of stages where predictive judgments are required, far beyond the sole risk-assessment on recidivism at sentencing. An extremely relevant field is constituted by pre-trial detention, where the judge must decide whether to leave the defendant in custody pending trial or to set her/him free. The decision is usually based on risk predictions (traditionally, the risk that the defendant may tamper evidence, if left at large, or may flee, or the risk that s/he could commit further offences if not subjected to restriction pending the proceedings). All these factors are usually evaluated on incomplete evidentiary basis – mostly on the information collected by police and the prosecutor – that is untested by the defence (and sometimes not even disclosed to the defendant's counsel). The risk assessment for pre-trial detention is usually carried out evaluating both objective and subjective elements, such as the defendant's personality (and her/his propensity to commit further crimes). This form of prediction seems very close to that elaborated in *Loomis* with regard to the sentencing stage. In other terms, once opened the

46 *Loomis v. Wisconsin*, July 13, 2016 (*Tate v. Loomis*, 881 N.W.2d 749 – Wis. 2016), § 74.

door to predictive actuarial methods in sentencing, there is no reason not to do the same also for decisions on pre-trial detention (or on bail, where available according to national law), and for all other decisions similarly based on risk prediction.

Another predictive assessment where AI systems may play a role concerns probable cause, the well-known standard required by law to interfere with some fundamental rights (privacy, or domicile constitutional privileges). Probable cause, indeed, sounds prima facie compatible with an algorithmic based approach to risk assessment[47].

Finally, AI-based predictive judgments may become greatly relevant with regard to preventive detention for dangerous offenders, a very sensitive field for criminal justice policy in many continental countries, as well as in the United States[48]. Indeed, judicial decisions on preventive detention are almost exclusively dealing with the defendant's propension to commit further crimes in the future, a topic for which, as *Loomis* confirms, algorithmic actuarial predictions could bear a useful potential[49].

It is interesting to observe that the limits provided for in the European legal framework on the use of algorithms for judicial decisions do not really differ much from those provided for by the Wisconsin Supreme Court in *Loomis*. As we have seen, in *Loomis* the Court required AI assessment to be considered with caution by the judges, and not to constitute the sole evidentiary basis supporting the judicial decision.

A similar regulation is provided in the EU. According to Article 11 Directive 2016/680, a decision based solely on automated processing shall be prohibited (an analogous provision is contained in the Regulation (EU) 2016/679 – the General Data Protection Regulation).

It should be pointed out, however, that on both sides of the Ocean, such rules do not seem to significantly increase the level of protection of individual

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47 For example, the Italian Code of Criminal Procedure allows body and premises searches if there are reasonable grounds to believe that someone is concealing the *corpus delicti* or other physical items related to the crime on his body or in a certain place. See Article 247, in M. Gialuz, L. Luparia and F. Scarpa (eds.), *The Italian Code of Criminal Procedure. Critical Essays and English Translation*, Wolters Kluwer, 2014, p. 206.

48 On preventive detention in the comparative perspective between Europe and North America see M. Caianiello-M. L. Corrado (eds.), *Preventing Danger. New Paradigms in Criminal Justice*, Carolina Academic Press, Durham, North Carolina, 2013, pp. xiii-253.

49 It needs to be reminded however that, according to others, such potentialities are definitely overrated: M. Tonry, 'Predictions of Dangerousness in Sentencing: Déjà Vu All Over Again, in 2018 Crime and Justice—A Review of Research,' Forthcoming (*available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=32977899*).

rights. At the bottom line, what is required is that judicial decisions are not taken on the sole basis of an algorithmic calculation. In other terms, other evidence needs to corroborate the mathematical predictive outcome. As it is well known, this does not constitute a particularly rigorous threshold: After all, it is not hard for average experienced judges to find some circumstantial evidence to support their reasoning, therefore formally respecting the standard provided for by *Loomis* (and by the EU regulations).[50]

7 How to Face Future Challenges – Is There Still Room for Dialectic?

In light of the challenges previously exposed, one may be tempted either to refuse modern scientific and technological developments at all, to preserve the traditional Socratic approach to the administration of criminal justice, or to conclude that, because of the rise of these new evidentiary instruments, there is no room anymore for such old traditions in criminal justice systems. Of course, neither of the two conclusions seems well founded.

Closing the door to scientific development is simply unhistorical, and, in the long run, also impossible. Once new technological tools and scientific discoveries are available, and may be of help for the administration of justice, the wisest thing to do is to determine how to implement their use within the criminal procedure domain. Refusing to do it, far from preventing the recourse to science and technology in adjudicating cases, would only end up with others determining the rules governing this kind of new evidentiary instruments.

But also giving up on the dialectical and Socratic approach to justice would not remain without unpleasant consequences. This approach is indeed crucial for the resilience of democracy in the administration of justice. Dialectics, and equal footing between the prosecution and the defence reproduce democratic interactions inside courtrooms: The more such method is restricted or undermined, the more confidence in democracy will be weakened in the long run.

Besides, no matter how sophisticated new evidentiary tools may be, fact-finding in legal processes will continue to remain abductive in its essence. Facts relevant to the case continue indeed to belong to the past, and cannot be reproduced at trial in the terms in which an experiment can be conducted

50 The fact that corroboration does not constitute a real problematic limit was repeatedly observed, among the Italian scholars, with regard to the statements given by co-defendants (or by persons accused in separate trials whose facts are connected with those tried in other proceedings). See R. A. Ruggiero, *L'attendibilità delle dichiarazioni dei collaboratori di giustizia nella chiamata in correità*, Giappichelli, Torino, 2012, pp. 45 and seqq.

to test a scientific theory. Furthermore, even if the influence of science and technology will greatly increase in the next future, it seems likely that for a long time still, fact-finding will continue to combine knowledge from hard sciences with common sense, that is, with its biases, misperceptions, false truths and other misleading factors that characterise any social community. Again, dialectics and Socratic approach seem the best way to detect common sense mistakes or misperceptions in criminal trials.

In other terms, there is no other way but to work hard to harmonise new instruments and methodologies with old principles and traditions, to keep fact-finding both fair and adequate to modern challenges.

But how to reach this outcome?

Three seems to be, from my perspective, the paths worth to be followed.

The first consists in keeping a high standard in applying defence rights. Far from being considered balanceable, manipulable, or shrinkable, they need to be rigorously observed and respected. In this perspective, new inspiration might come from the case-law of the European Court of Justice, that will increasingly follow from the adoption of the Stockholm directives on due process.

The potentials of these directives are indeed very broad, as it can be confirmed by a recent CJEU judgment concerning an Italian case (*Moro*, June 13, 2019, C-646/17). The case concerned a criminal proceeding where charges had a purely internal dimension (handling the proceeds of a crime and aggravated theft)[51]. Despite the submission of the Italian Government and of other States, claiming that EU due process directives should be applied only in cases with transnational dimension, the Court declared the case admissible. The Court in fact, observed that nothing in the wording of the directives, and in particular of Directive 2012/13, could be found to sustain that their effect was limited to

51 During the trial, celebrated in the special form of the abbreviated trial, the judge modified the legal definition of the charge, from handling the proceeds of crime to aggravated theft. The defendant then asked to be admitted to plea bargaining. However, the Italian law does not permit at that stage to reopen the terms for plea bargaining in case of amendment of the legal qualification of the charges (*quaestio iuris*), while it admits the plea when the material facts described in the charges are modified (*quaestio facti*). The judge therefore submitted the issue to the European Court of Justice for a preliminary ruling, asking if the provision preventing the defendant to enter into a plea bargaining after the legal definition of the charges has been amended is compatible with Article 6 of the Directive 2012/13. The CJEU declared the case admissible. With regard to the merit, however, it concluded that Article 6 of the Directive 2012/13 and Article 48 of the Charter of Fundamental Rights does not prevent a Member State legislation to prevent plea bargaining when the legal qualification of the charges are changed though permitting the plea when the material facts are modified.

cases with a cross-border dimension. On the opposite, the wording and the scope of application of Directive 2012/13 is general[52]. As the Advocate General observed (and the Court acknowledged[53]):

> "*Independently of* the existence of *any specific situation of cross-border cooperation* between the authorities of two Member States, the objective pursued by that harmonisation is to create a common playing field in which certain minimum procedural standards are guaranteed. In this way, *when* the need for a specific instance of cross-border cooperation arises, the authorities in question will be able to trust each other's criminal-law systems with respect to the existence of those procedural guarantees, so that judicial cooperation may be more effective".

Therefore, the Court concluded that Directive 2012/13, aiming, as the other due process directives, to create a harmonised minimum level of protection of defence rights in criminal proceedings in the Member States, is independent from the existence of a cross-border dimension, and can be invoked also in a case with purely national dimensions.

This judgment confirms how great is the potential of the new directives on defence rights adopted following the Stockholm Program, because they can be applied to all criminal proceedings in the Member States, no matter what is the nature (cross-border or merely national) of the case prosecuted. In other terms, whenever defence rights are involved in criminal proceedings, the CJEU may have a say about it.

If the CJEU will find the strength to keep a rigorous understanding of individual rights in criminal proceedings, the path seems open to a widespread rise in the level of protection of defence safeguards throughout the European Union.

In this context, national courts may feel boosted by the competition with the CJEU, in protecting defence rights. This is, hopefully, happening in Italy, where the Italian Constitutional Court recently seems to have undertaken a new interpretative line aimed to challenge the CJEU approach to due process safeguards, with the purpose of stimulating the latter to raise the level of protection of the defendant's rights[54].

The second thing to do in order to improve courts skills in overcoming the challenges stemming from scientific and technological development. This

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52 See the Opinion of Advocate General Bobek delivered on 5 February 2019, § 38.

53 CJEU, June 13, 2019, C-646/17, Moro, § 35.

54 Cf. Constitutional Court, Order no. 117 of 6.03.2019 (dep. 10.05.2019).

issue was brightly defined as the translation problem. Quoting Washington and Richards, digital revolution (as well as scientific progress)

> "squarely presents the problem of translation for constitutional rules. It requires courts to answer the question how (or if) we will translate our hard-won protections of civil liberties into the digital environment [...] Translating ancient principles and doctrines to emerging technologies such as the cloud, location tracking, and encryption has proven so difficult as to threaten civil liberties themselves. One way or another, our response to this challenge will become our generation's defining legacy of civil liberties"[55].

As Lasagni most appropriately wrote

> "we need to rethink the foundational basis of fundamental rights and freedoms established by the European Convention on Human Rights and by the Charter of the Fundamental Rights of the European Union in light of the advent of digital technology, trying to delineate some guidelines from which to extrapolate procedural rules able to guarantee an adequate level of safeguard in the digital era"[56].

Solutions like those adopted in *Riley* or *Carpenter*, on the US side, seem to represent good examples of how such a new interpretative methodology should be developed, in order to adapt the foundational basis of rights and freedom to the current times. The same holds true, on the Continental side, for the 2008 judgment by the *Bundesverfassungsgericht* and for the *Digital Rights Ireland* case decided by the CJEU.

The third proposal to harmonically merge modernity with tradition concerns algorithmic justice. To make it compatible with individual rights, parties must possess the necessary information to challenge each passage of the algorithmic prediction. This way, judges may be supported in developing an autonomous and independent approach to actuarial assessment tools, and to use them as a relevant resource, without being passively subject to their incomprehensible outcomes.

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55 M. Washington – N. Richards, 'Digital Civil Liberties and the Translation Problem', cit., pp.366

56 G. Lasagni, 'Tackling phone searches in Italy and in the US', cit., p. 386.

In essence, parties and the judge should be put in a condition to verify the passages of the algorithmic calculation, in order to make their observations and draw their conclusion about its prediction.

Therefore, disclosure about the set of data taken into consideration to train the system should be available to the court and the parties (in *Loomis* they were not). The same should be done with the cross-validation set of data, that are crucial to test the credibility of the actuarial prediction (in *Loomis* they remained undisclosed). The methodology used to set the algorithm should be communicated to the parties, and the predictive outcome should be tested under more than one model of algorithm (multiple cross-validation), to avoid the risk that the judge passively accepts the scientific validity of the algorithmic assessment (in *Loomis* the court accepted as credible the risk assessment tool elaborated by COMPAS, without further analysis under the aspect of cross-validation). Finally, the testimony of the expert who created the algorithmic model should be admitted, where necessary (as it is provided by recital no. 38 in the directive 680/2016).

In short, there are various ways to test the credibility of algorithmic predictions, and the law should effectively implement them to allow the parties in criminal proceedings to challenge their credibility, and, in the end, to continue under different guises to tell their story (and undermine the counterparts').

Only with a critical approach, procedurally regulated, it will be possible to detect biases, and perception mistakes, that already various commentators point out as the constant risk of an actuarial management of criminal justice[57].

8 Conclusions

Thanks to modern scientific and technological development, new evidentiary instruments are wildly competing to replace the traditional tools used to establish facts in courtrooms since long time.

At first glance, it could therefore appear that there is no need any more for a critical approach to fact-finding at trial, and that it is not necessary anymore to found the philosophical bases of criminal trial on the art of doubt. Machines and sciences – one might claim – are making such approaches obsolete and are permitting to solve doubts in a quicker and more reliable way.

However, there are numerous reasons to argue that the opposite is true, and to continue believing that, no matter how many new fact-finding instruments

57 M. Tonry, 'Predictions of Dangerousness in Sentencing: Déjà Vu All Over Again', cit.

will be discovered in the next years, in *a courtroom, whoever tells the best story wins*.

After all, there is still a need for cross-validation with regard to evidence, assessment, data elaboration, biases: For the reasons expressed above, criminal trial should firmly remain a place where there is no room for undisputable truth. Furthermore, fact-finding still remains retroductive, regardless of how much the field of evidence is going to change in the next years.

Dialogue and science, doubt and truth, were never found incompatible in modern times, and there is no reason to start doing that now.

After all, the first book on modern science –Galileo's *Dialogue Concerning the Two Chief World Systems* – was presented precisely in the shape of a Socratic dialogue, just to remark the difference between the modern dubitative approach to science (an approach inspired to the art of doubt) and the premodern concept/view of science, rigidly based on undisputable truths.

Lastly, we should never forget that, if machines can progressively provide more answers, they are not (yet?) able to elaborate and put questions: A faculty that, up to now, strictly pertains to human beings.

This – the faculty to raise doubts and ask questions – is a precious gift, of which we should be proud, and not so easily ready to give it up.