

## The Presence of fMRI in European and American Courts

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### Abstract

The permanent scope of courts has been to detect the truth and the lie, because they comprise the hallmark of justice. The last more reliable lie-detection tool before fMRI was the polygraph. fMRI was proved to be a more reliable tool, compared to a polygraph, to evaluate the claims of somebody as true or deceptive. Yet, it could detect false memory and if this memory leads to a lie or is re-stored. Its accuracy and reliability were proved through abundant scientific studies, and the scientific community has approved fMRI as a reliable lie-detection machine. Furthermore, fMRI could evaluate the psychopathic level of someone. The prejudices that the fMRI recordings were just images could not stand up. Either the countermeasures could not jolt the fMRI accuracy.

Since the beginning, neither the fact that its feedback did not cover all the American Supreme Court parameters to be accepted as court evidence nor the fear that the justice representatives might misinterpret the neuroscientific terms could impede the acceptance and impact of fMRI as legal evidence. Its use was extended to many criminal cases in European states. The fMRI influence was proved to be of vital importance. There are serious allegations that fMRI should be a coercive examination.

**Keywords:** fMRI; Lie-Detection; Forensic; Law; Brain; Polygraph; Human Rights; Recidivism

### Introduction

fMRI was defined as a modern truth test. Initially, it was used to discriminate between truth and deception. The modern truth test could successfully distinguish between truth and deception. In real life, there could be false memories, too. The latter should not be excluded from the studies on fMRI interrogations. Unlike the polygraph, fMRI comprises a trustworthy diagnosis of false memories. It could detect if the false memories will insist and as a consequence, there will be told either lies or whether these memories will be corrected.

The overlap between brain parts activated during deception and false memory does not mean non-accuracy of fMRI, but that the allegations could be not indisputably true and MIGHT not be the truth. Because of negative bias toward fMRI, it was not always considered when presented in courts. In some cases it could not pass the courtroom doors because fMRI images were estimated to be just photographs and thus they had nothing to do with reliable evidence. Another reason why judges excluded it from evidence presented to juries was because they saw fMRI as the reason that would lead juries to have a wrong judgment. In many other cases, it was admitted and taken seriously into consideration by the justice corps to evaluate if there was truth or deception. The use of fMRI in the courtrooms was not limited to its function as a lie-detection tool. There were cases of usage to prove the accuracy of the events by providing proof of the

mental capacity and state of the defendants or victims. When rejected, it was not due to fMRI underestimation from the trial but due to insufficient fMRI data explanation provided by neuroscientists or the unimportance of any fact the fMRI results were presented for. Nowadays, after being admitted and affecting many forensic cases in American and European Courts, there is an endeavor to add fMRI to the compulsory investigations of any testimony when the latter is not evident and confuses the image the justice representatives create about what has really happened.

### Polygraph

Detecting deception and illuminating the truth are the fundamental scopes of justice [1,2]. The first lie-detection tool was applied in 1000 B.C. in China [3]. Since then, justice has accepted many lie detection tools [1,2]. Polygraph was created in the 1920s [4]. Although it had no logical scientific explanation and was not accepted by the scientific community in many cases the courts admitted the polygraph [4-6]. However, many courts denied its use, because of estimating it as unreliable evidence [5]. It was the last tool used in courts before the approval of modern lie detectors [1,7].

Additionally, the polygraph recorded and examined the peripheral brain nervous system [1,6]. If it records any external emotional reaction like anxiety or abnormal eye movements to the interrogated person, it could be interpreted as an attempt to hide deception [1]. Polygraph results could be easily manipulated [8]. If the subject desired not to show any emotional agitation, it would be enough to think about quiet moments without showing agitation [4]. Hence, it could be translated as true testimony.

### Emotional agitations

At this point, it should be mentioned that the agitations are not always a product of deception.

In many cases, the idea of being interrogated by a justice representative could be enough to cause emotional agitation, independently if the person's claims are valid or deceptive. Additionally, when someone doubts the truthfulness of its own confession while aiming to tell the truth, it might also cause emotional agitations. Another option is the emotional reaction when mentioning a brutal crime. Representative examples are the cruel crimes of violation, severe somatic damages, killing and throwing a 20-year old girl in the sea in Greece. Many women might start shaking, crying, and being terrified when hearing or talking about the crimes. Experiencing similar emotions during interrogation under a polygraph recording could mean being sentenced for a false confession. Therefore, neither in the first nor in the other cases did the interrogated person commit deception, but according to polygraph recordings in all cases mentioned above, the interrogated individuals would be accused of deceptive confession or perjury. It results that, because of the polygraph system, innocent persons who respect the justice laws and did not intend to lie would be condemned for lying by justice. Indeed, the countermeasures could beat the polygraph. Moreover, it would convict innocent defendants and exonerate dangerous for civil safety defendants [1]. All these come from the fact that the polygraph could detect an individual's emotional state but not the cause of the emotions. Thus, emotions should not be a parameter to evaluate if something told is deception or not. However, they should not be ignored. On the contrary, they should be taken into account to prevent injuries and other secondary victimization consequences to the person experiencing the agitations. In these cases the interrogation should be interrupted. The subject should have the necessary support to get quiet and concentrated. The interrogation should restart only when the person would be in a proper mental and psychic state to defeat any negative impact that recalling bad memories, which might comprise part of the testimony, could cause.

### Modern tests

Contrary to polygraph, modern truth tests record and analyze an individual's central nervous system during the interrogative process [1]. The principal modern truth tests are electroencephalography (EEG), Positron Emission Tomography (PET), Single Photon Emission

Computed Tomography (SPECT) and Functional Magnetic Resonance Imaging (fMRI) [1,9]. Of all of them, the most preferred has been fMRI, because contrary to EEG, it records all of the brain [9], unlike PET and SPECT, the injection of a radioactive substance is not a parameter to have an fMRI, and it provides more millimetres and seconds [9]. Hence, compared to the other modern tests mentioned above, more people could have fMRI with no limited brain recording and no limits on health issues like being allergic to the injected substance, stressed, or anxious about the idea that a substance was injected into one's own body.

### Functional magnetic resonance imaging (fMRI)

fMRI was defined as a lie-detection tool before the beginning of the 20<sup>th</sup> century's last decade [10]. It could detect brain reactions independently of the exterior response of the interrogated individual [7]. Thus, if someone has a convincing external performance that what is telling is the truth - indicatively showing calmness and not stopping while talking - but in reality is deception, fMRI recording could prove the reality. Compared to the polygraph, its impact on legal decision-makers was more significant [11,12]. Its admissibility might be due to its similarity with PET and SPECT, which were admitted and evaluated as reliable evidence in many cases [9]. Another factor affecting the reliability of fMRI reliability was its proper and comprehensive interpretation by the experts [9,21-23]. fMRI was not only admitted but was seriously taken into consideration and affected the decision of the trial in the presence of accurate explanations about fMRI recording [9]. From the first decade, it was obvious that while the probability of the justice corps' decision to be right was not more than 89%, fMRI accuracy was more than 90% [1,13-16]. It might be a consequence of subjectivity's presence in verdicts content. Indicatively, no one could detect if a witness finds the defendant sympathetic or antipathetic. Additionally, no one could know if a defendant or a witness during the trial was experiencing a serious psychopathic state - a health condition that provides the subjects with advanced abilities to perform convincing deceptive responses (see Benefits of fMRI). Contrary to the polygraph, fMRI could detect deceptive declarations, even when they might be well-performed. Indeed, subjectivity could deceive the justice representatives' but not fMRI results. fMRI provides the objective part of the truth. There were allegations that fMRI could replace judges and interrogations [1,17,18]. At least until 2007, fMRI did not fulfill all the standards of the Supreme Court of America to comprise reliable evidence in courts. Despite that, the Supreme Court of America did not always define fMRI as unreliable to support legislative facts. Based on fMRI evidence, the justice corps canceled the death penalty for adolescents and many other citizens [9,19,20].

The beginning of the second decade of the century found fMRI to be more robust and have a more significant impact on legal matters than psychiatric and psychological explanations did [24-27]. In the cases it was not admitted or admitted but not taken into, consideration; it was not because of a lack of trust in the fMRI images, but because of the insufficient scientific explanation of its results [9]. In other cases, fMRI was ignored because its evidence was irrelevant to the purpose it was presented for [9]. Such a case would be the proofs collected from the fMRI recording according to which the defendant had a brain injury which caused self-control minimization. The trial ignored the brain injury because the fMRI recording was done much later after the defendant's crime and nothing could ensure the existence of the injury during the crime commitment [9,28]. Another barrier to the fMRI entrance in the courtroom was the not common language between neuroscientists and law [19]. Thus, when the fMRI would be used as evidence in trials, if the explanation of fMRI results would not be paraphrased in simple language to avoid confusion and misunderstanding by the judges and the juries, it could comprise a significant impediment to the use of fMRI as legal evidence [19]. A dossier with fMRI images, its explanation in neuroscientific language, and the paraphrase should be left to the brief. Images and explanations should be there for transparency and availability to neuroscientists that the court or the other party might bring. In such a way, the explanations of fMRI recording would be confirmed and its reliability would not decrease.

The bias that fMRI images were just photographs was another stimulus to the rejection of accepting it in the justice procedures as credible evidence [9]. This option ignores the fact that photography has an established epistemic status [29-31]. Since photography is not artistic, it should be considered because the credibility of scientific cinema - part of which is photography too - has been proved throughout time. A representative example would be the movie of Ugo Cerletti [32]. It was the recording of the animals' biological reactions while

having electroshock [32]. It was not a fictional art product but the recording of a scientific investigation. The same, fMRI images are not artistic photographs but scientific outcomes. Contrary to artistic photography, neuroimaging depends not on subjective interpretation but on pre-defined scientific standards. A representative example would be the interpretation of fMRI recording. The neuroscientist, in the court, might have the personal belief that the person the brain function of whom was recorded could not be a liar. However, when the neuroimages provide the contrary results, the neuroscientist's opinion would not affect the fMRI results, because fMRI results comprise an objective, based on neuroscientific terms, exam which the neuroscientist should explain and paraphrase in an understandable by justice representatives language [31]. Hence, the fMRI images are not just photographs. They are the recording of the human brain based on neurological - therefore neuroscientific - parameters.

Not always the admission from the judges to cite the interpretation of fMRI results composed by experts was a synonym of admission from the judges to show the fMRI images to the juries [9]. It was explained as a preventive action not to lead juries to unfair judgment because of the fMRI presence - either jury might overestimate, underestimate or misapprehend the images [33-42]. Coming to the jury, when it shows maturity and not instant estimation of fMRI evidence, there could be avoided monitoring and other unpleasant consequences that might be ignored or considered unimportant in case of spontaneity evaluation of fMRI evidence as data of indisputable evidence [43,44].

Accumulating evidence indicated that neuroscientists have achieved a common explanation regarding the interpretation of fMRI as a lie-detection test [2,4,6,7,45-48]. Moreover, the justice systems of many members of the European Union considered fMRI as reliable evidence to affect their judgment of many criminal cases [49,50]. It was what it was missing for justice representatives to establish a fair verdict [51,52].

Currently, its reliability as a neuroimaging evidence in courtrooms has achieved the point of being proposed as a compulsory examination, equal to fingerprints and DNA [50] to examine the truthfulness of testimony or have knowledge of the brain and mental state conditions.

### **fMRI as a lie detection tool**

#### **Deception**

Deception is the on-purpose act of concealing the truth and convincing someone about the truthfulness of an untrue fact [6,7,46-48]. The activation of a single part of the brain could not define deception [2,4,9]. Deception is a complex activity composed of many brain parts' activation and several processes [7,46]. It requires remembering the truth and the on-purpose inhibition and modification of truth [48]. Additionally, there should take place an attempt to understand what could be believable to the person the deception is destined to [48], and a character evaluation of the person the deception will be told to [48]. The initiation of creating a story believable to whom the teller intends to narrate it, the accomplishment of the deceptive option, its narration, and the effort to hide the emotional agitation experienced during deception comprise part of the deception network.

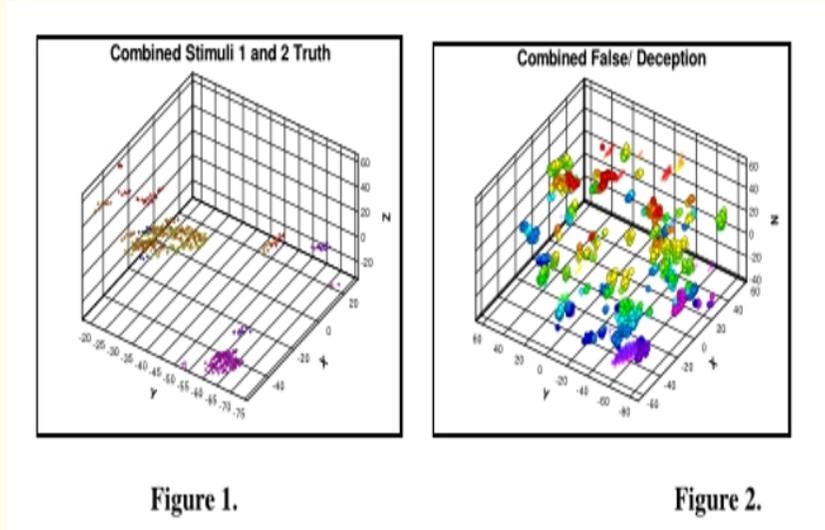
The deception requires higher activation of the brain parts related to the cognitive processes executed by the three major components of executive control: Working Memory (WM), inhibitory control, and task switching [e.g. frontal cortex and Anterior Cingulate Cortex (ACC)] [4,7,45-48].

The function of WM in deception was agreed to be collecting the truth and while manipulating it adding new information to fulfill the deception's puzzle [4,7,45-48].

The inhibition corresponds to gaining and keeping the cognitive control of concealing the truth [4,7,45-48].

Task switching means attention converting processes of the truth into deception [4,7,45-48].

The deception requires a higher reaction time (RT) than truth-telling cases [47].



**Figure 1 and 2:** Activation points that were in common for visual test stimuli #1 and #2 for a truthful response (Figure 1) or for a false/deceptive response (Figure 2). Shown are 3-D scatter point graphs. From the interrogation using functional MRI and cognitive engrams by Donald H. Marks.

### Telling the truth

An essential aim of the jurists is truth detection. fMRI detection of indisputable truth is incontrovertible [2,4] (Figure 1 and 2).

The truth could be successfully detected and explained based on the fMRI recording and the proper interpretation by qualified experts. The truth is a current event. It comprises a basic cognitive condition requiring modest conscious control compared to deception [2,6]. Telling it without experiencing memory difficulties means not intending to proceed with any modifications, being indifferent about how believable it might be, and aiming to inhibit neither a single factor of it. While telling it, the individual has regular brain activity, and every part of the brain has the same activity as the other parts. The only scope of someone telling the truth is to say it. When the fMRI records a normal function of the brain activity, the individual is telling the truth with no memory abnormalities and doubts when speaking during the fMRI recording [2,4]. The RT of telling the truth is lower than that of deception.

### False memory

Furthermore, fMRI could distinguish between deception and false memory. Many prefrontoparietal regions were activated in cases of false memory [48]. It was explained as a consequence of the fact that false memory requires the activation of WM, too [48]. The WM is activated in false memory when holding the truth in WM to estimate its accuracy [48]. False memory is a complex process too, but contrary to deception, the scope of the individual could not necessarily be to hide the truth but to tell the truth and try to avoid confessing

false evidence. Thus, it does not always need inhibition and task switching processes. False memory is not always followed by lies [53]. There were cases where fMRI was corrected and the individual told the truth [53]. False memory processes could not be identical to deception stages. Therefore, the brain parts activated in false memory are not identical to deception and are not activated to the same degree as in deception. The RT of false memory was shorter than the RT of deception and longer than the RT of truth [48].

### Prefrontoparietal regions

A variety of scientific studies on fMRI as a truth test defended the option that the activation of prefrontoparietal parts comprises a key feature of deception [2,4,6,7,45-48]. It was a bias refuted since the first decade of the century [14,54]. The domination of these activations is a consequence of the fact that prefrontoparietal regions are responsible for many tasks. They could be activated in cases of composing stories, (working) memory-related issues - including false memory retrievals - behavioral control, cognitive administration, (exogenous and endogenous) attention, concealing information, executive control, inhibitory control, task converting, performance monitoring, decision making and checking the familiarity of the called at the WM events [2,4,6,7,45-48]. Consequently, the presence of high activated prefrontoparietal regions, when they could not be part of the deception network, could not be perceived as brain activation because of deception. Its activation - increased or minimized - should be evaluated according to the network - deception or not - it could be part of.

### Countermeasures

The reliability of fMRI was confirmed once more when countermeasures were used. When the brain analysis was done based on the prejudice that frontal lobe activation is a synonym of deception presence, fMRI accuracy was decreased significantly [55]. When the analysis of brain regions was not limited to the frontoparietal brain regions, the impact of countermeasures was significantly low [55]. Hence, in the absence of bias, the countermeasures could not beat the reliability of fMRI. Yet, in the presence of countermeasures, it was not examined the option of false memory [6,55,56] and the countermeasures were applied through the Conceal Information Test (CIT) [55,56], which was created to find out what somebody knows and not to detect deception [4]. Hence the existing results of countermeasures should be treated cautiously [6,55]. The training was a countermeasure that reduced the reaction time in deception [47]. Nevertheless, the reaction time of deception was still longer than in truth-telling [47]. Also, the countermeasures were applied in pre-designed mock crimes and conditions. The participants knew that they would apply a countermeasure and were prepared for that.

Additionally, the participants knew what they would be asked for and that their claims would not harm anyone. In real-life conditions, someone would not be informed about the queue of the questions or the specifications requested by the interrogator. As somebody does not know when will be asked about something for which is instructed or intends to deceive, or when it will come the time to apply countermeasures, it will take more time to reach the efficacy of countermeasures than when pre-designing the time of its application. Moreover, when knowing that the countermeasures would harm someone by concealing the truth, many people would hesitate to apply them and would not be so sure and decisive. As a result, the countermeasures in non-pre-designed conditions would not be as effective as in fictional stories. Since the impact of countermeasures in mock illegible actions was insignificant, it might not be noticed at all in real-life conditions.

Furthermore, the impact of countermeasures could be set aside if the Differentiation of Deception (DoD) test<sup>1</sup> was applied to answer each question three times: once yes, once no, and once not sure/do not remember [4]. When someone makes movements during fMRI recording to beat the test, in both cases, the common brain activation parts should be ignored. Only the activation patterns of different brain areas should be considered. If someone begins applying countermeasures only in one option - only yes or no - then it should be clear that the application of countermeasures is made to conceal the truth. Coming to false memory cases, as specified above, an individual

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<sup>1</sup>Or otherwise named Sheffield Lie Test. examinees are asked to answer truthfully to half of them and lie to the other half. Another variant of the DoD is to answer each question twice: once truthfully and once deceptively in cases of not considering false memory. The last option could bring more accurate results.

experiencing false memory might not intend to beat the fact. As a result, the subject could not apply countermeasures. Thus, the application of countermeasures means no presence of false memory. Moreover, the individual who will be anxious because of false memory or other factors should be supported to remain calm and concentrate on the question. Additionally, if the person does not remember, would click the button: not sure/I do not remember.

### The legal hesitations of applying fMRI

#### The right not to incriminate oneself

It was formulated to protect the defendants from any kind of violence by police and other government representatives to obligate a defendant to confess things that could incriminate the latter [57]. The article comprises support to the choice a defendant could make to remain silent [58]. The article could be called when the accused individual is the only one who could provide some proof, but the accused decides not to collaborate [59,60]. The rejection should be respected and neither pressure nor violence should be permitted either by a government or justice representative [58]. When something could be provided without the defendant's consent, it does not matter if the latter consents or collaborates to collect the evidence [61,62]. DNA, like fingerprint, examination does not stand against the right not to commit a self-incriminating action because it is not the will of the defendant that defines its existence [61,62]. In other words, the acquisition of the data obtained by fingerprint and DNA examination does not require the collaboration of the defendant. It exists independently of the will a defendant might have about the existence of these data. It is not the defendant who provides the data. Thus, even if the defendant does not collaborate to give a DNA sample, it will be collected from the defendant. The same should apply to mind and brain recording through fMRI.

The detection of psychic and neurological disorders through fMRI could not require the subject's consent.

Even in lie detection through fMRI, the defendant's consent could be a non-necessary parameter because as stated above the presence of countermeasures could not defeat the accuracy of fMRI in the absence of CIT and the bias that activation of prefrontoparietal parts comprises deception. The detection of deception, psychic, and neurological disorders through fMRI when permitted in legislation could occur without the subject's consent.

Hence the fMRI application to someone without the subject's consent does not violate the right to incriminate oneself. Moreover, the right against self-incrimination is not extended to witnesses or convicted perpetrators, because there is no criminal charge against them [63-67]. It is restricted only to defendants. Another explanation of the legally permitted coercive fingerprint examination, which is not considered a violation of not self-incriminating right, is that it comprises physical evidence [68]. Indeed, fMRI is determined as a neurophysiological device. Thus, it reads inner physical evidence - mind, and brain-related features.

#### Private data

Psychiatric state and neurological condition comprise private data. Thus, a justification to deny fMRI would be the claim of the right to private life, according to which someone has the right not to experience attention to its own private social and personal life if it is not the subject's will [69]. The house constitutes part of someone's private life. A legally permitted case of personal data collection comprises the police entrance into the defendant's house independently if the defendant consents to it.

Yet, fingerprints, DNA, and cellular extracts, which contain unique and strictly private data, comprise compulsory examinations [50,70-75]. Regarding the cellular content, ECtHR admits "that they contain much sensitive information about an individual, including information about his or her health. Moreover, samples contain a unique genetic code of great relevance to both the individual and his relatives..... their retention per se must be regarded as interfering with the right to respect for the private lives of the individuals concerned" [76]. The

fact that the “limited part of information ... actually extracted or used by the authorities through DNA profiling and that no immediate detriment is caused in a particular case does not change this conclusion” [76]. As ECtHR stated the unchangeable DNA and cellular data are extended to the subject’s ethnicity and family’s data [50]. It could stimulate racism and bias toward the subject’s acquaintances. Albeit that, the collection of these data is not forbidden [50]. Let alone fMRI examination which does not record a permanent situation, because the brain is vulnerable to many internal and external factors. An explanative example would be the presence of schizophrenia detected in a perpetrator based on fMRI results. It does not mean that the acquaintances will have schizophrenia. Since they will not have schizophrenia, they will not be identified based on the schizophrenic condition of the subject. Even if someone would have schizophrenia it does not comprise evidence that this person would be the subject’s acquaintance because schizophrenia, like any mental health condition, does not comprise unique data. While executing the sentence in jail, the subject might have had an efficient treatment and, if not fully cured, at least would control the psychic condition and turn to a normal life.

Therefore, it is impossible to identify the subject’s acquaintances and ethnicity based on fMRI data. Thus, it could not stimulate either bias or racism.

It becomes clear that certain parameters could defeat the protection of private information. Specifically, the action of ignoring the right to privacy to protect and prevent recidivism and any kind of disorder and crime - indicatively could be mentioned homicide, public health, and any human rights and freedom of others - is not considered illegal [50,73-75]. As the collection of DNA, fingerprint, and cellular data is proved to be used for the legal purposes mentioned above, it should be and is permitted [50]. The member states of the European Council have agreed to use the very personal data collected from the DNA, cellular, and fingerprint examinations only for the aforementioned legal purposes [50]. If they ensure the fMRI data collection exclusively for the legal purposes mentioned above there would be no legal impediment to fMRI coercive examination.

Contrary to the examinations mentioned above, there could be a selection of the data collected through fMRI. When fMRI is used as a lie-detection and memory detection, the data collected would be selected by the examiner [50]. An indicative example might be the knowledge of sexual preferences. If the sexual preferences are not related to the crime/s the defendant is accused of, the examiner should not ask about them. As a result, they will not be revealed. Another explanative example could be childhood memories. When these memories could not contribute to the crime examination, the examiner should not ask the defendant about them. It should be mentioned that the basic factor to define an offender as a serial offender is the detection of the psychological tendency to commit more crimes in the future, independently of the existing offender’s number of crimes and victims [77]. The psychological tendency to commit further crimes comprises a synonym of high psychopathic condition. As will be explained below people with advanced psychopathic abnormalities have developed abilities to be calm when lying and committing deception. There should not be excluded the possibility that someone with a deteriorated psychic disorder could beat an expert during the assessment of the psychological state. In these cases, it would be a good practice to verify the reliability of the subject’s allegations. Albeit the really serious attempts of individuals with aggravated psychic disease to beat the fMRI accuracy, they did not reach their scope [47]. Since the infringement of personal data protection is a legally permitted action, when assessing the psychological complexity of an offender for the purpose of not permitting the offender to commit further crimes in order to prevent further crimes and protect the collective safety, there would not be a legal obstacle to the psychological examination [50,73-75]. While the state of the brain is flexible, its function is stable. It was because of the stability, that the reliability of fMRI as a lie- detection test was approved by the scientific community, including law representatives. As fMRI could assist to achieve a successful and accurate psychological examination, it turns out to be a valuable legally permitted tool to reach crime prevention. Thus, it could be a valuable legally permitted tool for the prevention of crime.

### The right to freedom of thought

It defines that no one - including government and police forces - could obligate someone to express the thoughts and beliefs that carry inside. In the Human Rights Handbook of the Council of Europe is written that the formulation of the article intends “to prevent

state indoctrination of individuals by permitting the holding, development, and refinement and ultimately change of personal thought, conscience and religion” [78, p. 18]. Thoughts could be expressed through external factors like words, actions, and even attire. Thus, an individual, in many cases, expresses thoughts and beliefs. Consequently, either the thoughts or the beliefs could not be hidden, and there is no need for fMRI to note them. However, fMRI does not detect and “express” the beliefs or thoughts. FMRI was used in medicine many years before being introduced to justice areas. It still continues to be applied in many people for medical purposes. If fMRI could record the private data of someone there should be necessity to obtain the formal consent of the subject.

Never such a process was required. Thus, the fMRI could not read the private thoughts and beliefs of someone. It just records the functioning and the condition of the brain - the existence of any abnormalities. Furthermore, as mentioned above, any article on personal human rights is less important than fighting the risk of crime and thus preventing the violation of citizens’ human rights. Diaries and private calls comprise another private way to express thoughts. However, disclosing of the diaries and personal telephone calls has not been a rare legal action. Yet, the statement of law that a witness is obligated to tell the truth adds further credence to the fact that the right to freedom of thought is infringed when it comes to prove the truth [66]. It happens because telling the truth is not a thought or a belief. On the contrary, it is something objective and an obligation of all citizens toward justice and to the order of society. For example, the question “Did you see the defendant throw the victim in the sea” is an objective factor. It is neither a belief nor a thought of the witness. Additionally, the establishment of truth comprises a basic parameter to render justice. When this parameter is not fulfilled, there cannot be justice. Essentially, the absence of truth cancels the scope of any court: to make justice, which is an unquestionable right and an essential prerequisite for a civilized society, built by people for people, to work properly and make citizens feel safe, estimated and respected.

That is what fMRI provides with high accuracy: the truth. When a witness might not sympathize with the defendant, the former’s scope would be to harm the latter. Thus, the witness would give a deceptive confession against the defendant.

In that case, the fMRI recording will show the truth, save the defendant from unfair condemnation, and be a hallmark of the fulfillment of justice’s preventive role by discovering the deception and avoiding future victims of the false confessions.

### Benefits of fMRI

The activation of brain parts detected by fMRI in deception could reliably prove the psychic stage of an individual [47]. It could detect the presence of a psychic disorder and its stage [47]. The reduction of frontal lobes implies high skilled abilities in an activity [9]. As it gets clear, reduction of the frontal lobe in the deception network shows expertise in deception [47]. It comprises evidence of high-psychopathic persons [47]. The presence of advanced psychic disorders causes a reduction of frontal lobes - which could clearly be recorded during fMRI examination - in deceptive cases, compared to frontal lobe activation in individuals free of psychic abnormalities [47]. Consequently, fMRI could prove deception and the health condition of the subject. It should be clarified that serious psychopathic states reduce the freedom of thought and of choosing what to do. Many defendants have expressed their regret and admitted that they could not control their actions and thoughts. Also, many adults that have not committed illegal actions apply to be hospitalized in psychiatric clinics because they used to lose self-control in certain moments. Knowing of not being free is a tormenting condition too. Being aware that it will happen again and that the psychic abnormalities will dominate the subject creates to this person a tormenting state that deteriorates the subject’s psychic aberrations. Thus, these patients are caught in a vicious circle the consequences of which could be fatal. Therefore, having an fMRI recording could be an important supporter of bringing back the lost freedom and ending the tormenting state of the subjects. Serial offenders have serious psychic agitations which would lead them to commit more crimes in the future [77].

The law intends to prevent any illegal and dangerous, for civil safety and health, action. Thus, having knowledge of future illegal actions could work preventively for future crimes of the perpetrator. It could be essential for the detection of a serial killer [77].

The fMRI recording could provide neuroscientists, psychiatrists and psychologists with an accurate image of the dimensions of the perpetrator's psychic disorders. In many cases, people with agitated psychic states do not admit their agitation and refuse to have any kind of treatment. Having an accurate presentation of the psychic abnormalities stage, the scientists who could help the patient treat the abnormalities could make a serious and more effective effort to convince the patient to follow a therapy - choose the appropriate content of their attempts to convince the patient to follow an effective treatment - pharmaceutical or not. By following the treatment, there will be an improvement in the health of the patient. As a result, the perpetrator would no longer be in the agitated psychic state that was responsible for the commitment of the illegality the perpetrator was condemned for, and it would be easier than before to cope with legal norms and everyday life as a free and law-abiding citizen. The benefit of having an fMRI recording of the defendant goes even further.

The detection of psychic abnormalities would benefit the defendants as extenuating circumstances [79] and even save the defendants' lives - in cases of death sentence or severe psychic abnormalities that could lead to suicide. Since mental health comprises a vital factor in the determination of the final sentence, fMRI would be helpful to the justice to compose a more accurate verdict and determine the conditions of the convictions and restorative factor - e.g. if there will be in a penal institution and be defendant's decision to visit a doctor, or if it will be in a penal institution and have at least one obligatory meeting per week with a doctor and so forth [80,81]. fMRI could be an objective evidence to clarify the dimensions of crime on the victim. The benefits of fMRI go even further. It could be a significant factor in favour of the fight against stigma of epilepsy. There are many legal actions which support the stigma of epilepsy (SoE) [82]. A representative example could be the case of people with epilepsy receiving antiepileptic drugs and having seizures. These people are not eligible to hold a driving license [82]. If having a traffic accident, because of the SoE in the legal environment, the epileptic person would be accused of being guilty of the accident, independently if is guilty or innocent [82]. In this case, the presence of fMRI would prove the innocence of the epileptic defendant and would demonstrate that an epileptic person receiving antiepileptic drugs and having seizures could drive without causing accidents. Therefore, fMRI could contribute to the fight against SoE.

Like DNA, cellular and fingerprint data, fMRI recording could contribute to the prevention of crime and violence of others' human rights. Contrary to the existing compulsory examinations, fMRI could have a significant role in restoring the health disorders of the criminal. Consequently, the presence of an fMRI recording could serve the scope of justice to give a second opportunity to the perpetrator to have a normal life and prevent recidivism.

### Conclusion

The fMRI could estimate if truth or deception were accompanied by false memory. Contrary to the polygraph, it was not defeated by countermeasures. The overlap between brain parts activated in deception and false memory does not comprise evidence of fMRI inconsistency. The activation of other parts of the brain activated solely in deception, and others activated exclusively in false memory will confess if what is told is truth, deception, or false memory result. The presence of psychopathy and its stage could be successfully detected from fMRI. The milder activation of the network in cases of deception could not lead to the wrong conclusion that the truth is told or that fMRI accuracy decreased. It should be interpreted as serious evidence of a high-psychopathic state.

As it gets obvious, fMRI is very detailed and explanatory in analyzing and estimating if someone is sure or unsure of telling the truth, lying on purpose, or telling the truth. As a result, it was considered reliable evidence in European and in American courts. fMRI could be proved a successful tool to estimate the impact of the crime on the victim, combat the stigma of epilepsy and detect if an offender could be a serial offender.

fMRI could be proved a successful tool to detect if an offender could be or not a serial offender. In Europe, many allegations support the classification of fMRI as compulsory examinations of the witnesses and the defendants. It would be an effective weapon for the justice to fight the illegality and achieve its aims.

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### Conflict of Interest

None.

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### Statements and Declarations

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The author dedicates the article to the memory of her uncle Athanasios Antzaras.

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