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"Idiopathic pedophilia and acquired pedophilia: is public opinion influenced by anatomical or cognitive data?"

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Abstract

The fierce stigma associated with pedophilia is reflected in several aspects of the life of the individual who carries the burden of said stigma. In fact, pedophilia is a disorder of public concern due to its association with child sexual offences. From social opinion, to stigmatization, to court, the impact of this stigma may interfere with attempts to prevent sexual offending, recidism and with seeking of therapeutic help.

The aim of this study is twofold: investigating public opinion regarding idiopathic and acquired pedophilia, and whether providing cognitive/neuroscientific information, such as neuropsychological information and brain images, to frame a forensic case of either idiopathic or acquired pedophilia would modulate one's opinion about legal justifiability and juridicial punishment.

Two forensic cases of acquired pedophilia and one forensic case of idiopathic pedophilia have been described in three different versions each: description of only the offense; description of the offense with the supplement of cognitive/neurpsychological information about the offender; description of the offense alongside the presentation of the offenders' MRI. 433 non-expert participant took part in the study; each one of them read a survey containing three versions differing for the type of information contained, one from each forensic case. Participants were required to provide their opinion about the legal justification, juridical punishment and therapeutic treatment for each offender of each version read.

Results showed that the opinion regarding acquired pedophilia and idiopathic pedophilia is different regardless of the data presented, toward more legal justifiability, less request for punishment and greater proneness for treatment for acquired pedophilic individuals than for idiopathic ones. Moreover, the presence of cognitive and anatomical data did not influence in a relevant way the opinion about offenders, and no effect of the typology of enriched information (i.e., cognitive and anatomical data) emerged.

In conclusion, the inclusion of cognitive and imaging data within the offender's description do not create a bias in the participant, but rather help the reader better understand the cases and the repercussions of the pathological condition.

Chapter 1. Idiopathic and acquired pedophilia: are we dealing with two distinct disorders?

1.1 *Idiopathic and acquired pedophilia*

"Pedophilia" is typically defined as sexual attraction to prepubescent children, reflected in a person's sexual thoughts, fantasies, urges, sexual arousal, or behavior regarding children (Seto, 2010), and is included within the fifth edition of the Diagnostic and Statistical Manual of Psychiatric Disorders (DSM-5, American Psychiatric Association, 2013) among the paraphilic disorders. The term "paraphilia" indicates every intense or persistent sexual interest different from a sexual interest in genital stimulation or sexual foreplay with phenotypically normal, physically mature, and consenting human partners (American Psychiatric Association, 2013). These last few words play a key role in the understanding of pedophilia, which is characterized by the predilection for the atypicality of the sexual object, namely very often children or teenagers who are not physically mature and non-consenting.

Paraphilia *per se* is a necessary but not sufficient condition for having a paraphilic disorder; in fact, paraphilia does not necessarily require clinical intervention. A paraphilic disorder, on the other hand, is a paraphilia that causes discomfort or impairment in the individual, or which satisfaction has caused, or risked causing, harm to oneself or others (American Psychiatric Association, 2013). The DSM-5 (2013) proposes a similar distinction between pedophilic disorder and pedophilic sexual interest. In fact, pedophilic disorder is defined by an intense sexual interest and arousal toward children and prepubescent individuals which persists for at least six months and led to acting in sexual activities, or sexual fantasies causing marked discomfort and interpersonal difficulties. Hence, if individuals complain of psychosocial difficulties caused by their attraction or sexual preference toward children, or if they deny any sexual attraction and fantasy involving children, despite objective evidence of the contrary, the pedophilic disorder can be diagnosed. On the other hand,if these people report the absence of feelings of guilt, shame, or anxiety regarding these impulses and not being functionally limited by their impulses, and their self-reports, documented psychiatric or judicial history indicate that they never acted out their own impulses, then these individuals have a pedophilic sexual interest, but not a pedophilic disorder.

It is important to understand that pedophilia as sexual preference must be seen independently from sexual offending against children, as otherwise there would be only offending pedophiles. Pedophilia could be seen as a phenotype of sexual preference (Beier et al., 2009a) and the sexual preference itself cannot be considered a mental disorder (Green, 2002). Having a pedophilic inclination does not mean that the person will act on his fantasies, although pedophilia is a major risk for committing sexual offending against children (Mohnke at all., 2014).

The type of pedophilia that is described in the DSM-5 appears to be a permanent condition across the individual's lifespam although there may be elements that change over time, such as subjective distress or propensity to interact with children, and it typically apperas in adolescence (Tengergen et al., 2015). This type of pedophilia is called "developmental or idiopathic pedophilia" (American Psychiatric Association, 2013).

What emerges from literature is that, on some cases, the pedophilic behavior occurs as a symptom of an underlying neurological condition (Ciani, Scarpazza, et al., 2019; Scarpazza, Finos, et al., 2021; Fumagalli, Pravettoni, & Priori, 2015; Sartori, Scarpazza, Codognotto, & Pietrini, 2016). This type of pedophilia is called "acquired pedophilia" and, by definition, acquired pedophilic behavior refers to a sexual urge toward children that emerges later in life as a consequence of a neurological condition (Ciani, Scarpazza, et al., 2019).

1.2 Etiology

Idiopathic pedophilia is commonly considered a psychiatric disorder characterized by subtle structural and functional alterations and by a lack of clear biomarkers (Prata, Mechelli, & Kapur, 2014; Scarpazza, Zampieri, et al., 2021).

According to some researchers, the etiology of pedophilia seems to be explained by complex and multifactorial phenomena, such as the influences of genetics (Kruger et al., 2019), stressful life events (Jespersen, Lalumiere, & Seto, 2009), testosterone exposure, neurochemical impairment (mainly serotoninergic disturbances) (Gilbert & Focquaert, 2015) as well as subtle brain alterations. All these factors may contribute generating this specific phenotype of sexual preference (Cantor et al., 2008; Ciani, Scarpazza, et al., 2019).

Moreover, a relationship has been identified between pedophilia and comorbid psychiatric disorders. According to the available literature, two-thirds of pedophiles have a lifetime history of mood or anxiety disorders, 60% have lifetime substance abuse history, with 51% citing alcohol as their drug of choice, and 60% have a personality disorder diagnosis (Fagan et al., 2002; Green, 2002).

In recent years, in-depth research revealed some significant developments regarding the neurobiology of idiopathic pedophilia and its diagnostic implications. For instance, by measuring the hemodynamic brain responses to sexual stimuli, functional magnetic resonance imaging has shown considerable success in assessing pedophilia (Ponseti et al., 2012). Other research indicates that those who commit acts of pedophilia show structural impairments: as an example, some studies revealed a correlation between the likelihood of committing pedophilic sexual offenses and smaller right amygdala volumes (Schiltz et al., 2007). Other studies observed that pedophiles showed decreased gray matter volume in the ventral striatum, the orbitofrontal cortex and the cerebellum, compared to control subjects (homosexual and heterosexual) (Schiffer et al., 2007).

Additionally, individuals with pedophilia may suffer from neurochemical or neurodevelopmental disorders (De Ridder, Langguth, Plazier, & Menovsky, 2009). According to neurochemical research, individuals with idiopathic pedophilia may have a serotonergic imbalance, most likely caused by a decreased activity of the presynaptic serotonergic neurons and an hypersensitivity of the serotonin postsynaptic receptors (Maes et al., 2001).

Moreover, De Ridder et al. (2009) suggested that a fronto-executive dysfunction or a temporo-limbic one, or combinations of both, are the two most significant functional neuroanatomic models for explaining the cognitive and behavioral manifestations in individuals with idiopathic pedophilia. This would imply a dysfunctional stimulus-reward association in the reward system of these individuals (De Ridder et al., 2009).

On the other hand, despite the lack of agreement regarding the neurobiology of idiopathic pedophilia, acquired pedophilia has a clear neurological etiology and, as such, it appears with evident brain lesions and functional alterations (Scarpazza, Finos, et al., 2021; Hall, 2007), and the majority of patients do not have a history of premorbid pedophilic interest (de Castro Prado et al., 2021). Thus, the temporal relation between brain damage or

dysfunction and the emergence of the pedophilic behaviors is an important aspect of distinguishing between the two typologies of pedophilia (Joyal, 2022).

The etiology of acquired pedophilia could be of traumatic (Fumagalli et al., 2015), neoplastic (Burns & Swerdlow, 2003), surgical (Devinsky, Sacks, & Devinsky, 2010), degenerative (Scarpazza, Pennati, & Sartori, 2018), or demyelinating origin (Frohman, Frohman, & Moreault, 2002). Generally, in acquired pedophilia, no comorbidities with psychiatric disorders and no influences of psychological and/or genetic factors have been described in the literature (Ciani et al. 2019).

1.3 Modus operandi

The modus operandi differs between idiopathic and acquired pedophilia.

Idiopathic pedophiles are described in the literature as individuals that actively search for victims, organize their actions and try to mask their behavior (Fagan, Wise, Schmidt, & Berlin, 2002). In addition, they typically blackmail and manipulate their victims to stay silent, either by exerting psychosocial or physical violence (Fagan et al., 2002; R. C. Hall & R. C. Hall, 2007). Usually, child sex offenders might gain access to children through persuasion, friendship, and actions aimed at gaining the trust of the child and parents. Thus, idiopathic pedophiles are most likely characterized by a highly predatory style (Ciani et al., 2019).

Clearly, not all pedophilic men are "predators". Tenbergen et al. (2015) argued that from a clinical perspective several types of pedophiles can be identified: pedophilic men who restrict their desire for sexual contact with children to fantasies only; others who are at risk of committing an offense because the fantasy alone is not sufficient but seek for therapeutic help wishing to reduce their impulses; pedophilic men that have committed sexual offense against children who feel severe remorse and may or may not ask for help; pedophilic men with an exclusive sexual interest for prepubescent individuals, and those who have a coexistent sexual attraction for adults (Tenbergen et al., 2015).

The modus operandi, on the other hand, is quite different for acquired pedophilia. Generally, this type of pedophiles lack premeditation, showing a more impulsive behavior (Gilbert & Focquaert, 2015). In fact, these individuals do not mask their behavior; for instance, in some occasions sexual abuse has been carried out by leaving the door open

or potentially in front of people passing by (Sartori et al., 2016; Scarpazza, Pennati, & Sartori, 2018).

In support of this, Joyal et al. (2007) argued that most cases of acquired pedophilia are signs of a more generalized syndrome of impulsivity and hypersexuality rather than a true modification of sexual interests. Indeed, the majority of cases of child abuse occurred in the context of hypersexuality, broader changes in personality, impulse control difficulties and neuropsychological deficits. Individuals who develop pedophilia in the context of a neurological condition typically show behavioral disinhibition, suffereing from a more general impulse control syndrome (Scarpazza et al., 2019).

1.4 Treatment

Regarding possible treatments, treatment for idiopathic pedophilia has proven to be effective only if the individual is prepared and compliant in engaging the therapeutic intervention (Hall & Hall, 2007; Stone, Winslade, & Klugman, 2000). Psychotherapeutic interventions aim to increase voluntary control over sexual arousal and to avoid acting upon pedophiles's sexual interests (Seto, 2009). As the long-term effectiveness of therapy in preventing new offenses is debated (Hall & Hall, 2007; Langton et al., 2006), psychotherapy is often coupled with androgen deprivation therapy (ADT) (Thibaut et al., 2010), or with the administration of selective serotonin reuptake inhibitors, which is a non-hormonal treatment suggested for paraphilias in general, including pedophilia (Hall & Hall, 2007). Results suggest that after a year of combined psychotherapy and pharmacotherapy, the frequency of urges decrease but pedophiles still show sexual interest for children (Hall & Hall, 2007). The real concern is that they seldom comply with therapies, increasing the risk of sexual recidivism (Seto 2009).

On the contrary, acquired pedophilia can be resolved very often by treating the underlying medical neurological condition (Sartori et al., 2016). For example, it has been demonstrated that pedophilia can recede after surgical resection of the tumor causing it (Burns & Swerdlow, 2003; Sartori et al., 2016). Pedophilia could also emerge as a side effect of antidopaminergic drugs (Solla, Floris, Tacconi, & Cannas, 2006) and in these cases drug removal or dosage reduction may remiss pedophilic behavior.

However, treatment success is not always guaranteed, as sometimes acquired paedophilia emerges as a symptom of neurodegenerative disorders such as frontotemporal dementia

(Scarpazza, Pennati, & Sartori, 2018) or hippocampal sclerosis (M. F. Mendez et al., 2000). In these cases, the ADT might be taken into consideration to avoid further offending.

1.5 Neural basis

Both idiopathic and acquired pedophilia's neural basis described in the literature are spatially heterogeneous, thus hampering a clear understanding of the neural origin of offending behaviour (Mohnke et al., 2014; Scarpazza, Finos, et al., 2021). As a recent meta-analysis highlighted, results of the neural basis of idiopathic pedophilia did not yield consistent spatially convergent results, disheartening the idea that idiopathic pedophilia could be explained by consistent structural or functional brain alterations (Scarpazza, Finos, et al., 2021). On the other hand, despite the brain lesions of patients with acquired pedophilia are spatially heterogeneous within the brain, all of them localize to a shared brain network which includes the orbitofrontal cortex bilaterally and the posterior midline structures (Scarpazza, Finos, et al., 2021). A plausible explanation of why these brain alterations could lead to acquired pedophilia was provided in said work by adopting the approach of the functional characterization (Genon et al., 2018; Plachti et al., 2019), a statistical analysis method which allows linking topographically defined brain regions with the corresponding psychological processes, identifying which kind of experiments are most likely to activate a given region (Genon et al., 2018; Plachti et al., 2019). The functional characterization approach applied to the results of acquired pedophilia allowed to link the orbitofrontal cortex with action inhibition and the posterior midline structures with social cognition abilities, particularly with the construct of theory of mind (Scarpazza, Finos, et al., 2021). These results seems to suggest that acquired pedophilia could emerge as a consequence of a deficit in the inhibitory abilities and in the social cognition abilities, which in turn result in a poorer understanding of the moral disvalue of the pedophilic behavior.

1.6 Consequences of wrong diagnosis

Concluding, despite the recent advances in the understanding of these disorders and whether they in fact represent different conditions, the contribution of neuroscientific methodologies to the diagnosis and differential diagnosis, and the consequences of

misdiagnosis have been so far under-investigated, as well as the forensic and legal implications, which remain controversial. As already stated, a person suffering from idiopathic pedophilia needs a different kind of rehabilitation from a person with acquired pedophilia: as for the former condition, the patient generally needs a pharmacological treatment and a psychotherapeutic intervention, while for the latter, the intervention should be programmed according to the etiology of the neurological condition of which acquired pedophilia is a symptom.

Moreover, the consequences of misdiagnosis are not only medical; misdiagnosis can also have ethical consequences. Providing the correct interpretation of the offense might help offenders' families to have a rational explanation of their relative's behavior. Furthermore, it would constitute an ethical concern to condemn to prison someone affected by a life-threatening condition which severely impacts on his behavior and who would benefit more from medical treatment (Scarpazza, Costa et al., 2022, in press).

Also from a legal point of view, consequences should not go unnoticed: while in a clinical setting all the distinctions cited above are relevant with the unique aim of assessment and documenting a cognitive/psychiatric deficit in order to define the right therapy, in the forensic setting the aim is to investigate the existence of a causal link between the psychopathology/condition and the crime.

Thus, the verdict for an individual with idiopathic or acquired pedophilia should be different. While an individual with idiopathic pedophilia is almost always to be considered criminally liable, insanity should be carefully assessed in individuals with acquired pedophilia, as they can be considered not guilty by reason of insanity, not due to the presence of an underlying neurological condition *per se*, but due to the impact that the impaiment of certain brain regions and networks has on relevant behavior (Scarpazza, Costa et al., 2022, in press).

Indeed, the possibility that brain impairment could prevent individuals from acting in their typical sexual behavior has serious implications for the responsibility debate. It raises the question of whether many people with brain abnormalities may experience hypersexual impulses but are still able to control them and desist from engaging in inappropriate sexual behavior. An individual with acquired paedophilia should thus have adequate control over his or her cognitive, emotional, and motivational states to prevent any inappropriate

action in order to be judged completely or partially responsible (Gilbert & Focquaert, 2015).

From a legal perspective, it appears that these neurological patients have lost voluntary/volitional control, while still being able to discriminate between wrong and good behavior and its repercussions. Although they have intact moral cognition, the impulsive continuation of hypersexual urges seems to challenge their executive capacity to control themselves and, presumably, also their affective ability to fully "feel" the wrongness of their behaviors. Hence, these individuals lack inhibitive behavior despite having preserved moral cognition. A possible explanation is that the neuropathological deficits, underlying hypersexuality, and the impairment of executive functions may have an impact on these people's capacity to judge and inhibit their behavior (Gilbert & Focquaert, 2015).

The challenge is thus to recognise that some of these individuals are partially responsible, while others may not be responsible for their behavior because they have impaired executive and cognitive capacities (Gilbert & Focquaert, 2015).

This supports the notion that rational and executive abilities are not present or absent but rather extend along a continuum. Moreover, the assessment must carefully take into account how neurobiological evidence affects a person's ability to exercise rational/moral self control and decision-making.

A case-by-case analysis must be performed to determine whether or not an offender with acquired pedophilia should be judged (totally or partially) responsible (Gilbert & Focquaert 2015).

Chapter 2. Public opinion about pedophilia and Italian juridical guidelines

2.1 Stigmatization of pedophilia

In 2004, McCartan (McCartan, 2004) claimed that a moral panic regarding pedophilia strongly affected our contemporary society. Nowadays, after decades, the perception of pedophilia did not change. Pedophilia is, in fact, connected to a strong social stigma. The term stigma is used to refer to attributes or 'marks' that deeply discredit, causing avoidance or aggression towards the bearer of the attribute who is perceived as bad, dangerous or weak (Goffman, 1963). Believing negative assumptions, such as prejudices about a person carrying a stigma, arouses negative emotions, which may in turn motivate discrimination (Rüsch, Angermeyer, & Corrigan, 2005). Therefore, stigmatization has effects on people's life's chances by, for instance, limiting access to appropriate housing, health care, or work opportunities (Hatzenbuehler, Phelan, & Link, 2013).

According to a study conducted by Stelzmann, Jahnke, & Kuhle (2020) the stigma associated to pedophilia may interfere with attempts to prevent sexual offending. Moreover, research has shown that people from the general public have extremely negative feelings and attitudes towards individuals with pedophilia, including the ones that do not offend (Jahnke et al., 2015). As a result, people inclined to pedophilic interests and/or behaviors fear being shamed, threatened and cut off from sources of social support if their sexual interests are discovered. This may in turn limit therapy requests (Cantor et al., 2016).

As one of the main sources of information on pedophilia, media have a great responsibility to portray pedophilia realistically and to dispel common and harmful myths. However, generally, media reports about pedophilia perpetuate the stereotype that all people affected by it are dangerous predators, not worthy of society's respect or support (Harper & Hogue, 2015), ultimately perpetuating the stigma in the general population.

According to Jahnke (2018), the stigmatization of people with pedophilic interests is "tremendous". Evidence on the level of behavioral intentions shows that the tendency to reject poeple with pedophilia on different levels of social interaction is strongly present. For instance, comparative surveys revealed that non-offending pedophilic individuals are rejected more fiercely than people who abuse alcohol, sexual sadists, or people with

antisocial tendencies (Jahnke, Imhoff, et al., 2015). In addition, in a large-scale survey conducted in Germany (Schmidt et al., 2013), 38% of the respondents stated that non-offending people with pedophilic interests should rather be dead or incarcerated, even if they never committed a sexual offense.

Jahnke, Schmidt, et al. (2015) claimed that this stigmatization may indirectly increase the risk of sexual offending by worsening deficits in social and emotional functioning (including deficits related to coping with stress), and reduce willingness to seek professional help when needed (Figure 1).

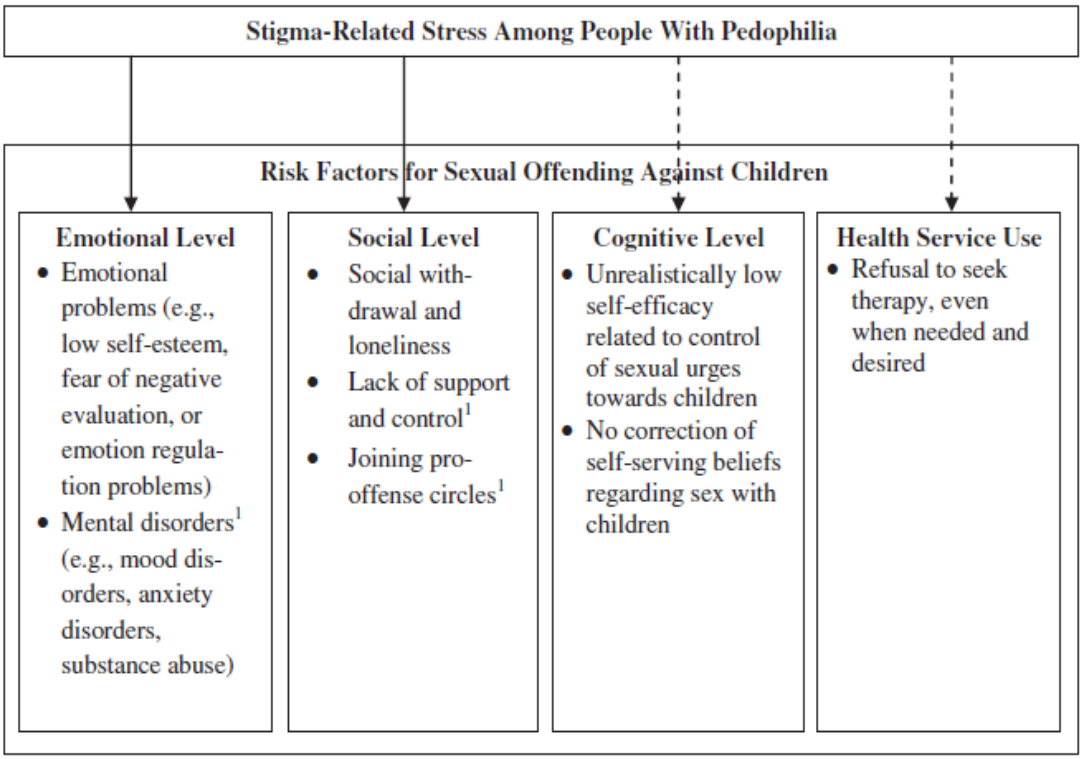


Figure 1. Framework of the effects of stigma-related stress in risk factors for sexual offending against children. Solid arrows = empirically established links, dashed arrows = hypothesized links that could not be empirically corroborated. Links between these variables and risk factors for sexual offending against children have not yet been empirically tested (Jahnke, Schmidt, et al., 2015).

2.2 *Role of media in fuelling mass hysteria*

Media themselves play a crucial role in the development of an incident, problem, social issue, or scandal, as they generate a significant “news tsunami” (Fiske, 1994). When this occurs, a mismatch between the news waves and the reality that the media are supposed to cover takes place. Events accumulate in the news quickly, fueling the sensation that a situation has suddenly turned into a crisis or scandal, and that the issue is getting worse (Vasterman, 2015).

Every new incident that resembles and that seems to fit a mediatically resonant crime will receive more attention than before, giving the idea that said typology of crime is widespread (Kepplinger & Habermeier, 1995), creating a real media-hype. The word "hype" refers to "amplification, exaggeration, and distortion"; indeed, an unusual event evokes increased media attention. Media focus on this particular topic or event, enlarging it, and by doing so, they elicit all kinds of social responses, which recursively become news and further fuel the news wave. Critical factors for creating media excitement, according to Vasterman (2015), are the fast emergence of a news wave and the existence of a key event that clearly marks the beginning of the news wave, since it is this event that receives more attention than comparable events.

Additionally, a central aspect of the news wave is the news theme. Factually, it serves as the starting point for subsequent reporting, since it organizes the search for newer news on the case in question by specifying the story's angle and the types of sources that are required (Brosius and Eps, 1995). However, this causes a flow of news stories that are thematically related: stories that appear to reinforce the frame of reference will be reported, while other facts and opinions are ignored or suppressed.

Evenmore, media are crucial in the social construction process because they label certain situations as problematic before society acknowledges them as social problems, scandals, or crises. In fact, media-hype can quickly amplify or widen certain issues (Vasterman, 2015).

Regarding pedophilia, one’s might wonder: what is more widespread, the phenomenon of pedophilia or the fear of pedophilia spread through the media? It’s clear that the term pedophilia creates suspicion and prejudice, even in those cases where a real threat can not be detected. The mechanism is actually very simple, as described before. Media report

the news, misleading the audience into believing that an impellent dangerous situation is spreading.

2.3 Pedophilia and the Italian legal system

In Italy, to hold a defendant criminally responsible, proof is required that he/she committed the act (*actus reus*) of his/her own free will (*mens rea*), intentionally. The aim of psychiatric assessment within the forensic setting is to determine whether the defendant suffers from a mental disorder or a neurologic condition, and whether the defendant's ability to make a distinction between right and wrong (ability to understand) or to do otherwise (ability to will) at the time of the crime was either completely or partially weakened or abolished due to the presence of the clinical condition, according to the Italian penal code, art. 88, 89 (Scarpazza et al., 2017). Moreover, establishing the presence of a mental disorder or a neurologic condition is only one component of the insanity evaluation process, as the expert also needs to highlight the causal link between the defendant's *mens rea* and the *actus reus* (Scarpazza et al., 2020).

Acquired pedophilia's recognition is problematic, due to the rarity of this disorder and that it is described only in a limited number of cases within the scientific literature (Scarpazza, Costa et al., 2022, in press).

Recent evidence suggests that acquired pedophilia prevalence might be higher than previously expected, but it might be unrecognized due to the fact that an in-depth neuroscientific investigation to understand the origin of the offenses toward children is rarely performed (Ciani et al., 2019).

It is thus important to identify the behavioral and clinical characteristics of acquired pedophiles, in order to help clinicians, in both clinical and forensic settings, to recognize the distinctive signs of acquired pedophilia, avoiding misdiagnosis which, as seen in Chapter 1, carries severe consequences.

From a legal standpoint, there is also the need to obtain consensus in the scientific community about the legal implications of acquired pedophilia. In fact, the ambiguity of this condition complicates even more an issue easily identifiable in court, that is, the fact that starting from the same objective data, different experts draw different conclusions. This leads to a low inter-reliability (namely, the amount of agreement between different experts evaluating the same individual), with an error rate associated with the

unstructured psychiatric interviews which revolves around 53%, clearly indicating the unreliability of this method (Miller-Withehead, 2001; Miller et al., 2001). This is due to the fact that insanity evaluation is usually carried out by means of the psychiatric interview, which is the basis of the so-called "classical approach" (Scarpazza et al., 2018). As earlier stated, nevertheless, this approach presents some limitations (Scarpazza et al., 2018): the psychiatric evaluation alone is not sufficient to evaluate insanity in the forensic settings, as it solely relies on information reported by the defendant, which raises the concern regarding symptoms malingering for defensive purposes, which might compromise the verdict (Scarpazza et al., 2018). Moreover, as previously stated, the inter-reliability between experts following unstructured psychiatric interviews is low and unreliable; thus, in order to follow the principle of convergence of evidence, where information coming from different approaches have to fit in a logical reasoning, further information is needed to sustain and corroborate the psychiatric diagnosis. The use of a transdisciplinary, scientifically-grounded approach can help to change the way legal phenomenon is interpreted. When assessing mental insanity, consultants should in fact investigate not only the existence of a diagnosis, but also the cognitive abilities that are necessary to understand one's behavior and emotions, as well as our own (Scarpazza et all., 2018). The use of a neuroscientific logic based on recent scientific evidence and which refers to cognitive/biological/behavioral models of normal functioning, can change the legal concept of responsibility or culpability.

However, in the scientific community the role of neuroscience in court is still debated. Some neuroscientists criticize the role that neuroscience might have in the classic psychiatric assessment (Farisco & Pietrini, 2014), while others suggest that the neuroscientific methods are useful to provide markers to understand the crimino-genesis and crimino-dynamics while being complementary to the clinical psychiatric assessment (Scarpazza et all., 2018), thus updating the classical approach with a new cognitive one. The cognitive approach aims to translate the legal concepts of "ability to understand and ability to want" into their neuropsychological components: the ability to understand may be deconstructed into emotions, distinction of the right from the wrong and the theory of mind; on the other hand, the ability to want is deconstructed into verbal inhibition and behavioral inhibition. These components are measurable by means of neuropsychological tests (Scarpazza et al., 2018).

The cognitive approach improves the classical approach for several reasons:
1) it does not rely only on psychiatric diagnosis (which implies less risk of bias and error);
2) it complies with the legal standards on insanity (i.e., the presence of cognitive or volitional impairment of the defendant at the time of the crime, investigating if the defendant could have done otherwise if he/she wanted);
3) it ensures personalization as each defendant undergoes a different assessment based on the behavioral and neuropsychological symptoms;
4) it has a strong underlying free will theory which refers to the ability to do otherwise;
5) it allows the causal link between the cognitive status of the defendant and the criminal act, so the crime can be decomposed into its neuropsychological components.
In the frame of this approach, neuroimaging covers an important role. Indeed, the link between cognition and neuroimaging allows to investigate if there is a correspondence between the anatomical alterations and the symptoms of the patients. However, it is important to highlight that neuroimaging alone is meaningless, as a psychiatric diagnosis cannot be made solely based on neuroanatomical alteration: it is rather needed to couple neuroimaging results with clinical symptoms (Scarpazza et. al., 2018).
Given that pedophilia is among the most hideous behaviors condemned by society, a more comprehensive and transdisciplinary approach would be recommended in court.
An example of how pedophilia might be deconstructed under the scope of the cognitive approach is provided by Ciani et al. (2019), who conducted a systematic review of cases of acquired pedophilic behavior, with the aim to delineate a behavioral profile that might help to identify defentants whose pedophilic behavior is likely to be a consequence of a neurological disorder. Seventeen clinical and behavioral variables of the modus operandi and victimology (that can distinguish between acquired and developmental pedophilic behavior) were collected, and, out of these, six were found to be consistent behavioral indicators for acquired pedophila. These six “red flags” are: 1. older age; 2. absence of previous criminal sexual offenses; 3. absence of premeditation; 4. absence of masking behavior; 5. spontaneous confession; 6. absence of sense of guilt. Four of these profiling elements are related to the crime (i.e., premeditation, absence of masking, sense of guilt and confession), one is demographic (i.e., offender's age over 50) and one is clinical (i.e., absence of previous sex offenses) (Ciani et al., 2019). The authors conclude by suggesting that any pedophilic case showing four or more red flags should receive further

neurological investigation to assess the acquired rather than developmental nature of pedophilic behavior. In those cases, an in depth trans-disciplinary neuroscientific investigation is advocated.

Chapter 3. How can we overcome the problem of stigmatization in public opinion?

3.1 *The role of cognitive and anatomical data in previous studies*

As previously seen, in the juridical context the experts should adopt the cognitive approach, because the use of a multidisciplinary approach (e.g., neuropsychological tests and neuroimaging) provides a clearer and more complete picture, changing the way the information is perceived.

The phenomenon of using neuropsychological and anatomical data in juror evaluations started to be studied in the 2000's. In particular, Greene and Cahil (2012) studied the effect of neuroimaging and neuropsychological results on mock juror decision making, wondering whether neuroimages would influence mock jurors' judgments. The procedure consisted in describing in detail a capital offense, adding for some jurors evidence from neuropsychological testing and brain scans; then, they measured the impact of this information on the mock juror's perception of the offender. The authors considered the neuropsychological and brain information as mitigating factors reducing the defendant's moral culpability, due to factors that are beyond one's control, such as mental illness.

Results showed that both neuropsychological tests results and neuroimages acted as mitigating effects on jurors' impressions of the defendant. For jurors, the defendant appeared less likely that he could control his behavior. Moreover, the authors expected that neuroimages would have a major impact on jurors' decisions than neuropsychological testing results. However, no differences were highlighted, suggesting that brain scans have an impact no greater than the impact of neuropsychological testing data.

As for factors that are within the offender's control, such as drug or alcohol abuse, results from the available literature suggest that jurors are generally more receptive to uncontrollable factors than to ones that appear to be voluntary (Barnett et al, 2007; Garvey, 1998). In fact, Garvey (1998) claimed that the most powerful type of mitigating evidence are factors that reduced the defendant's moral culpability. In addition, psychiatric testimony about the defendant's mental abnormality has a powerful impact on the juror's impressions of the defendant. Montgomery et al. (2005) found that the presence of a defense psychiatrist or psychologist expert witness and the jurors' impression that

the defendant is affected by a mental condition are positively strongly correlated during the sentencing phase (Montgomery, Ciccone, Garvey, & Eisenberg, 2005).

Other researchers tried to investigate the impact of neuropsychological and neuroimaging information in the public opinion. “Brain images are believed to have a particularly persuasive influence on the public perception of research on cognition” is the opening sentence in a paper written by McCabe and Castel (2008) who, in their first experiment, presented participants with fictional articles about cognitive neuroscience research, either including no image, a brain image or a bar graph representing the critical results. The participants were required to rate the soundness of the scientific reasoning of the article. They found that when articles summarizing cognitive neuroscience data were accompanied by brain images, rather than bar graphs, they were rated higher. To exclude the possibility that the participants were influenced by the visual complexity of the brain images (rather than real comparison between brain images and bar graphs), the authors designed a second experiment where articles were accompanied either with brain images or topographical maps of brain activation. Articles with brain images received a higher rating of scientific soundness rather than the ones with topographical maps, suggesting that the effect was not simply due to visual complexity of the information stimuli.

According to the authors, brain images are persuasive because they provide a tangible explanation of hidden structures and abstract cognitive processes. The physical evidence of brain activity permits us to easily interpret it. They concluded by stating: “There is something special about the brain images in influencing judgments of scientific credibility. The scientific credibility of brain imaging as a research technique lies in the images themselves.” (McCabe and Castel, 2008).

Another paper, titled “The Seductive Allure of Neuroscience Explanations” by Weisberg, Keil, Goodstein, Rawson and Gray (2008), tried to investigate whether people consider cognitive neuroscience attractive. According to the authors, people are satisfied when explanations are provided. Participants were presented with four types of descriptions of psychological phenomena: half of them were classified as “good explanations”, the other half as “bad explanations”, and both typologies were divided in plain explanations, and explanations coupled with neuroscientific information. In this study, information about the brain were used rather than brain images (Figure 2).

	Good Explanation	*Bad Explanation*
Without Neuroscience	The researchers claim that this "curse" happens because subjects have trouble switching their point of view to consider what someone else might know, mistakenly projecting their own knowledge onto others.	The researchers claim that this "curse" happens because subjects make more mistakes when they have to judge the knowledge of others. People are much better at judging what they themselves know.
With Neuroscience	**Brain scans indicate** that this "curse" happens because **of the frontal lobe brain circuitry known to be involved in self-knowledge.** Subjects have trouble switching their point of view to consider what someone else might know, mistakenly projecting their own knowledge onto others.	**Brain scans indicate** that this "curse" happens because **of the frontal lobe brain circuitry known to be involved in self-knowledge.** Subjects make more mistakes when they have to judge the knowledge of others. People are much better at judging what they themselves know.

Figure 2. Sample Item (Weisberg, Keil, Goodstein, Rawson and Gray, 2008).

The good explanations were rated as more satisfying than bad explanations; in particular, for what concerns bad explanations, the ones containing neuroscientific information were rated as more satisfying than the ones without neuroscientific information. Neuroscientific information seems to have a specific effect of making bad explanations look significantly more satisfying than those without, leading participants to consider the "enriched" bad explanations less critically, although the neuroscientific information was *per se* irrelevant (Figure 3).

Authors concluded that irrelevant neuroscientific information may interfere with people's abilities to critically consider the underlying logic of the explanation.

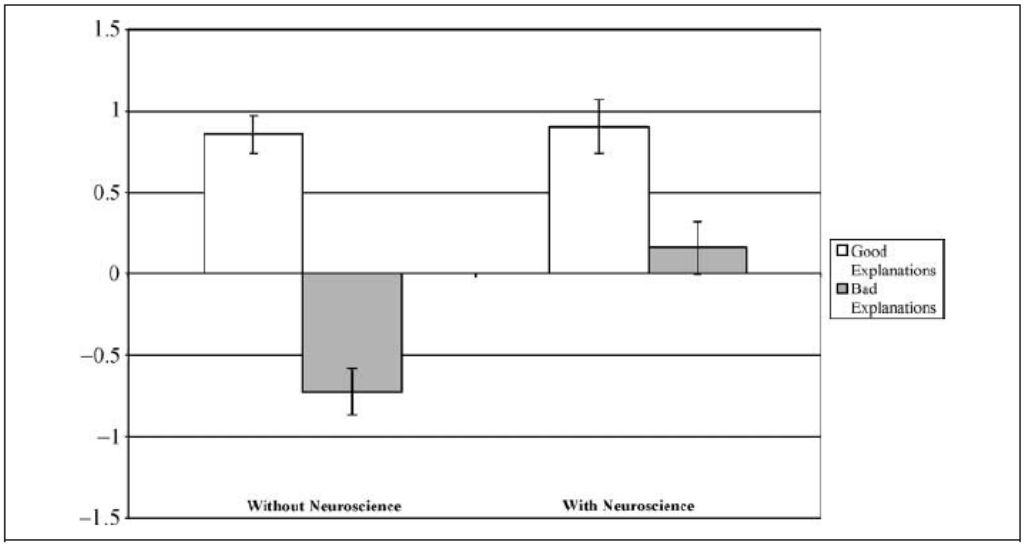


Figure 3. Mean ratings of how satisfying subjects found the explanations (Weisberg, Keil, Goodstein, Rawson and Gray, 2008).

In addition, the authors wanted to investigate if these results were an effect of misinterpretation of the neuroscientific information or whether the information itself was the cause of these results. They tested experts from the field of cognitive neuroscience in order to investigate if they were immune to the effects of neuroscientific information. As previously, experts rated good explanations as more satisfying than bad ones. On the contrary, the experts' data showed no effect of neuroscientific information: they rated the explanations regardless of the presence of neuroscientific information. According to the authors' conclusion, since the experts are able to properly interpret the given data, the non-experts' results are due to misinterpretations of the information, not due to the information itself, (Weisberg, Keil, Goodstein, Rawson and Gray, 2008).

"Why are nonexperts fooled?" is the final question that Weisberg et al. (2008) posed after their findings. Several answers can be provided. One possible explanation relies on heuristic reasoning (Tversky & Kahneman, 1974), according to which explanations involving technical language are better perceived as they look more scientific. So the neuroscientific information can be seen as a stronger marker of a good explanation. Moreover, Kulich at al., (2009) claimed that brain images are persuasive because they are typically explained by medical experts who are considered to have high credibility by

jurors and people in general. Another possible explanation is the "seductive details effects" (Harp e Mayer, 1998), according to which attention is moved from important generalization in the text toward interesting irrelevant details. In addition, as McCabe and Castel (2008) proposed, neuroscience may be perceived as a physical and tangible explanation of a cognitive phenomenon, creating a connection between mind and brain.

Despite all these possible explanations, Weisberg et al. (2008) 's study suggests some worries about the powerful influence of neuroscience. According to their results, neuroscientific information may interfere with the ability of judgment, leading to considering explanations with poor quality as good and satisfactory explanations, only due to adding the "neuro-factor".

Along the same line of thought, other researchers worried about the powerful effect of brain images, in particular about how fMRI data can be interpreted by media and the general public. In an article published in *Nature Reviews Neuroscience*, Racine et al. (2005) presented some provocative questions to readers: "Are the boundaries of what this technology can and cannot achieve being effectively communicated to the public? Are its limitations understood? Are the applications of the technology viewed as useful and meaningful?". According to the authors, one of the challenges neuroscientists should face is to convey knowledge, regarding behavior and personality, in a meaningful way to the public. In fact, journalists must report these results in a comprehensible style for the audience, a style that obviously differs from the level of technicality of scientific communication and that follows different standards and rules, avoiding the tendency to oversimplify and misrepresent conclusions from neuroscientific studies. In the authors' opinion, the popular press coverage of brain imaging research has led to a so-called "neuro-realism", which describes how the coverage of fMRI investigation can make a phenomenon "uncritically real in the eyes of the public", making it an instrument that enables people to capture a visual proof of brain functioning without considering the complexities of data acquisition and image processing. (Racine et al., 2005).

Also Treadway and Buckholtz (2011), in a forensic psychiatric journal, claimed that despite the comprehension of the brain, provided by novel imaging technologies, holds great promise for improved reliability and validity in diagnosis and assessment, these tools have limitations. As such, they worried about the potential of neuroscientific data in

creating prejudicial and probative value for addressing relevant questions to criminal responsibility and sentencing mitigation.

In the paper “On the (non)persuasive power of a brain image”, Micheal et al. (2013) pointed out that McCabe and Castel’s (2008) study has never been replicated. Hence, they asked participants to read a brief news article taken from one of MaCabe and Castel’s experiments, manipulating the presence and absence of a brain image. They concentrated on more precise estimation of how much people agree with an article’s conclusion when it is accompanied by a brain image, and they concluded that a brain image exerts little to no influence on people's judgment about the conclusions of a new article. The authors discussed that brain images can exert powerful effects on cognition because they can clarify complex ideas and create a bridge between what we know and what we do not know (Mayer and Gallini, 1990). However, this is true especially for individuals with prior knowledge about a specific technique, whereas it is not for individuals who happen to be ignorant about the technique under investigation.

Another study that follows this direction is by Gruber and Diskerson (2012). Participants were asked to evaluate one of four versions of an article about neuroscience findings, each with a different image as independent variables. The authors wanted to investigate: if a popular news article with fMRI image appears more credible than the same article with no image, with non-scientific images, or with images from a well-known science fiction film. One group evaluated the article with no image; another read the version of the article with a brain scan image; the third received the article with a fantastical, artistic image and the last group was given the article with an image from a popular science fiction. After reading the article, participants had to complete a short survey. The authors found that fMRI images are not evaluated as more credible than other types of images. Thus, they suggest reconsidering the conclusion that brain images have a persuasive power, increasing the credibility in neuroscientific findings. However, the authors pointed out some limitations of the study, such as the heterogeneity among the participants and the fact that not all participants had the appropriate knowledge to be able to judge the credibility of scientific information. Despite these limitations, the authors suggest further research to explore other ways through which science news persuades the audience and whether an image, isolated as the only independent variable as in this study, does significantly alter the perceived credibility of an article. According to Gruber and

Diskerson (2012), future research should consider how text can be persuasive, how it interacts with images, the “rhetorical qualities” of images, such as emotional appeal, and the role a picture may play in the audience's level of understanding of the article's topic.

3.2 Research question

Starting from McCabe and Castel’s insight that images are persuasive for the public opinion, and taking a cue from Greene and Cahil's (2012) study that used both cognitive/neuropsychological information and brain images, it was decided to investigate public opinion and whether different type of information modulate said opinion, regarding a delicate and mediatically resonant topic such as pedophilia.

The present study aimed at investigating public opinion regarding idiopathic and acquired pedophilia and whether providing cognitive/neuroscientific information, such as brain images and neuropsychological information, to frame a forensic case of either idiopathic or acquired pedophilia would modulate one’s opinion about legal justifiability and juridicial punishment. The hypotheses of the study were that individuals with acquired pedophilia could be considered less punishable and more justifiable than individuals with idiopathic pedophilia. As for cognitive and neuroanatomical data, it was expected a modulatory effect for acquired pedophilia cases toward greater justifiability and less punishment, while an effect of the typology of information was not expected. According to previous literature (Green and Cahil, 2012), no differences in the potential biasing effect of providing people with brain or cognitive data are expected.

Answering the question of how multiple variables like brain images or neuropsychological information interact with the reader and how they can be used to responsibly and ethically improve public perception of neuroscience research will serve an important purpose for future research.

Chapter 4. An experimental Contribution

4.1 Methods

4.1.1 Participants

433 participants were enrolled for the present study. Participants were contacted and invited to participate through social media and word of mouth. Participation was on a voluntary basis, and participants received no reward or incentives for participating in the study. The present study was carried out with the adequate understanding and written consent of the participants, in accordance with the Declaration of Helsinki. The study was approved by the local Ethics Committee, University of Padua.

4.1.2 Study design

The study has a between-subject design. Three forensic cases were chosen, two describing cases of acquired pedophia, one of idiopathic pedophila. Three description versions for each of the three forensic cases were created, differing in the degree of detail reported: the first version only reported the description of the crime; the second version reported the same information, enriched with the description of the cognitive/neuropsychological status of the defendant; the third version reported the same degree of information as the first version, but MRI images of the defendant's brain were added. A total of nine versions were created, three for each forensic case. Then, three surveys were created, each containing a version of each forensic case, varying in the degree of information. Each participant responded to one survey only.

4.1.3 Materials

Survey Creation and Structure

Each survey was divided in 4 main parts:

1) An initial questionnaire about the general information of the participant (age; gender; years of education; current profession; if a student, the course of study; nationality; and, if italian, the region of provenience);

2) A questionnaire to investigate the general knowledge about idiopathic pedophilia and acquired pedophilia. Participants had to answer to the following questions:

Regarding idiopathic pedophilia:

- Are you aware that pedophilia is considered to be a psychiatric disorder? Yes/No
- Did you know that the DSM-5 states that pedopilia is present from adolescence or young adulthood? Yes/No
- Are you aware that the origin of pedophilia is unkown and that this is why it is called “idiopathic etiology”? Yes/No
- Do you think that a person with idiopathic pedophilia who has never acted out the pedophilic impulse (i.e., has never touched children) should be treated pharmacologically or psychologically to prevent them from committing sexual abuse? Yes/No
- Do you think that a person with idiopathic pedophilia who acted out the pedophilic impulse should be punished for his actions? Yes/No
- Do you think a person with idiopathic pedophilia can be justified (e.g., legally by having a reduced sentence for insanity) after committing the abuse? Yes/No
- Do you think that a person with idiopathic pedophilia who abuses a child should deserve to be imprisoned or should need to receive pharmacological/psychological treatment? Prison/Treatment outside prison/Treatment inside prison

Regarding acquired pedophilia:

- Are you aware that there is a second type of pedophilia, called acquired pedophilia? Yes/No
- Are you aware that acquired pedophilia is called as such because it can manifest during the lifespan at any age? Yes/No
- Are you aware that acquired pedophilia is a symptom of an underlying neurological condition (e.g., brain damage, head trauma or a form of dementia)? Yes/No
- Do you think that a person with acquired paedophilia should be punished for its actions? Yes/No
- Do you think a person with acquired paedophilia can be justified (e.g., legally by having a reduced sentence for insanity) after committing the abuse? Yes/No

- Do you think that a person with acquired pedophilia who abuses a child should deserve to be imprisoned or should need to receive pharmacological/psychological treatment? Prison/Treatment outside prison/Treatment inside prison

3) A survey regarding the three cases. After reading the text about the cases, participants had to answer the following questions:

- Do you think that the acts committed by this person can be justified (e.g., from a legal point of view and considered as insanity)? Yes/No
- Do you think that the person described in this extract should be punished for what he/she has done? Yes/No
- Do you think this person would benefit more from medical treatment than imprisonment? Treatment/Imprisonment

4) A final questionnaire investigating the metacognitive dimension: participants were asked if they believed their responses could have been influenced by the presence of the cognitive or neuroimaging data, and why.

In particular, regarding cognitive data participants were asked the following questions:

- As you may have noticed, one of the presented cases contains cognitive information (e.g., about impulsiveness in daily life). Do you think this information might have influenced your answer as to whether the person described should be punished or not? Yes/No
- Why? (Choose one or more)

- It allowed me to better understand the case
- It made me understand concretely what we are talking about
- It led me to say that the patient could be justifiable (from a criminal/legal point of view) even if before I actually did not think so
- It allowed me to understand that the behavior was linked to a general impairment of cognitive functions, such as impulsivity
- I think it was unnecessary and even without it I would have had the same final opinion

- Can you describe in your own words why, in your opinion, the description of the defendant's cognitive functioning was useful/unhelpful?

Regarding neuroimaging data, participants were asked the following questions:

- As you may have noticed, one of the cases presented contains a picture of the brain of the person described. Do you think this picture might have influenced your answer as to whether the person described should be punished or not? Yes/No
- Why?

- It allowed me to better understand the case
- It made me understand concretely what we are talking about
- It led me to say that the patient could be justifiable (from a criminal/legal point of view) when before I actually did not think so
- It allowed me to understand that the behavior was related to a brain damage
- I think it was unnecessary and even without it I would have had the same final opinion.

- Can you describe in your own words why, in your opinion, it was useful/unnecessary to see the image of the patient's brain?

Cases description

In section 3, each survey contained the description of three different cases of pedophilia: two about acquired pedophilia and one about idiopathic pedophilia. These texts presented a rigid structure (three different versions) that reflected the manipulation: the first version only reported the description of the crime; the second version reported the same information, enriched with the description of the cognitive/neuropsychological status of the defendant; the third version reported the same degree of information as the first version, but MRI images of the defendant’s brain were added.

While this structure was always the same in each survey, the cases associated with the version changed in each survey.

The aim was that the participant read three versions about three different cases (Table 1).

	Q1	Q2	Q3
Only text	FO	DA	LU
Cognitive data	DA	LU	FO
Brain image	LU	FO	DA

Table 1. Q1, Q2 and Q3 are the three surveys, respectively.
FO, DA and LU are fictitious names for the defendants of the three cases.

Description of the three cases more in detail

The three forensic cases were inspired by real cases found in literature.

First case

The case about FO was a case of acquired pedophilia; a 40-year-old man that developed pedophilic behaviors following a malignant tumor (astrocytoma) in the frontal lobe, particularly in the orbitofrontal cortex. He made sexual advances on his eight-year-old stepdaughter (e.g., touching her private parts).

In the text version: the events of this case are described.

In the cognitive version: neuropsychological data are added, for example: "*FO had gone to great lengths to conceal his activities because he considers them unacceptable. Yet, despite this, he could not inhibit his sexual urges in any way*"; "*When questioned about his behavior, FO stated that he was unable to inhibit his sexual urges in any way, even though he was aware of the moral and legal invalidity of his actions*"; "*The formal neuropsychological examination reveals a significant alteration in the ability to control impulses and an inability to inhibit the preponderant response*".

In the brain version: A brain picture with FO's tumor in the axial, frontal and medial axis is added to the text (Figure 4).

A: brain seen from the side (sagittal view); B: brain seen from the front (coronal view), C: brain seen from above (axial view).

Figure 4. From Burns, J. M., & Swerdlow, R. H. (2003). Right orbitofrontal tumor with pedophilia symptom and constructional apraxia sign. *Archives of neurology*, *60*(3), 437-440.

Second case

The second case of acquired pedophilia was about DA; he was a 50-year-old peditrician that developed pedophilic behavior after a surgical lesion in the hippocampus-amygdala complex and acted on a ten years old girl during a visit to his office.

In the text version: the events are described.

In the cognitive version: the neuropsychological data are added, for example: "*Showing that he does not understand the seriousness of his behavior, the moral and social disvalue and the legal consequences that will follow*"; "*Given the symptoms and modus operandi, the neurologist suggested a neuropsychological assessment, which revealed an inability to control his impulses, as well as a deficit in moral reasoning: on a very simple test such as assessing the appropriateness of behaviors such as walking around naked in the street, DA showed difficulty in understanding which behavior was socially appropriate and which was not, he showed difficulty in understanding the consequences of actions and the social and moral disvalue of inappropriate behavior*".

In the brain version: a brain picture with DA's lesions in the axial axis is added to the text (Figure 5).

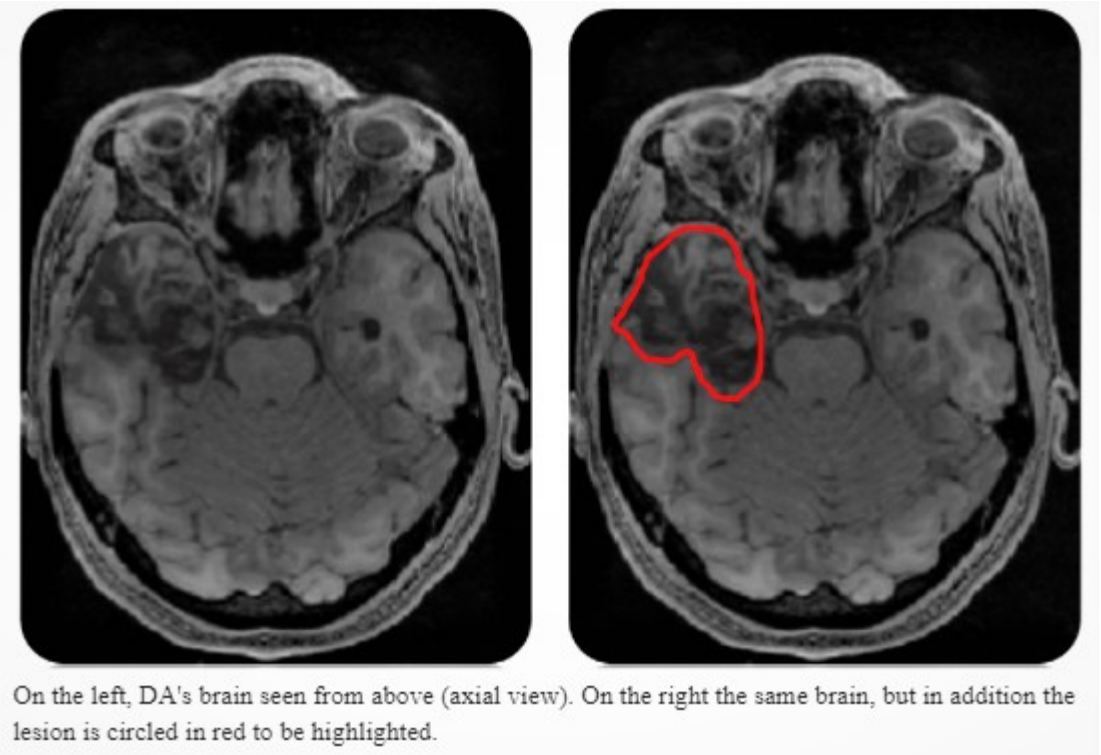


Figure 5. From Devinsky, J., Sacks, O., & Devinsky, O. (2010). Klüver–Bucy syndrome, hypersexuality, and the law. *Neurocase*, *16*(2), 140-145.

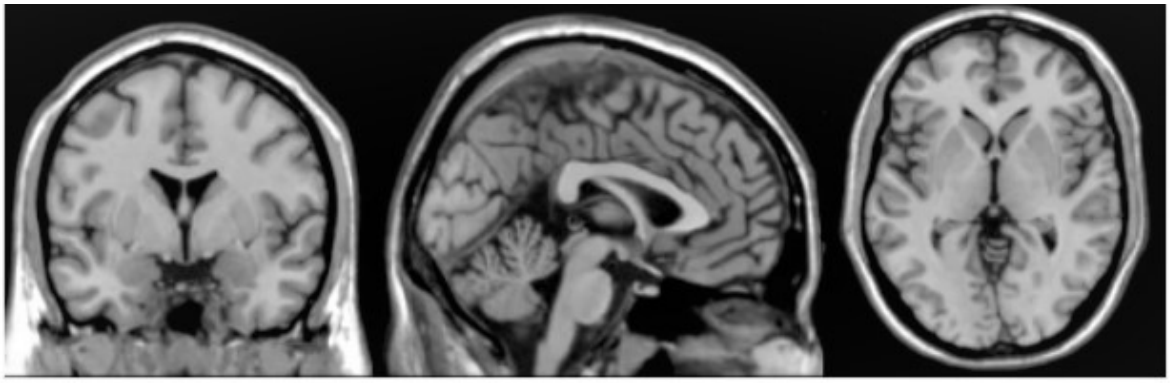
Third case

The third case was about idiopathic pedophilia; LU was a 45-year-old man that had pedophilic behavior on young girls.

In the text version: the events are described.

In the cognitive version: the neuropsychological data are added, for example: "*Everything was well planned, down to the smallest detail*"; "*LU was never discovered because he blackmailed his victims and threatened them with repercussions in their lives if they tried to tell anyone else what had happened*"; "*The victims told how they initially trusted him completely and how LU took advantage of their weaknesses*".

In the brain version: a brain picture in the axial, frontal and medial axis of a normal brain is added to the text (Figure 6).



On the left, LU's brain seen from the front (coronal view); in the middle, LU's brain seen from the side (sagittal view); on the right, LU's brain seen from above (axial view). No abnormalities are evident.

Figure 6. MRI of a healthy subject.

4.1.4 Statistical Analyses

Analyses were performed using the IBM SPSS V28.0.1 software (IBM Corp. 2021).

First, in order to investigate between-subjects differences regarding previous knowledge on idiopathic (IP) and acquired pedophilia (AP), a Chi-squared test was run.

Second, in order to investigate between-subjects differences regarding opinion about justification, punishment and treatment, a Chi-squared test was run.

Third, in order to test whether previous opinion about idiopathic and acquired pedophilia are related to the way participants reply to the items regarding treatment, punishement and justification for each case, a McNemar test was run.

Fourth, in order to test whether people acknowledged whether or not neuropsychological information and anatomical information had an impact on their responses regarding punishment, a McNemar test was run.

4.2 Results

433 participants took part in the present study. The mean age was 25 years old (sd=7.9), with a minimum age of 18 and a maximum of 60. 343 participants were females and 90 males. The average years of instruction was 16.5 (sd=2.05), with a minimum of 8 and a maximum of 28 years.

4.2.1 Between-subjects differences in previous knowledge on idiopathic and acquired pedophilia

Following the Chi-squared test, for each case, no appreciable between-subjects differences in previous knowledge regarding IP and AP ($p>0.05$) were detected. In other words, participants responding to the three different versions of each case did not differ in previous knowledge.

4.2.2 Between-subjects differences in opinion about justification, punishment and treatment

LU case (idiopathic pedophilia)

Analysis revealed that providing participants with cognitive or brain imaging data impacted on the opinion of whether the individual could be justified for his actions ($p=0.001$). Indeed, 15.9% of participants were willing to legally justify the defendant after reading the text only; this percentage was lower for participants provided with the cognitive data (3.5%) and with brain imaging (7.1%).

Contrarily, providing the participants with cognitive and brain imaging data did not impact on their opinion on whether the defendants should or should not be punished ($p=0.080$). Indeed, 98.7% of participants provided with text only thought that the defendant deserved punishment and this percentage remained similar when adding neuropsychological data (98.6%) or brain imaging (95.0%).

Analysis revealed that providing participants with cognitive or brain imaging data impacted on the opinion of whether the individual should be treated ($p=0.000$). Indeed, 42.4% of participants were willing to treat the defendant after reading the text only; this

percentage was lower for participants provided with the cognitive data (16.9%) and with brain imaging (32.1%).

FO case (acquired pedophilia - tumor)

Analysis revealed that providing participants with cognitive or brain imaging data did not impact on the opinion of whether the individual could be justified for his actions (p=0.412). Indeed, 80.0% of participants were willing to justify the defendant after reading the text only; this percentage was slightly higher for participants provided with the cognitive data (82.1%) and with brain imaging (85.9%).

Equally, providing participants with cognitive and brain imaging data did not impact their opinion on whether the defendants should or should not be punished (p=0.876). Indeed, 61.4% of participants provided with text only thought that the defendant deserved punishment, while this percentage slightly decreased when adding neuropsychological data (59.6%) or brain imaging (58.5%).

Analysis revealed that providing participants with cognitive or brain imaging data did not impact on the opinion of whether the individual should be treated (p=0.295). Indeed, 92.1% of participants were willing to treat the defendant after reading the text only; this percentage was slightly lower for participants provided with the cognitive data (89.4%) and slightly higher for participants provided with brain imaging (94.4%).

DA case (acquired pedophilia - lesion)

Analysis revealed that providing participants with cognitive or brain imaging data did not impact on the opinion of whether the individual could be justified for his actions (p=0.246). Indeed, 73.9% of participants were willing to justify the defendant after reading the text only; this percentage was slightly higher for participants provided with the cognitive data (82.1%) and with brain imaging (76.8%).

Contrarily, providing the participants with cognitive and brain imaging data impacted on their opinion on whether the defendants should or not be punished (p=0.04). Indeed, 75.4% of participants provided with text only thought that the defendant deserved

punishment, while this percentage decreased when adding neuropsychological data (61.4%) or brain imaging (69.5%).

Analysis revealed that providing participants with cognitive or brain imaging data did not impact on the opinion of whether the individual should be treated (p=0.452). Indeed, 90.1% of participants were willing to treat the defendant after reading the text only; this percentage was slightly lower for participants provided with the cognitive data (88.5%) and with brain imaging (85.4%).

4.2.3 Relation between previous opinion and opinion after lecture of the cases

It was then explored whether previous opinion about idiopathic and acquired pedophilia are related to the way participants reply to the items regarding treatment, punishement and justification for each case.

LU case (idiopathic pedophilia)

Treatment

The relationship between the item related to prior opinion of IP on treatment and the item related to treatment after reading LU's case is analyzed.

Text only

Analysis revealed that after reading the text only there is a significant change in the opinion about the treatment (p=0.001) from “yes” to “no”. Indeed, 41,7% of participants who initially said “yes to treatment” changed their opinion to “no to treatment” after reading, while a small percentage, 11.9%, changed from “no” to “yes”; 30.5% maintained “yes to treatment” in both items and 15.9% kept “no” to treatment in both items.

Cognitive data

Analysis revealed that after reading the text with cognitive data there is a significant change in the opinion about the treatment (p=0.001) from “yes” to “no”. Indeed, 60.6% of participants who initially said “yes to treatment” changed their opinion to “no to treatment” after reading, while a small percentage, 4.9%, changed from “no” to “yes”; 12.0% maintained “yes to treatment” in both items and 22.5% kept “no” to treatment in both items.

Brain Image

Analysis revealed that after reading the text with anatomical data there is a significant change in the opinion about the treatment (p=0.001) from “yes” to “no”. Indeed, 52.1% of participants who initially said “yes to treatment” changed their opinion to “no to treatment” after reading, while a small percentage, 11.4%, changed from “no” to “yes”; 20.7% maintained “yes to treatment” in both items and 15.7% kept “no” to treatment in both items.

Punishment

Then, the relationship between the item related to prior opinion of IP on punishment and the item related to punishment after reading LU's case is analyzed.

Text only

Analysis revealed that after reading the text only there is not a significant change in the opinion about the punishment (p=0.070). 0.7% of participants who initially said “yes to punishment” changed their opinion to “no to punishment” after reading, while a slightly higher percentage, 4.6%, changed from “no” to “yes”; 94% maintained “yes to punishment” in both items and 0.7% kept “no” to punishment in both items.

Cognitive data

Analysis revealed that after reading the text with cognitive data there is a significant change in the opinion about the punishment (p=0.001) from “no” to “yes” to punishment. Indeed, 0.0% of participants who initially said “yes to punishment” changed their opinion to “no to punishment” after reading, while an higher percentage, 9.2%, changed from “no” to “yes”; 89.4% maintained “yes to punishment” in both items and 1.4% kept “no” to punishment in both items.

Brain image

Analysis revealed that after reading the text with the brain image there is not a significant change in the opinion about the punishment (p=0.180). 1.4% of participants who initially said “yes to punishment” changed their opinion to “no to punishment” after reading, while a slightly higher percentage, 5.0%, changed from “no” to “yes”; 90% maintained “yes to punishment” in both items and 3.6% kept “no” to punishment in both items.

Justification

Continuing, the relationship between the item related to prior knowledge of IP on justification and the item related to justification after reading LU's case is analyzed.

Text only

Analysis revealed that after reading the text only there is a significant change in the opinion about the justification (p=0.001) from "yes" to "no". Indeed, 30.5% of participants who initially said "yes to justification" changed their opinion to "no to justification" after reading, while a lower percentage, 0.7%, changed from "no" to "yes"; 15.2% maintained "yes to justification" in both items and 53.6% kept "no" to justification in both items.

Cognitive data

Analysis revealed that after reading the text with cognitive data there is a significant change in the opinion about the justification (p=0.001) from "yes" to "no". Indeed, 41.5% of participants who initially said "yes to justification" changed their opinion to "no to justification" after reading, while a lower percentage, 1.4%, changed from "no" to "yes"; 2.1% maintained "yes to justification" in both items and 54.9% kept "no" to justification in both items.

Brain image

Analysis revealed that after reading the text with anatomical data there is a significant change in the opinion about the justification (p=0.001) from "yes" to "no". Indeed, 42.9% of participants who initially said "yes to justification" changed their opinion to "no to justification" after reading, while a lower percentage, 2.9%, changed from "no" to "yes"; 4.3% maintained "yes to justification" in both items and 50.0% kept "no" to justification in both items.

FO case (acquired pedophilia - tumor)

Punishment

The relationship between the item related to prior opinion of AP on punishment and the item related to punishment after reading the FO's case is analyzed.

Text only

Analysis revealed that after reading the text only there is a significant change in the opinion about the punishment (p=0.001) from "yes" to "no". 22.1% of participants who

initially said “yes to punishment” changed their opinion to “no to punishment” after reading, while a slightly lower percentage, 3.6%, changed from “no” to “yes”; 57.9% maintained “yes to punishment” in both items and 16.4% kept “no” to punishment in both items.

Cognitive data

Analysis revealed that after reading the text with cognitive data there is a significant change in the opinion about the punishment (p=0.001) from “yes” to “no”. Indeed, 28.5% of participants who initially said “yes to punishment” changed their opinion to “no to punishment” after reading, while a slightly lower percentage, 4.0%, changed from “no” to “yes”; 55.6% maintained “yes to punishment” in both items and 11.9% kept “no” to punishment in both items.

Brain image

Analysis revealed that after reading the text only there is a significant change in the opinion about the punishment (p=0.001) from “yes” to “no”. Indeed, 25.4% of participants who initially said “yes to punishment” changed their opinion to “no to punishment” after reading, while a lower percentage, 0.7%, changed from “no” to “yes”; 57.7% maintained “yes to punishment” in both items and 16.2% kept “no” to punishment in both items.

Justification

Subsequently, the relationship between the item related to prior knowledge of AP on justification and the item related to justification after reading the FO’s case is analyzed.

Text only

Analysis revealed that after reading the text only there is a significant change in the opinion about the justification (p=0.001) from “no” to “yes”. Indeed, 2.9% of participants who initially said “yes to justification” changed their opinion to “no to justification” after reading, while a higher percentage, 20%, changed from “no” to “yes”; 60.0% maintained “yes to justification” in both items and 17.1% kept “no” to justification in both items.

Cognitive data

Analysis revealed that after reading the text with cognitive data there is a significant change in the opinion about the justification (p=0.001) from “no” to “yes”. Indeed, 1.2% of participants who initially said “yes to justification” changed their opinion to “no to

justification" after reading, while 25.2%, changed from "no" to "yes"; 57.0% maintained "yes to justification" in both items and 16.6% kept "no" to justification in both items.

Brain image

Analysis revealed that after reading the text with the brain image there is a significant change in the opinion about the justification (p=0.001) from "no" to "yes". Indeed, 1.4% of participants who initially said "yes to justification" changed their opinion to "no to justification" after reading, while a higher percentage, 29.6%, changed from "no" to "yes"; 56.3% maintained "yes to justification" in both items and 12.7% kept "no" to justification in both items.

DA case (acquired pedophilia - lesion)

Punishment

The relationship between the item related to prior knowledge of AP on punishment and the item related to punishment after reading the DA case is analyzed.

Text only

Analysis revealed that after reading the text only there is a significant change in the opinion about the punishment (p=0.019) from "yes" to "no". 10.6% of participants who initially said "yes to punishment" changed their opinion to "no to punishment" after reading, while a slightly lower percentage, 2.8%, changed from "no" to "yes"; 72.5% maintained "yes to punishment" in both items and 14.1% kept "no" to punishment in both items.

Cognitive data

Analysis revealed that after reading the text with cognitive data there is a significant change in the opinion about the punishment (p=0.001) from "yes" to "no". Indeed, 21.4% of participants who initially said "yes to punishment" changed their opinion to "no to punishment" after reading, while a slightly lower percentage, 2.9%, changed from "no" to "yes"; 58.6% maintained "yes to punishment" in both items and 17.1% kept "no" to punishment in both items.

Brain image

Analysis revealed that after reading the text with anatomical data there is a significant change in the opinion about the punishment (p=0.001) from "yes" to "no". 19.2% of participants who initially said "yes to punishment" changed their opinion to "no to

punishment" after reading, while a slightly lower percentage, 4.6%, changed from "no" to "yes"; 64.9% maintained "yes to punishment" in both items and 11.4% kept "no" to punishment in both items.

Justification

Now the relationship between the item related to prior knowledge of AP on justification and the item related to justification after reading the DA case is analyzed.

Text only

Analysis revealed that after reading the text only there is a significant change in the opinion about the justification (p=0.001) from "no" to "yes". Indeed, 4.9% of participants who initially said "yes to justification" changed their opinion to "no to justification" after reading, while a higher percentage, 21.1%, changed from "no" to "yes"; 52.8% maintained "yes to justification" in both items and 21.1% kept "no" to justification in both items.

Cognitive data

Analysis revealed that after reading the text with cognitive data there is a significant change in the opinion about the justification (p=0.001) from "no" to "yes". Indeed, 3.6% of participants who initially said "yes to justification" changed their opinion to "no to justification" after reading, while a higher percentage, 22.9%, changed from "no" to "yes"; 59.3% maintained "yes to justification" in both items and 14.3% kept "no" to justification in both items.

Brain image

Analysis revealed that after reading the text with anatomical data there is a significant change in the opinion about the justification (p=0.001) from "no" to "yes". Indeed, 5.3% of participants who initially said "yes to justification" changed their opinion to "no to justification" after reading, while a higher percentage, 23.8%, changed from "no" to "yes"; 53.0% maintained "yes to justification" in both items and 17.9% kept "no" to justification in both items.

4.2.4 Metacognition

Concluding, it was explored whether people realized that neuropsychological information and anatomical information had an impact on their responses regarding punishment, the direction of the change from previous opinion about idiopathic and acquired pedophilia, as well as the way participants replied to the items regarding punishement. Participants were divided into two groups: one group included participants who believed that cognitive or brain imaging data influenced their opinion on the case; while the second group included participants who believed that cognitive or brain imaging data did not influence their opinion on the case.

Final question about cognitive data

Taking into consideration IP, among participants (305) who believed that the presence of cognitive data impacted on their opinion on the case there is a significant change (p=0.001) from those who switched from “yes to punishment” in the preliminary item on punishment to “no to punishment” after reading the case. In particular, 26.6% changed from “yes” to “no” and 3.3% from “no” to “yes”.

Taking into consideration IP, among participants (128) who did not believe that the presence of cognitive data impacted on their opinion on the case there is a significant change (p=0.027) from those who switched from “yes to punishment” in the preliminary item on punishment to “no to punishment” after reading the case. In particular, 12.5% changed from “yes” to “no” and 3.9% from “no” to “yes”.

Considering AP, among participants (305) who believed that the presence of cognitive data impacted on their opinion on the case there is a significant change (p=0.001) from those who switched from “yes to punishment” in the preliminary item on punishment to “no to punishment” after reading the case. In particular, 19.7% changed from “yes” to “no” and 7.5% from “no” to “yes”.

Considering AP, among participants (128) who did not believe that the presence of cognitive data impacted on their opinion on the case there is not a significant change (p=0.523). 10.2% changed from “yes” to “no” and 7.0% from “no” to “yes”.

Final question about anatomical data

Taking into consideration IP, among participants (143) who believed that the presence of anatomical data impacted on their opinion on the case there is a significant change (p=0.001) from those who switched from “yes to punishment” in the preliminary item on punishment to “no to punishment” after reading the case. In particular, 37.8% changed from “yes” to “no” and 4.2% from “no” to “yes”.

Taking into consideration IP, among participants (290) who did not believe that the presence of anatomical data impacted on their opinion on the case there is a significant change (p=0.001) from those who switched from “yes to punishment” in the preliminary item on punishment to “no to punishment” after reading the case. In particular, 12.1% changed from “yes” to “no” and 2.1% from “no” to “yes”.

Taking into consideration AP, among participants (143) who believed that the presence of anatomical data impacted on their opinion on the case there is a significant change (p=0.001) from those who switched from “yes to punishment” in the preliminary item on punishment to “no to punishment” after reading the case. In particular, 26.6% changed from “yes” to “no” and 7.7% from “no” to “yes”.

Taking into consideration AP, among participants (290) who did not believe that the presence of anatomical data impacted on their opinion on the case there is not a significant change (p=0.243). 9.7% changed from “yes” to “no” and 6.6% from “no” to “yes”.

Chapter 5. Discussion

5.1 What the results revealed

The aim of the present study was twofold. Firstly, it aimed at investigating public opinion regarding idiopathic and acquired pedophilia; then, whether providing medical/scientific information, such as brain images and neuropsychological information, to frame a forensic case of either idiopathic or acquired pedophilia would modulate one's opinion about justifiability and juridicial punishment. The study hypothesized that individuals with acquired pedophilia could be considered less punishable and more justifiable than individuals with idiopathic pedophilia. As for cognitive and neuroanatomical data, it was expected a modulatory effect for acquired pedophilia cases toward greater justifiability and less punishment, while an effect of the typology of information was not expected.

Results allowed to draw four main considerations:

1. the opinion about acquired pedophilia and idiopathic pedophilia is different regardless of the data presented, supporting the a priori hypothesis;
2. the presence of cognitive and anatomical data do not impact in a relevant way the opinion about cases, and no differences between the presence of cognitive and anatomical data emerged;
3. despite the a priori opinion on idiopathic and acquired pedophilia, participants are willing to adapt their opinion to each case presented;
4. participants have a good metacognition: they are aware of the impact that cognitive and imaging data had on their opinion.

5.1.1 Differences on the opinion about the two different forms of pedophilia

As said in the first chapter, evidences let to consider idiopathic and acquired pedophilia as two distinct disorders: in fact, they differ in the modus operandi, in the aetiology, in the neural basis, and also in the legal consequences. These differences appeared to be perceived by participants; indeed, they provided different answers about the treatment, the justification and the punishment depending on the case presented, seemingly understanding that in presence of a neurological condition, the case regarded acquired pedophilia. It is also worth noting that even in the absence of any cognitive or neuroimaging information, participants were more prone to justify the case of acquired

pedophilia more than the case of idiopathic pedophilia. It is plausible to speculate that empathy played a role, as the two cases of acquired pedophilia described two severe and tragic conditions (brain tumor, and post-surgical lesion), particularly the brain tumor.

5.1.2 The impact of cognitive or anatomical data

The addition of cognitive and anatomical data did not have a relevant impact on the opinion of participants about cases, suggesting that framing the cases with enriched information did not modulate one's opinion, but rather allowed a better understanding of them.

Particularly, regarding acquired pedophilia's cases, neuropsychological and imaging data showed no statistically significant influence on opinions related to either justification, punishment or treatment.

To note, the percentage of participants who tend to justify the defendant, not to punish him and support him with treatment is high in all of the versions (text only, cognitive data, brain image). In particular, for the first case of acquired pedophilia (FO case) around 80% of participants choose to consider the defendant justifiable from a legal standpoint, approximately 40% agreed not to legally punish the defendant for his behavior, and around 90% choose for a therapeutic treatment. In the second case of acquired pedophilia (DA case), around 78% of participants choose to consider the defendant justifiable from a legal standpoint, approximately 30% agreed not to legally punish the defendant for his behavior, and around 88% choose for a therapeutic treatment.

On the contrary, for idiopathic pedophilia's case the percentages are low. Regarding the LU case, approximately 10% choose to consider the defendant justifiable from a legal standpoint, around 3% agreed not to legally punish the defendant for his behavior, and 30% choose for a therapeutic treatment.

It is worth noting that, for idiopathic pedophilia, there is an effect of additional information on justification, as the description of the neuropsychological status or the presentation of brain images led to a further decrease in the percentage regarding legal justification. As for punishment, no variation in percentages is appreciable; this is explainable in light of a ceiling effect, in that participants strongly toward legal punishment. Indeed, the ceiling effect represents a type of attenuation effect appreciable when a high proportion of subjects gives the same answer on the observed variable.

Moreover, an effect of information on treatment is detectable, as the addition of information regarding the neuropsychological status and brain imaging reduces the percentage of participants choosing to provide therapeutic treatment. This last result could be interpreted as a tendency to hesitate in providing treatment to an individual whose cognitive status and brain imaging appears to be normal.

These results are in line with the present study's hypothesis, as for idiopathic pedophilia less people tend to justify the defendant, with a stronger agreement toward punishment, compared to acquired pedophilia, for which people are more prone to legally justify the defendant, and less to punish him.

The finding that cognitive and anatomical data acted as mitigating factors are in line with Greene and Cahil's (2012) study's results, that showed that both neuropsychological test results and neuroimages acted as mitigating effects on jurors' impressions of the defendant, who appeared as more sympathetic and less likely to control his behavior. In the present study, additional information allowed participants to better understand the cases, and the different impact that acquired and idiopathic pedophilia have on one's behavior. Indeed, as McCabe and Castel (2008) concluded, brain images provide a tangible explanation of hidden structures; it is safe to further comment that neuropsychological information covers a similar role, providing a tangible explanation of the cognitive processes underlying the behavior.

The current results are in contrast with the conclusions of Weisberg, Keil, Goodstein, Rawson and Gray, in "The Seductive Allure of Neuroscience Explanations" (2008). In fact, they claimed that, according to their results, neuroscientific information leads non-expert participants to not consider the logic of explanations, considering less critically "bad explanations" when coupled with neuroscientific information, compared to the equally bad information with no technical scientific information. On the other hand, results showed that experts in the neuroscientific field rated the bad explanations the same way regardless of the presence of neuroscientific information. Thus, they conclude that while experts, who understand scientific data and in turn are not affected by them, are able to judge an information regardless of the supposed soundness, the non-experts are "manipulated" by the effect of neuroscientific data, which interfere with their ability to judge.

The divergence between the present results and Weisberg et al. (2008) is explained by the fact that, for the present study, only simple and comprehensible neuropsychological information was used, as well as brain images which clearly pointed out the tumor and the lesion, in order to avoid confusion in the participants. In fact, participants did not need to know the physical principles of magnetic resonance imaging (MRI) or brain's anatomy; they just had to observe a clearly evident mass/lesion in the brain.

As already stated, neuropsychological data and brain images acted as mitigating factors. To cite Garvey (1998): "mitigating factors refer to evidence that reduces a defendant's moral culpability due to factors beyond one's control such as mental retardation, youthfulness, and history of mental illness, and to factors that are seemingly within an offender's control such as drug or alcohol addiction and intoxication and duress exerted by a co-defendant". This is in line with the hypothesis of the present study; in fact, acquired pedophilia generally manifests from a neurological condition that leads to consequences that are not within one's control. The addition of neuropsychological information and brain images should help people understand this concept and better conceptualize the acquired behavior.

In addition, Schweitzer et al. (2011) investigated whether neuroimaging evidence could unfairly influence jurors. In four experiments, a representative sample of 1,476 jury-eligible participants evaluated written summaries of criminal cases where expert testimony was offered in support of an exculpatory mental disorder. The degree to which neuroscientific justifications and neuroimaging were provided in support of the expert's findings varied across the testimony. The authors found no evidence that neuroimaging affected jurors' judgments (verdicts, sentence recommendations, judgments of the defendant's culpability) over and above verbal neuroscience-based testimony. Furthermore, they confirmed their findings by performing a meta-analysis of the four experiments. Even though neuroscientific evidence appeared to be more effective than clinical psychological evidence in persuading jurors that the defendant's disorder reduced his ability to control his actions, this effect did not translate into differences in verdicts. The authors state that, despite concerns that neuroimaging evidence could unduly influence jury, and by extension, for the present study, public opinion, the aim of providing clinical, scientific information is to allow the perceiver to better comprehend

the target information, and not to manipulate their opinion. This is possible only through responsible, accurate and effective scientific data communication.

5.1.3 Adaptation of opinion to each case presented

As said previously, the changes of opinion regarding justification, punishment and treatment before and after reading the case are statistically significant. For acquired pedophilia, around 30% of participants changed their opinion after reading the enriched versions (i.e., cognitive and neuroanatomical data).

Again, a mitigating effect is appreciable: the added information helped participants better comprehend the cases. The changes of opinions went toward more legal justificationism, less punishment and greater proneness to treatment for acquired pedophilic individuals; while it went in the exact opposite direction for idiopathic pedophilia's case. Thus, what emerges is that participants clearly understood the distinction between idiopathic and acquired peodphilia and the different cognitive/behavioral implications that the two conditions entail, and therefore be willing to change their opinion.

5.1.4 Regarding metacognition

Participants showed to have good metacognition. Indeed, they were able to acknowledge whether the enriched information did or did not influence their response. In fact, they themselves admitted if the added data altered their opinion.

5.2 Final considerations

5.2.1 Limitations

This study is not free from limitations. Regarding the brain images used, due to the scarce availability of MRI of individuals with acquired pedophilia, it was not possible to choose images of the same neurological condition, in a similar anatomical location. Evenmore, while FO's MRI was presented in all three planes (i.e., sagittal, coronal and axial), only the axial plane was available for DA. It would be appropriate to include more consistent images in future studies of this kind.

For what concerns the sample, participants were not experts in the field of neuroscience. Although the sample was homogeneous in terms of prior opinion about pedophilia, it

would be interesting to observe a less heterogeneous sample in terms of academic and professional background. A possible enhancement would be to also include an expert group to be tested for similarity in their ability to evaluate the reasonableness of scientific claims.

5.2.2 Strengths

Strength of this study is that the three versione provided within a survey showed homogeneity of content, despite describing three different forensic cases. In fact, different contents could have influenced the results.

Moreover, the enriched data was consistent with the forensic case; that is, additional information actually belonged to the defendant, differentiating this study from those available in the literature, which adopted plausible but fictitious additional information.

5.2.3 Future investigation and implications

Future research could involve neuroscientific experts to compare the present results in order to verify the truthfulness and generalizability of this survey's outcome. It is then recommended to educate individuals who are not experts in the neuroscientific field, with the aim to allow them to acknowledge the impact that disorders, such as acquired pedophilia, have on people.

Further investigations should pursue a replication of the present study involving lawyers and jurors, in order to test whether cognitive and anatomical data help them better understand and conceptualize the case of object. It is of uttermost importance to know which information is essential in order to provide legal experts a transdiagnostic, clear, responsible framing of the cognitive/behavioral condition they are judging.

5.2.4 Conclusions

In conclusion, to answer the question "*is public opinion influenced by anatomical or cognitive data?"*, the current investigation suggests that neuropsychological and anatomical data do not create a bias effect on people's opinion. Rather, this type of information influence public opinion in the sense that permit people to reach a deeper understanding about the topic of interest.

It appears from the results that providing the reader with neurpsychological and neuroanatomical data to better conceptualize a case could be useful to mitigate the perception of a complex, delicate topic such that of pedophilia, framing the *actus reus* as consequence of a complex condition that leads to consequences that are not within one's control, strongly affecting one's behavior and ability to inhibit preponderant responses.

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Appendix

Caso LU

Text only

A 45-year-old man (LU) who led a life that would never give rise to suspicion was charged with sexual assault of a minor and production of child pornography. LU was the president of a cultural association which was involved in annual projects for children and adolescents. LU allegedly committed the crimes against two minors who were members of his association. Investigating the content of Whatsapp, Facebook and Instagram chats, the police discovered that LU had engaged in sexually explicit relationships with underage girls. Thanks to the chats, the investigators were also able to reconstruct his modus operandi. First he won the trust of the girls through flattery and inappropriate compliments, then he took advantage of this trust by inducing them to perform sexual acts. In fact, in several circumstances, the verbal approaches became physical, with groping of the girls' private parts, while they were in the association's gymnasium. In addition, on another occasion, LU allegedly made his flat available to two underage members of the association, allowing them to use it for sexual intercourse. LU had hidden micro-cameras in the bedroom in order to film the sexual act, thus producing child pornography. Huge amounts of pornographic material and sadomasochistic objects were found in LU's house. The testimonies of the victims were decisive to start suspecting LU and to start investigating him. After the investigation had started, LU went to a neurologist complaining of headaches. The doctor, for scrupulousness, makes him perform a brain MRI, which does not show any anomaly.

Cognitive data

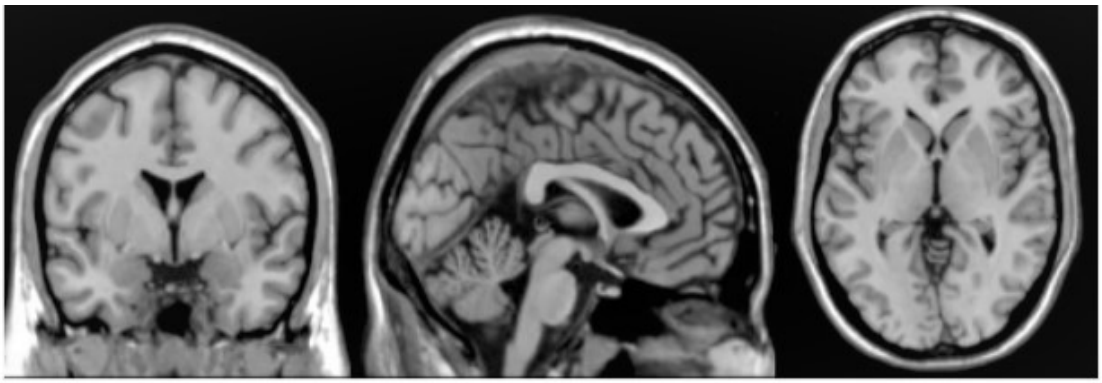
A 45-year-old man (LU) who led a life that would never give rise to suspicion was charged with sexual assault of a minor and production of child pornography. LU was the president of a cultural association which was involved in annual projects for children and adolescents. LU allegedly committed the offenses against two minors who were members of his association. Investigating the content of Whatsapp, Facebook and Instagram chats, the police discovered that LU had engaged in sexually explicit relationships with underage girls. Thanks to the chats, the investigators were also able to reconstruct his

modus operandi. **Everything was well planned down to the smallest detail**: first he won the trust of the girls through flattery and inappropriate compliments, then he took advantage of this trust by inducing them to perform sexual acts. In fact, in several circumstances, the verbal approaches became physical, with groping of the girls' private parts, while they were in the association's gymnasium. In addition, on another occasion, LU is alleged to have **deceitfully** made his flat available to two underage members of the association, allowing them to use it for sexual intercourse. LU had hidden micro-cameras in the bedroom to film the sexual act **without their knowledge**, thus producing child pornography. Huge amounts of pornographic material and sadomasochistic objects were found in LU's home. **LU was never discovered because he blackmailed his victims and threatened them with repercussions in their lives if they tried to tell anyone else what had happened**. In fact, no one ever had any suspicions, and it was only after one of the victims found the courage to speak out that the victims' testimonies were decisive in beginning to suspect LU and start investigating him. **The victims tell how they initially trusted him completely and how LU took advantage of their weaknesses**. After the investigation has started, LU goes to a neurologist complaining of headaches. The doctor has him undergo a cerebral magnetic resonance imaging (MRI) scan, which shows no abnormalities. **The doctor also recommended a formal neuropsychological evaluation**. **The neuropsychologist reports that LU's ability to inhibit the impulse is normal**.

Brain image

A 45-year-old man (LU) who led a life that would never give rise to suspicion was charged with sexual assault of a minor and production of child pornography. LU was the president of a cultural association which was involved in annual projects for children and adolescents. LU allegedly committed the crimes against two minors who were members of his association. Investigating the content of Whatsapp, Facebook and Instagram chats, the police discovered that LU had engaged in sexually explicit relationships with underage girls. Thanks to the chats, the investigators were also able to reconstruct his modus operandi. First he won the trust of the girls through flattery and inappropriate compliments, then he took advantage of this trust by inducing them to perform sexual

acts. In fact, in several circumstances, the verbal approaches became physical, with groping of the girls' private parts, while they were in the association's gymnasium. In addition, on another occasion, LU allegedly made his flat available to two underage members of the association, allowing them to use it for sexual intercourse. LU had hidden micro-cameras in the bedroom in order to film the sexual act, thus producing child pornography. Huge amounts of pornographic material and sadomasochistic objects were found in LU's house. The testimonies of the victims were decisive to start suspecting LU and to start investigating him. After the investigation had started, LU went to a neurologist complaining of headaches. The doctor, for scrupulousness, makes him perform a brain MRI, which does not show any anomaly.



On the left, LU's brain seen from the front (coronal view); in the middle, LU's brain seen from the side (sagittal view); on the right, LU's brain seen from above (axial view). No abnormalities are evident.

Caso FO

Text only

A 40-year-old man (FO) in an apparently normal state of health suddenly developed an increased interest in child pornography, an interest he had never had before. This led him to visit numerous child pornography sites.Shortly afterwards, FO started making sexual advances on his eight-year-old stepdaughter, even touching her private parts. This behavior occurred even when the child's mother was at home. FO's companion learned of these behaviors, which were told to her by her daughter, who was not encouraged by FO to remain silent. As a result of these incidents, the man was removed from the home. He was referred to a specialist who diagnosed him as a paedophile and prescribed treatment with medroxyprogesterone, a drug that reduces testosterone levels in the blood and thus reduces sexual libido. At the same time, the man was charged with child sexual abuse and ordered to start a rehabilitation programme. Despite ongoing criminal proceedings, FO is unable to modulate his behaviour and, for example, begins making sexual advances to other young patients in the rehabilitation centre in the presence of medical staff, from which he is consequently expelled. FO is sorry but cannot behave differently. Shortly after being expelled, FO was rushed to hospital with a severe headache related to balance problems. A neurological consultation and an MRI scan of the brain were requested. The MRI revealed the presence of a malignant tumor (astrocytoma) in the frontal lobe, and in particular in the orbitofrontal cortex. After the surgical removal of the tumour all the patient's symptoms disappeared and FO was no longer attracted to paedo-pornographic sites or made sexual advances. He returns home and resumes the life he had before the tumor appeared.

Cognitive data

A forty-year-old man (FO) in apparent normal health suddenly developed an increased interest in child pornography, an interest he had never had before and **which he describes as overwhelming**. This led him to visit numerous child pornography sites. Shortly afterwards, FO started making sexual advances on his eight-year-old stepdaughter, even touching her private parts. This behavior occurred even when the child's mother was at home. FO's companion learned of these behaviors, which were told to her by her daughter, who was not encouraged by FO to remain silent. **FO had gone**

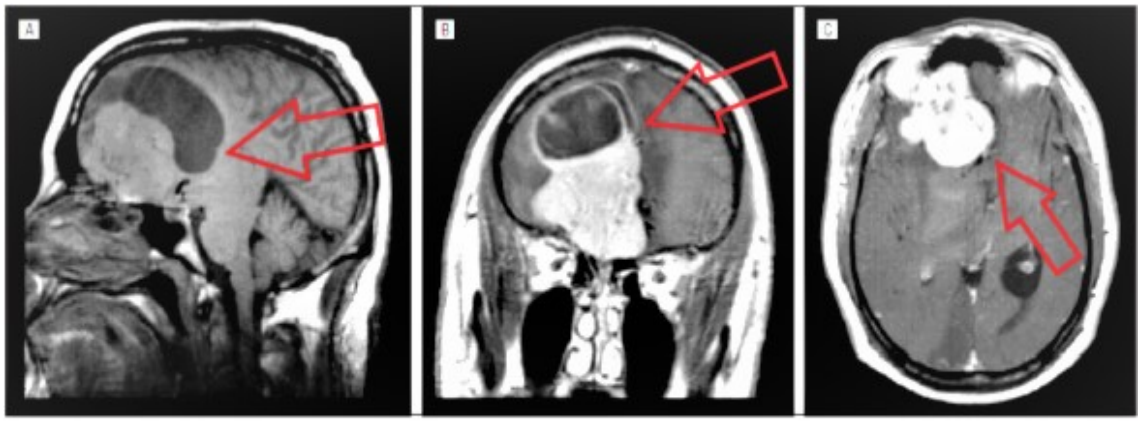
to great lengths to conceal his activities because he considers them unacceptable. **Yet**, **despite this**, **he could not inhibit his sexual urges in any way**. As a result of these incidents, the man was removed from his home and referred to a specialist, who diagnosed him as a paedophile and prescribed treatment with medroxyprogesterone, a drug that reduces testosterone levels in the blood and thus reduces sexual libido. At the same time, the man was charged with child sexual abuse and ordered to start a rehabilitation programme. Despite ongoing criminal proceedings, FO is unable to modulate his behaviour and, for example, begins making sexual advances to other young patients in the rehabilitation centre in the presence of medical staff, from which he is consequently expelled. FO is sorry but cannot behave differently.

When questioned about his behavior, **FO stated that he was unable to inhibit his sexual urges in any way**, **even though he was aware of the moral and legal invalidity of his actions**. Shortly after expulsion, FO was rushed to hospital with a severe headache related to balance problems. A neurological consultation and an MRI scan of the brain were requested. **The formal neuropsychological examination reveals a significant alteration in the ability to control impulses and an inability to inhibit the preponderant response**. MRI revealed the presence of a malignant tumor (astrocytoma) in the frontal lobe, and in particular in the orbitofrontal cortex. After the surgical removal of the tumour all the patient's symptoms disappeared and FO was no longer attracted to paedo-pornographic sites or made sexual advances. He returns home and resumes the life he had before the tumor appeared.

Brain image

A 40-year-old man (FO) in an apparently normal state of health suddenly developed an increased interest in child pornography, an interest he had never had before. This led him to visit numerous child pornography sites.Shortly afterwards, FO started making sexual advances on his eight-year-old stepdaughter, even touching her private parts. This behavior occurred even when the child's mother was at home. FO's companion learned of these behaviors, which were told to her by her daughter, who was not encouraged by FO to remain silent. As a result of these incidents, the man was removed from the home. He was referred to a specialist who diagnosed him as a

paedophile and prescribed treatment with medroxyprogesterone, a drug that reduces testosterone levels in the blood and thus reduces sexual libido. At the same time, the man was charged with child sexual abuse and ordered to start a rehabilitation programme. Despite ongoing criminal proceedings, FO is unable to modulate his behaviour and, for example, begins making sexual advances to other young patients in the rehabilitation centre in the presence of medical staff, from which he is consequently expelled. FO is sorry but cannot behave differently. Shortly after being expelled, FO was rushed to hospital with a severe headache related to balance problems. A neurological consultation and an MRI scan of the brain were requested. The MRI revealed the presence of a malignant tumor (astrocytoma) in the frontal lobe, and in particular in the orbitofrontal cortex. After the surgical removal of the tumour all the patient's symptoms disappeared and FO was no longer attracted to paedo-pornographic sites or made sexual advances. He returns home and resumes the life he had before the tumor appeared.



A: brain seen from the side (sagittal view); B: brain seen from the front (coronal view), C: brain seen from above (axial view).

Caso DA

Text only

A 50-year-old man (DA), a renowned paediatrician, is accused of paedophilia because he was caught by a teacher engaging in inappropriate sexual behaviour consisting of mutual touching of a girl's private parts during a visit to his office, because he had left the door open. DA has been a pediatrician for more than 20 years and has always been a highly regarded and esteemed pediatrician by the families of his patients; in fact everyone is amazed by this fact. DA is accused of sexually abusing a child and the police start investigating, although it does not seem that such an incident has ever occurred in the past. At the time of the arrest, DA calls his secretary and tells her to cancel the appointments for that day, but to leave the appointments for the next day unchanged. After the investigation had begun, DA's wife was questioned and reported that two months earlier DA had undergone brain surgery in an attempt to treat a particularly aggressive form of epilepsy. Since then, his wife says, DA has been exhibiting strange behavior. Despite being under investigation, DA was taken to his primary care neurologist for his post-operation check-up. The neurologist performs a follow-up encephalic MRI that reveals a surgical lesion in the hippocampus-amygdala complex in DA's brain.

Cognitive data

A 50 year old man (DA), a well-known paediatrician, is accused of paedophilia because he was caught by a teacher engaging in inappropriate sexual behaviour consisting of mutual touching in the intimate areas of a little girl during a visit to her office, since she had left the door open. When questioned about this, **DA stated that he found nothing inappropriate in the behavior**. DA has been a pediatrician for more than 20 years and has always been highly regarded by his patients' families.DA is accused of sexually abusing a child and the police start investigating, although it does not seem that such an incident has ever occurred in the past. At the time of his arrest, DA calls his secretary and tells her to cancel his appointments for that day, but to leave those for the next day unchanged, **showing that he does not understand the seriousness of his behavior**, **the moral and social disvalue and the legal consequences that will follow**. After the investigation had begun, DA's wife was questioned and reported that two months earlier DA had undergone brain surgery in an attempt to treat a particularly

aggressive form of epilepsy. Since then, the wife says, DA has been displaying strange behavior. **According to his wife's account**, **DA had recently become easily irritated and seemed at times to act without thinking too much**. **She recounts incidents that had taken place in the previous weeks**: **during a trip DA had stolen postcards from the displays in some museum shops and one night**, **he had searched for paedo-pornographic sites on the web**, **without worrying about being discovered by his wife**. **These events had never happened before**. Despite being under investigation, DA is taken to his primary neurologist for his post-operation check-up. The neurologist performs a follow-up encephalic MRI scan which reveals a surgical lesion in the hippocampus-amygdala complex in DA's brain. **Given the symptoms and modus operandi**, **the neurologist suggested a neuropsychological assessment**, **which revealed an inability to control his impulses**, **as well as a deficit in moral reasoning**: **on a very simple test such as assessing the appropriateness of behaviors such as walking around naked in the street**, **DA showed difficulty in understanding which behavior was socially appropriate and which was not**, **he showed difficulty in understanding the consequences of actions and the social and moral disvalue of inappropriate behavior**.

Brain image

A 50 year old man (DA), a renowned paediatrician, is accused of paedophilia because he was caught by a teacher engaging in inappropriate sexual behaviour consisting of mutual touching in the private areas of a little girl during a visit to his office, because she had left the door open. DA has been a pediatrician for more than 20 years and has always been a highly regarded and respected pediatrician by the families of his patients. DA is accused of sexually abusing a child and the police start investigating, although it does not seem that such an incident has ever occurred in the past. At the time of the arrest, DA calls his secretary and tells her to cancel the appointments for that day, but to leave the appointments for the next day unchanged. After the investigation had begun, DA's wife was questioned and reported that two months earlier DA had undergone brain surgery in an attempt to treat a particularly aggressive form of epilepsy. Since then, his wife says, DA has been exhibiting strange behavior. Despite being under investigation, DA was

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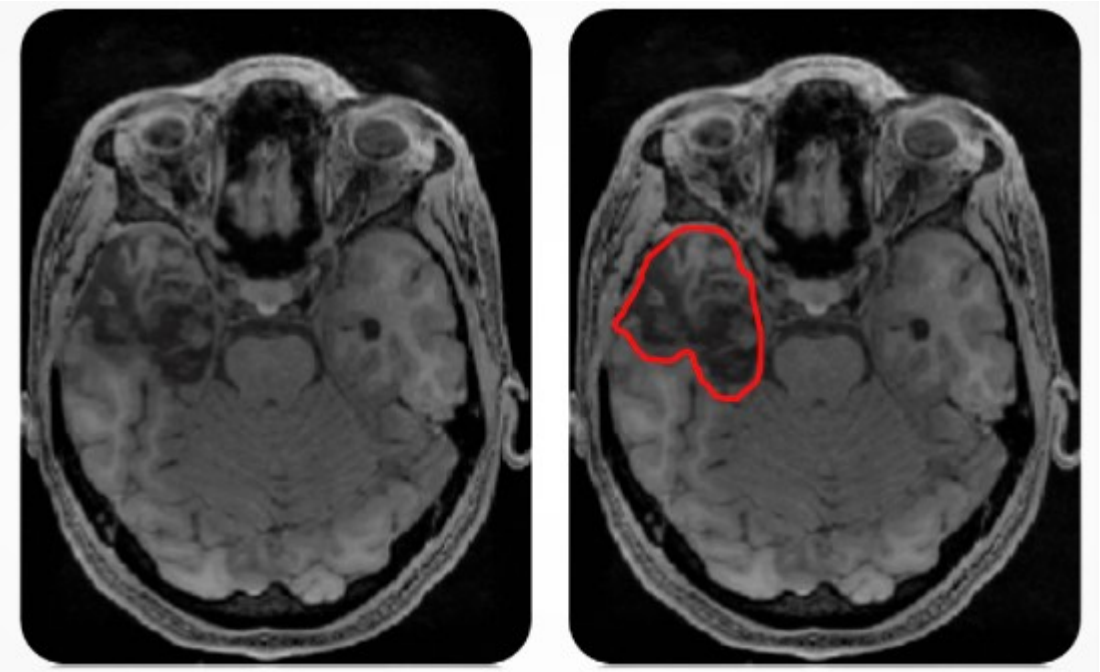

On the left, DA's brain seen from above (axial view). On the right the same brain, but in addition the lesion is circled in red to be highlighted.