AN ANALYSIS OF IMPLICATIONS OF NEURO-SCIENCES ON AMERICAN AND INDIAN JUVENILE JUSTICE SYSTEMS

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Abstract

Recent advances in neuroscience research have immensely contributed in reshaping the juvenile justice system in America. Neuroscience research initiated mainly by medical professionals as a part of their health service duty, aided by new technologies, came up with profound findings. These findings have far-reaching ramifications that are beyond the medical science domain. They significantly affect understanding of crime causation and sentencing that are hitherto grounded in centuries-old traditional principles. American academicians are overwhelmingly banking on such research findings to press for a different approach towards juveniles in conflict with law. These developments are echoing in the latest legislations and judicial decisions in transnational jurisdictions. The American judiciary is increasingly supplementing neuroscience research findings in their decisions which invariably turn the scales of justice in the opposite direction. However, much of the neuroscience, as a path breaking in juvenile justice, is reflected in American Juvenile Justice System than in the Indian Juvenile Justice System. This paper attempts to appraise the impact of neuroscience on the substantive provisions of the juvenile justice system of America and distils out lessons to be learnt for bringing changes in the Indian Juvenile system. Besides, it is addressing a larger question of how far neurosciences will guide us in policy-making and delivering justice to adolescent delinquents.

I Introduction

CHILDHOOD IS designated as a "*golden age*" in the whole life span of human beings. It is associated with joy, freedom, innocence and non-accountability. It is a stage with the power to convince others to get the desired but with no responsibility. It is infested with gullibility and credulity. This makes children vulnerable to vicious influences and emboldens them to take risks. These tendencies in children are associated with their immaturity and lack of understanding about the consequences of their omissions or commissions. This is the primary reason that law does not attach any importance to their acts in their early childhood. They are considered *doli incapex,* which makes them immune to criminal liability across jurisdictions but once childhood lapses, law attaches responsibility for their acts done without making any further difference in age.

The latest scientific and psychological studies reveal that adolescence is a different ephemeral period from childhood and adulthood characterised by increased experimentation and risk-taking. Adolescents are less mature and rational and hence discount long-term consequences. Further, adolescents are likely influenced by peer

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pressure and other social influences. Of all the age groups, adolescents are highly susceptible to external forces. "An essential feature of adolescence is developing an integrated sense of self, including individualisation, separation from parents, and personal identity. Experimentation and novelty-seeking behaviour, such as alcohol and drug use, unsafe sex, and reckless driving, are thought to serve a number of adaptive functions despite their risks".[1]

The courts have also accepted the latest neuroscientific research and psychological revelation about adolescents and received such research for treating juveniles differently than adults. The courts have pointed out three different characteristics of youths from adults-(i) "immature and impetus decision making with little regard for consequences, (ii) vulnerability to external coercions (particularly by peers), and (iii) unformed character- which make it difficult to judge an adolescent's crime as irretrievably depraved."[2] The brain images using the latest technologies like Positron Emission Tomography (PET scan), functional magnetic resonance imaging (fMRI), Diffusion Tensor Imaging (DTI); and the role of the amygdale and prefrontal cortex; and synaptic pruning and myelinations of neurons have brought forth that adolescent maturity develops until the early twenties. From a psychological perspective, the general propensity of adolescents is that they are risk takers, and criminal activity is a specific instance of this general inclination. Most juvenile crimes are impulsive in character and are committed without full consideration of their possible long-term consequences by the adolescents.[3]

Most studies have found that "youth in their early twenties are more likely to engage in risky behaviour; most forms of risk-taking- follow an inverted U-shaped curve with age, increasing between childhood and adolescence, peaking in either mid or late adolescence and declining thereafter".[4] The risk-taking behaviour of an adolescent is inversely proportionate to increasing age. As the age passes by, the immaturity of an adolescent lapses into maturity." This developmental pattern is explained by the 'dual systems model', which posits that risk-taking is determined by the interaction of brain systems underlying reward-seeking and self-regulation across multiple developmental stages and cultures".[5]

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1 *Reforming Juvenile Justice: A Developmental Approach*; National Academies of Sciences, Engineering, and Medicine, 2013; Washington, DC: The National Academies Press; available at: https://nap.nationalacademies.org/read/14685/chapter/6 (last visited on Dec. 20, 2022).

2 Elizabeth Scott et al; *Juvenile Sentencing Reform in a Constitutional Framework*; 88, No. 4, 682 (Summer 2016); *available at*: https://www.templelawreview.org/article/juvenile-sentencing-reform-in-a-constitutional-framework/(last visited on Dec. 10, 2022).

3 *Ibid*.

4 Elteto,N. and Janacsek, K., *et. al., Do adolescents take more risks? Not when facing a novel uncertain situation,* P.2*, available at*: https://www.biorxiv.org/content/10.1101/206128v2.full.pdf retrieved on 06.07.2022 (last visited on Dec. 10, 2022).

5 *Ibid*.

The above findings have dramatically impacted the discourse on the juvenile justice system. Not only in courts, but neurosciences have found their space in the legislation called" neuro-laws." The United States Supreme Court has delivered a catena of judgments after *Roper* to extend full constitutional protection to juvenile delinquents[6] and declared the death penalty[7] and life without parole in non-homicide[8] and homicide cases[9] unconstitutional.

The Development Model of Juvenile Justice[10] pioneered by *Scot and Steinberg* also finds its psychological and philosophical reasoning in the latest neuroscientific studies regarding brain images of adolescents. These scientific developments have changed the landscape of the juvenile justice system and adult criminal justice system. The American policy makers and courts have overwhelmingly adopted these scientific developments in restructuring the criminal and juvenile justice systems. More impact is seen on the juvenile justice system than on the criminal justice system. The Indian Juvenile Justice System is no more indifferent to these developments. Different treatment of juvenile delinquents involved in heinous offences as envisaged under section 15 of Juvenile Justice (Care & Protection of Children) Act, 2015 is much a reflection of the development model of juvenile justice. Neuroscience isstill in its infancy stage, and it will take some more time to properly weigh its pros and cons before it is introduced in criminal jurisprudence with full vigour. In the near future, more neuroscientific studies may unfold many new findings with great firmness that will have a profound impact on juvenile justice.

II Development of American and Indian juvenile justice system-A brief appraisal

The juvenile justice system has been influenced mainly by the ideas and thought processes of conservative and liberal blocks. Both have failed to draw a consensus on a particular model. Conservatives are pleading for a crime control model and liberals for rehabilitation and due process models. These models have dominated the juvenile

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6 *Miranda* v. *Arizona, 384* U.S. 436 (1966), *Kent v. United States, 383 U.S. 541 (1966), In re Gault 387* U.S. 1 (1967), *In re Winship (397 U.S. 358 (1970), Mckeiver v. Pennsylvania 403* U.S. 528 (1971), *Breed* v. *Jones 421* U.S. 519 (1975).

7 *Roper* v. *Simons,* 543 U. S. (2005), *available at*: https://www.supremecourt.gov/opinions/04pdf/03-633.pdf , (last visited on Dec. 10, 2022). , The Supreme Court held that the "Eighth and Fourteen Amendments forbid imposition of the death penalty on offenders who were under the age of 18 when their crimes were committed.

8 *Graham* v. *Florida,*560 U. S. (2010), *available at:* https://www.supremecourt.gov/opinions/09pdf/08-7412.pdf, (last visited on Dec. 10, 2022).

9 *Miller* v. *Alabama*, 567 U. S. (2012), *available at:* https://www.supremecourt.gov/opinions/11pdf/10-9646g2i8.pdf (last visited on Dec. 10, 2022).

10 Elizabeth S. Scott and L. Steinberg; *Rethinking Juvenile Justice* 223 (Harvard University Press, 2008).

justice philosophy. The philosophical premises of juvenile justice systems are diverse. The theoretical foundation started with the "welfare model" and the "justice model", more recently shifted to new models like the "participatory model", the "modified justice model", the "crime control model", the "corporatist model", the "minimum intervention model", the "restorative justice model", the "neo-correctionalist model"[11] and the "developmental model".[12] The impact of these models is such that it is almost impossible to make clear categorisation of juvenile justice systems on the basis of these models. Even where "welfare" and "justice" models are taken as "the classical models for distinction, in practice, these two models have also to a great extent become mixed over the years in many countries around the world due to developmental processes, making it almost impossible to identify either a pure "welfare model" or a pure "justice model" in any one State.".[13]

The philosophical premises of the American Juvenile Justice System are much more fascinating than any other juvenile system in the world. It is flexible, amenable and adoptive, and comprehensive in its ambit. Probably, it is the only system which can be likened to a chameleon as it has changed substantially in each era. The shifts and drifts in the philosophical premises of the American Juvenile Justice System are much more prominent. However, it is difficult to pinpoint when the particular philosophical shifts occur because the process is typically gradual.[14] The American Juvenile Justice System has adopted several models.[15] Civil Society, media, academicians, scientific advancement, and the judiciary have played a prominent role in developing and highlighting new approaches to handling juvenile delinquency. In comparison, the juvenile justice system in India has grown mainly due to recommendations of various committees, international developments, judicial pronouncements and, of course, of late, media and public pressure. The Indian Juvenile Justice System can safely be concluded as still in the evolutionary phase as it is akin to the European Juvenile Justice System, if not in theory, but certainly in practice. The Indian Juvenile Justice System marked its presence

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11 Pruin, I., *"The scope of juvenile justice in Europe",* in: Dünkel, F., Grzywa, J., Horsfield, P. and Pruin, I. (eds.), 4 *Juvenile Justice Systems in Europe* 1546-1547 (2nd edn., Forum Verlag Godesberg: Mönchengladbach, 2011), as quoted in *Justice in Matters Involving Children in Conflict with the Law: Model Law on Juvenile Justice and Related Commentary*, United Nations Office On Drugs And Crime Vienna, United Nations, 2013 *available at*: Front and back cover. indd (unodc.org) (last visited on Dec. 10, 2022).

12 Developmental Model of Juvenile Justice is the latest model based in science and psychological developments of adolescents' brain and behaviour.

13 *Ibid*.

14 James C Howell; *Preventing and Reducing Juvenile Delinquency: A Comprehensive Framework*; 18 (Sage Publication, 2nd edn., 2009).

15 The American Juvenile Justice has tested many models *viz*., Rehabilitative Model, Crime Control Model, Due Process Model, Just Desert Model. The juvenile justice is not, thus, operating on a single model.

with the enactment of the Juvenile Justice Act, 1986. The institutional development in India under juvenile justice laws is just three and a half decades old.

In America, the establishment of separate institutions for processing and treating juvenile offenders can be traced back to 1825, when the first juvenile institution (The House of Refuge) was established in New York. The first juvenile court was established in Chicago in 1899. The efforts to address the problemsof "juvenile delinquency" were made with the founding of the Society for the Reformation of Juvenile Delinquents in New York City in 1819. Before this, the children who committed offences were described as blackguard children, stubborn children, poor vagrant children, or simply labelled as young criminals.[16] Only "salvageable"[17] offenders were committed to the House of Refuge.[18] The youth offenders involved in serious offences were dealt with under the adult criminal justice system. The House also received those children who otherwise had not been sent to the adult penitentiary because of the apprehension of juries that they will get corrupted therein. Douglas Rendlemen termed the House of Refuge as a juvenile poorhouse rather than a juvenile penitentiary. Most of the children sent to the House were poor.[19] The principle of criminal justice rule "beyond reasonable doubt", was not required for committing juveniles to the House.

The idea of having a House for juveniles spread like wildfire, and soon, such Houses were established in Boston and Philadelphia in the following years. However, the legal basis of rendering children to these Houses while obviating the essential principles of criminal law became a reason to challenge the authority and working of these Houses. The first such case was that of *Mary Ann Crouse,* who was sent to House on her mother's complaint. According to her, Mary Ann Crouse appeared to be growing as a pauper. However, her father filed a *habeas corpus* writ petition and raised a crucial legal principle of criminal law that no one can be punished unless proved guilty. But this plea of the father was set aside by Pennsylvania Supreme Court on the ground that the House of Refuge was a charitable School, not a prison and that it was legal to help her on the basis of the state's role as *parens patraie*. As against this, the Court in *O'Cornells* took an opposite view by stating that no one can be punished unless proved guilty. Those believing House of Refuge was a novel idea to help the children came up with

16 Thomas J.Bernard and Megan C. Kurlychek, *The Cycle of Juvenile Justice*, 33 (Oxford University Press, 2nd edn. 2010).

17 "Salvageable" means those children who were still amenable or those called status offenders

18 Anna Louise Simpson, Rehabilitation as the justification of a Separate Juvenile Justice System, 64(4)*California Law Review*, 985(July 1976) , *available at*: http://www.jstor.org/stable/3479922 (last visited on June 15, 2022).

19 Douglas Rendleman, *Parens Patraie: From Chanceroy to the Juvenile Court*, *South Caroline Law Review* 23 (1971) quoted by Thomas J.Bernard and Megan C. Kurlychek, *The Cycle of Juvenile Justice*, 53 (Oxford University Press, 2nd edn. 2010).

an idea of establishing juvenile courts, making *parens patraie* its basis and akin to Chancery Courts in England. All kinds of children of a particular age group were subjected to its jurisdiction without digging deep into their culpability. In 1967, constitutional protection was extended to children *In re Gault* [20] case. This led to the constitutional domestication of juvenile courts as the court observed that "under our constitution, the condition of being a boy below a certain age does not justify Juvenile Court to be a Kangaroo Court".[21] This set the pendulum swinging about juvenile culpability. In subsequent cases,[22] more protection was extended to juveniles, thus immensely impacting the working and function of juvenile courts, now criticised as junior criminal courts or second-class criminal courts.

The latest scientific research about the development of brain of the child and immaturity became a catalyst for new approaches toward children. The Indian laws on juvenile justice, which were hitherto developed in a conventional mode, got impetus after 1986 as many international treaties were concluded to which India became a party. Furthermore, ugly incident of gang rape and murder, on December 16, 2012, infamously known as the *Nirbhaya* case[23] had shaken the conscience of the Indian society because of the brutality met to the rape victim who finally succumbed to the injuries after battling for life in the hospital. One of the rapists was found juvenile under the old law and was later on sent to juvenile home for rehabilitation. There was a public outrage against the rapists and open demand for their capital punishment without knowing that juvenile accused has a benefit of special law. There were candle marches and public protest in solidarity with the family of *Nirbhaya* that got enormous media coverage and public pressure. The Government of India immediately constituted a committee on December 23, 2012 headed by Justice J. S. Verma, former Chief Justice of the Supreme Court to look into the possible amendments to the criminal law so as to provide for quicker trial and enhanced punishment for criminals accused of committing sexual assault of extreme nature against women. The committee submitted its report on 23, January, 2013.[24] This reported to present legislation on Juvenile justice in India. Justice Verma Committee didn't recommend lowering of the age of juvenility. This was in resonance with neuroscientific research that explored children's brains being underdeveloped and navigable. A halfway house was found by the legislature by partly

20 In re Gault 387 U.S. 1 (1967), *available at:* https://tile.loc.gov/storage-services/service/ll/usrep/usrep387/usrep387001/usrep387001.pdf (last visited on Dec. 10, 2022).

21 Thomas J.Bernard and Megan C. Kurlychek, *The Cycle of Juvenile Justice* 104 (Oxford University Press, 2nd Edition 2010).

22 *In re Winship (397 U.S. 358 (1970), Mckeiver* v. *Pennsylvania 403 U.S. 528 (1971), Breed* v. *Jones 421 U.S. 519 (1975).*

23 *Mukesh* v. *State for NCT of Delhi* (2017) 6 SCC1 (famously known as Nirbhaya Case)

24 Report of the Committee on Amendment to Criminal Law, *available at*: https://adrindia.org/sites/default/files/Justice_Verma_Amendmenttocriminallaw_Jan2013.pdf) (last visited on Dec. 10, 2022).

accepting Justice Verma Commission's recommendations of not blanketly lowering the age and partly acknowledging neuroscience findings by providing that children aged 16 to 18 years involved in heinous offences may be subjected to preliminary assessment to determine their physical and mental maturity and only then can be transferred to children's court for trial.

III Neuro-scientific and psychological developments on adolescent mind

The recent neuroscientific research on an adolescent is drastically changing the landscape of juvenile justice systems, particularly the treatment of juvenile offenders. This research reveals that the juvenile brain undergoes structural and functional changes influencing adolescents' decision-making. In contrast to the adult brain, the fMRI images show that an adolescent's brain is under-developed. The process of myelination and synaptic pruning is inversely connected with adulthood's cognitive and emotional function. The science about interconnection myelination and synaptic and cognitive and emotional function are like this: "myelination refers to the insulation of the wires of the brain-a process that increases the speed via which messages can travel from one region to another. Synaptic pruning has the honing down of connectivity in the brain: only those connections which are used are retained, culminating in an escalation of efficacy in the cortex over time. These two processes lead to an increase in white matter and a decrease in grey matter, most notably in the prefrontal cortexas the young brain matures. The prefrontal cortex is of paramount interest in adolescent development, primarily because of its well-understood function concerning cognitive, social and emotional processes in adulthood". Maturity increases with age and is long recognised in religions and other human behavioural sciences. Often, we have witnessed in our daily lives that an adult is being reprimanded while as young is consoled in a confrontation between adult and young. The neuroscience finding corroborates such beliefs. Neuroscientific research has made inroads in the juvenile justice system. In European countries the policy makers have admitted the general principle about young people have limited and impaired capacity to behave otherwise.

Kambam and Thompson have drawn an apt distinction between "cognition" and "judgment". The former is usually present in adolescents, while the latter is often considered lacking in them. The "judgment" is taken to include the ability to "imagine alternative courses of action, sense of potential consequences of these hypothetical actions, estimate probabilities of their occurrence, weigh desirability in accordance with one's preferences, and engage in comparative deliberations about alternatives and consequences".[25] It is believed that young people greater than adults process information through the amygdala, which is associated with emotions. In comparison to young,

25 Charlotte Walsh; Youth Justice and Neurosciences: A Dual Dilemma" 51 *The British Journal of Criminology*; 23 (Jan. 2011) , *available at*: www.jstor.org/stable/23640335(last visited on Dec. 10, 2022).

adults use their prefrontal cortex, the most recently evolved part of the brain, to filter information. The prefrontal cortexis associated with rational thought and impulse control. To the extent, as *Rutherford* puts "that the prefrontal lobe operates like the brakes on a car, most adolescents would be driving cars with very thin brake shoes. It is not that the entire mechanism is missing, but it is not operating at full strength".[26]

This understanding delineates the essential requirement of crime and calls for a radical shift in understanding the causation of crime and then its punishment. In the case of adolescents involved in crime, their *actus reus* may be apparent, but *mens rea,* even though established, becomes irrelevant for punishment but may be crucial for deciding reformation and rehabilitation. These new research findings resonant with the neoclassical school propounded by Bentham, which rests on a thesis characterised by the core belief that people operate according to free will that can be regulated by an intangible element called punishment. The very existence of a different system for treatment and rehabilitation of juvenile offenders reflects a neoclassical view that free will of a human being is coloured by extenuating circumstances, namely a person's age and thus young shall not be punished but treated, reformed and rehabilitated.

The exclusion of *mens rea* in youth crimes is bound to change the earlier position of case-to-case basis judgments up to certain age, generally 18 years. This new approach is also going to change the exercise of judicial discretion, which is often criticised for creating a huge disparity in the sentencing process. However, the neuroscientific research assumptions about the human brain that it keeps growing and matures at uncertain age between 14- 25 has raised apprehension about youth delinquents who indulge in heinous crimes or are recidivists. This line of thinking has found partial approval in India by providing a statutory provision by transferring youth criminals charged with heinous offences from the juvenile justice system to the adult criminal justice system. Legislative policy changes are reflected in the Juvenile Justice (Children in Need of Care and Protection) Act, 2015. However, section 15 has not laid down any absolute rule of legislative waiver in favour of children aged 16 to 18 years alleged to have committed any heinous offence. This provision empowers the juvenile justice board to conduct a preliminary assessment of his mental and physical capacity to commit such an offence, his ability to understand the consequences of the offence and the circumstances in which he allegedly committed the offence.

IV Developmental model of juvenile justice

The developmental model is based on the latest advances in scientific knowledge about cognitive, psychological and neurobiological developments pertaining to the

26 Jane Rutherford, Juvenile Justice Caught between the Exorcist and a Clockwork Orange, 51 (3) *DePaul Law Review* 272 (2002), *available at:* https://via.library.depaul.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1563&context=law-review (last visited on Dec. 10, 2022).

brain and behaviour of an adolescent. The conclusion is that adolescents are different from adults in fundamental ways. This model is a proponent of different treatment for adolescents than adults and children below a certain age. The developmental model advocated by *Scott and Steinberg* (2008) provides a mechanism for addressing the shortcomings of the traditional model. In particular, it intends to hold the youth offenders accountable for their criminal activities with specific discounts. The mechanism under this model aims to promote the social welfare of juveniles.[27] The model envisages that "children below ten years of age must be treated as *doli incapex* as they are unable to understand the consequences of their actions. They are genuinely children in terms of their psychological development and cannot properly be held accountable for their crimes in a system committed to proportionality. Due to their cognitive and psychological immaturity, the criminal choices of children below ten years of age are simply not culpable enough to subject them to minimal criminal responsibility or state-imposed punishment.[28] However, it does not restrict the state from taking cognisance of the crime of children below a certain age. Pitching the doctrine of *parens patraie* in*,* the state is directed to intervene for the welfare of these children without stigmatising them. Thus, in other words, the rehabilitation model is proposed as the most suitable for them.

The developmental model does not follow the traditional binary classification of children as below a particular age, *viz.,* 16, 17 or 18 and adults. Rather, it proposes categories like children, adolescents and adults. It further makes subcategories of adolescents like pre-adolescence, early-adolescence, mid-adolescence and late-adolescence. The authors of this model accept that drawing chronological age boundaries between adolescents and adults for justice policy is a perplexing and tedious task. The relevant psychological aptitudes do not develop suddenly at a particular age but progress at different rates.[29]

> The logical reasoning and information-processing capacities most relevant to competence to stand trial and related matters mature steadily through pre-adolescence and early adolescence, reaching adult levels around age fifteen or sixteen. In contrast, psychosocial capacities that influence involvement in criminal activity, such as impulse control, future orientation, or resistance to peer influence, mature primarily in middle adolescence, continuing into late adolescence and even into early adulthood.

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27 *Moving Forward: Utilizing a Developmental Model in the Juvenile Justice System*; July 3, 2013; *available at*: https://jthart.com/weblog/moving-forward-utilizing-a-developmental-model-in-the-juvenile- (last visited on Dec. 10, 2022).

28 Elizabeth S. Scott and L. Steinberg; *Rethinking Juvenile Justice*; 235 (Harvard University Press, 2008).

29 *Id.* at 236.

This model is based on scientific studies of brain transition from adolescence to adulthood, a gradual process that continues even during early adulthood. Accordingly, the presumptive age of eighteen years as a dividing line between child and adult could lead to numerous errors in delivering justice to young people. Scientific evidence reveals that the brain keeps on developing till twenty-five of age. Still, this model is not making any concession for them as it presumes that they are mature enough to be held accountable for their acts.

The most perplexing category of age for policymakers, as per this model, ranges from fifteen to seventeen years. This is considered as a transitional period for most psychological developments, showing many developments from other groups. The model envisages that Juvenile Courts should retain jurisdiction over them because they deserve mitigation based on immaturity. However, it in a way, advocates a crime control model of justice for them by transferring them to the adult justice system if they are charged with serious crimes. As per the pioneers of the model, this will maintain the stability and legitimacy of the juvenile justice system besides accommodating Society's interest in crime reduction. This proposal is making its impact on the youth justice systems in the form of legislative and judicial waivers. The model further states except for those youth offenders who are charged for serious crimes, the jurisdictional age for dispositions of the juvenile court should be extended into early adulthood, optimally until age 24 or 25.[30]

The developmental model is based on three key lessons taken from the scientific literature on adolescence. "First, adolescents' choices to get involved in criminal activity are shaped by developmental forces that contribute to immature judgment and thus are less rational than those of adults. Second, because of these developmental influences, normal adolescents, particularly those growing up in high-crime neighbourhoods, may get involved in criminal activity but most likely mature out of these inclinations. And third, because social context plays a vital role in accomplishing essential developmental tasks during adolescence, the correctional settings and interventions that constitute society's response to juvenile crime will likely affect whether delinquent youth make a successful transition to adulthood".[31] Thus, the scientific investigation of the maturity of adolescents makes us conscious that developmental factors influence adolescents' criminal acts, and society's response is pivotal for their successful transition to adulthood. Based on this, the model insists on a different approach to adolescents than adults.

30 *Id.* at 239. The discussion on this point is beyond the scope of this paper.

31 Elizabeth S. Scott and L. Steinberg; *Rethinking Juvenile Justice* 223-224(Harvard University Press, 2008).

The developmental model brings out the sharp difference between adolescents and adults in three important ways:[32]

i. In an emotionally charged situation, adolescents are less able to regulate their conduct.

ii. External factors like peer pressure and the immediacy of rewards play a prominent role in the behaviour of adolescents.

iii. Adolescents do not consider the long-term consequences and hence make uninformed decisions.

The juvenile court can't render complete justice based on a single model. The developmental model, in view of its authors, is a noble attempt to provide a framework of stable and satisfactory responses to juvenile delinquency. It intends to promote the social welfare of youth but advocates that adolescents should be held accountable for their actions, although with youth discounts.

The developmental model supports retaining the juvenile justice system but with certain drastic changes both in the rehabilitative and punitive approaches. As per this model, the young offenders should not be exempted or given completely lenient treatment with a rehabilitative spirit. They shall receive the proportionate sanctions of determinate duration. The punishment must be executed in a setting that facilitates their transition to healthy adulthood. Also, it favours the transfer of a narrow category of recidivists charged with serious violent crimes to criminal courts. This model suggests that the discretion of judges and prosecution over transfer should be limited to those cases which fall within the group of "recidivists charged with serious violent offences".[33]

V Neurosciences to neuro-law in juvenile justice systems

The development of neurosciences in the adolescent brain has attracted the attention of psychologists, academicians, lawyers and policymakers. Neuroscience findings are presented both in juvenile and adult justice systems as mitigating circumstances during sentence hearing proceedings. Legal advocates have found these findings more favourable in achieving their desired goals. They seem to be more aggressive and unconditional in their use of science. The positive effects of neuroscience findingsand efforts of advocates can be grasped from the decision of the Supreme Court of United States, which declared mandatory life sentences for juveniles convicted for murder as

32 John A. Tuell, Jessica Heldman and Kari Harp;*Translating the Science of Adolescent Development to Sustainable Best Practice*; Developmental Reform in Juvenile Justice; Children's Action Corps, RKF National Resource Center for Juvenile Justice; *available at:* https://rfknrcjj.org/wp-content/uploads/2017/09/Developmental_Reform_in_Juvenile_Justice_RFKNRCJJ.pdf (last visited on Dec. 24, 2022).

33 Elizabeth S. Scott and L. Steinberg; *Rethinking Juvenile Justice*; 224 (Harvard University Press, 2008).

unconstitutional.[34] It endorses the belief that young offenders have more potential for rehabilitation than irredeemably hardened criminals. Some states[35] in United States have loosened the rigours of their juvenile legislation in view of the latest scientific developments in brain sciences.

Enormous pressure is mounting on states in United States to make juvenile justice compatible with the new neuroscientific studies about adolescent brain sciences. In 2009, the Washington Coalition for the 'Just Treatment of Youth' produced a report focussing directly on policy implications of neuroscience and argued that "developments in scientific and psychosocial research in recent years suggest that Washington laws that allow for the trial, sentencing, and incarceration of youth in the adult system should be revisited."[36] The National Campaign to Reform State Juvenile Justice Systems capitalised on momentum to "disseminate juvenile justice reform and earned at least some successes in 30 target states – or 81% of the total – enacting at least 151 juvenile justice reforms through legislation and court rules. National Campaign successes included measures to ensure that "young people are prosecuted in a juvenile court rather than criminal court. Instead of incarceration, it focused on increased use of diversion and community-based programs, and also on improvements in conditions of confinement, increased access to counsel, and policies that prevent school behaviour from leading to court involvement"[37]

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34 *Miller* v. *Alabama*, 567 US(2012), *available at:* https://www.supremecourt.gov/opinions/11pdf/10-9646g2i8.pdf (last visited on Dec. 24, 2022).

35 Georgia revised sentencing laws to keep non-violent drug and property offenders out of prison, directing them instead toward alternatives—drug courts, day-reporting centres, mental-health courts—designed to treat and rehabilitate rather than punish. It is thinking to also revise the Juvenile Justice System on these lines.; *Suffer the Children*; *The Economist;* Feb 2, 2013; *available at*: https://www.economist.com/united-states/2013/02/02/suffer-the-children(last visited on Dec. 24, 2022). Some states have reversed changes that lowered the age at which youthful offenders were automatically transferred to the criminal court, including Connecticut, a state that once sent the highest number of juveniles to the adult court.

Illinois Juvenile Justice Commission published a report condemning the state youth prison system and finding that the majority of incarcerated young offenders would be better served in treatment or educational programs.

36 Wash. Coal. for the Just Treatment of Youth, *A Re-examination of Youth Involvement in the Adult Criminal Justice System in Washington: Implications of New Findings About Juvenile Recidivism and Adolescent Brain Development* 5 (2009), *available at*: http://www.columbialegal.org/files/JLWOP_cls.pdf. (last visited on Dec. 24, 2022).

37 2017 Campaign Report; The National Campaign to Reform State Juvenile Justice Systems, *available at*: https://www.modelsforchange.net/publications/863/National_Campaign_to_Reform_State_Juvenile_Justice_Systems_2017_Report.pdf(last visited on Dec. 24, 2022).

The states in United States have fine-tuned their respective juvenile laws to incorporate the neuroscience findings. The legislators have again expressed that their statutes should not ignore advances in neurosciences and well-accepted understandings of adolescent brain development. Pursuant to these developments, the state of California enacted a law in 2012 called "The Fair Sentencing for Youth Act."

In 2016, the Louisiana and South Carolina states enacted legislation that included 17 years of age in the juvenile justice system. North Carolina n 2017 followed suit by ending the automatic prosecution of 16- and 17-year-olds as adults. The 2017 Campaign Report further reveals that "in 2011, 13 states automatically prosecuted 17-year-olds as adults. New York and North Carolina went one step further, treating every arrested 16-year-old as an adult. After the laws passed in 2017, only five states will continue prosecuting 17-year-olds as adults, and no state will automatically prosecute all 16-year-olds as adults. Delaware enacted six reform bills that increased fairness, opportunity, and age-appropriate accountability for system-involving youth. New York and North Carolina passed legislation to raise the age of juvenile jurisdiction from 16 to 18 years.[38] The new Florida statute, (which applies to juveniles facing a life sentence with the possibility of parole for homicide), includes multiple factors that require an inquiry into psychological immaturity and its impact on the youth's involvement in the offence."[39]

The Indian juvenile legislation concerning the age of maturation was quite in sync with the neuroscientific revelations before 2015. Incarceration for the purpose of treatment under previous legislation could be for a maximum period of three years, leaving no chance for Indian courts to dig into the question of the death penalty's constitutionality, lifer without parole in both non-homicide and homicide cases. Further, constitutional protections envisaged for adult offenders already extended to all juvenile delinquents, rendering the question of extension of Miranda rights irrelevant before the courts.[40] The recent illegal detention of children by the police, followed by inhuman treatment in the Police Lockup[41] and denial of legal counsel and medical help[42] are

38 2017 Campaign Report; The National Campaign to Reform State Juvenile Justice Systems; *available at:* https://www.modelsforchange.net/publications/863/National_Campaign_to_Reform_State_ Juvenile_Justice_Systems_2017_Report.pdf

39 Elizabeth Scott *et al*; *The Supreme Court and the Transformation of Juvenile Sentencing*; Models for Change: Systems Reform for Juvenile Justice; at 12 *available at:* https://www.modelsforchange.net/publications/778/The_Supreme_Court_and_the_Transformation_of_Juvenile_Sentencing.pdf

40 *Miranda* recognised that the compulsive pressures of custodial interrogation threatened suspects' Fifth Amendment privilege against self-incrimination.

41 The UP Police accused of Stripping Cleric; The Telegraph Online; Dec. 29, 2019; *available at*: https://www.telegraphindia.com/india/uttar-pradesh-police-accused-of-stripping-cleric/cid/1731127

42 How detainees were denied legal counsel, medical help at the Daryaganj police station; The Caravan; Dec. 25, 2019; *available at:* https://caravanmagazine.in/politics/detainees-denied-legal-medical-help-daryaganj

some flagrant violations of Juvenile Justice(Care & Protection of Children), Act, 2015 depicting protections (Miranda rights) are more on paper than in practice. The Supreme Court of India has taken a strong note of these brutalities with the children of tender age and passed directions for *JJBs* to be active and prompt and not to be mute spectators. In the words of apex court: [43]

> All JJBs in the country must follow the letter and spirit of the provisions of the Act. We make it clear that the JJBs are not meant to be silent spectators and pass orders only when a matter comes before them. They can take note of the factual situation if it comes to the knowledge of the JJBs that a child has been detained in prison or lock up. It is the duty of the JJBs to ensure that the child is immediately granted bail or sent to an observation home or a place of safety. The Act cannot be flouted by anybody, least of all the police.

Indian juvenile law concerning the age of maturity, protection and rehabilitation is more pragmatic on statutes. It is soothing to ears but is not so when it comes to its implementation. The change of legal position under the latest legislation for juveniles in conflict with law aged 16 and above who are alleged to have committed heinous crimes, is a retrograde step, as it is in consonance with the latest neuroscientific and psychological research findings on adolescents' mind.

The Indian Juvenile system does not reflect any scientific development in neurosciences. It continues with that traditional approach of treating all juveniles alike, and the recent decision of lowering the age of children to 16, succumbing to public and media pressure after *Nirbhaya* gang-rape, partly disregards neuroscience developments

VI Neurosciences in juvenile justice and judicial reflex

In the last few decades, the accused juveniles in a catena of cases before the US courts have taken the defence of the latest neuroscientific research to establish immaturity at the time of commission of offence. Before these latest scientific developments, juvenile offenders used to take recourse to the Eighth Amendment to the US Constitution, which provided that "excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishment inflicted."The death sentence to anyone below a certain age, like 16 or 18, was considered cruel and unusual punishment. In *Thomspson* v. *Oklahoma* (1988),[44] the Supreme Court ruled that "the execution of a person who was under 16 at the time of the offence violated the Eighth Amendment prohibition against 'cruel and unusual punishment'." The Court, while delivering the judgement,

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43 *Re Exploitation of Children in Orphanages in the State of Tamil Nadu v. Union of India*; Writ Petition No. 102/2007; *available at:* https://indiankanoon.org/doc/139894183/.

44 *Stanford* v. *Kentuchy,* (1989), *available at:* https://www.supremecourt.gov/pdfs/transcripts/1988/87-5765_03-27-1989.pdf (last visited on Dec. 20, 2022).

took into consideration;(i) the policies of those other western nations of similar heritage which do not allow the execution of juveniles; (ii) the arguments of professional organisations *viz.,* American Bar Association and America Law Institute, that death penalty shall not be imposed on offenders who were below certain age at the time of their offence and (iii) the behaviour of juries.

This lenient view to juvenile offenders, however, was rolled back in *Stanford* v. *Kentuchy*[45] (1989)and *Wilkins* v. *Missouri*[46] (1989).The issue raised before the US Supreme Court was: "Does the imposition of the death penalty on an individual for a crime committed at the age of 16 or 17 years constitute 'cruel and unusual punishment' under the Eighth Amendment?". The court this time, upheld the "capital punishment imposed on offenders who had reached the age of 16 or 17 at the time of the offence" on the ground that it "does not offend the Eighth Amendment's prohibition against cruel and unusual punishment." Justice Scalia, while writing this judgment, stated that:

> There is no relevance to the state laws cited by petitioners which set 18 or more as the legal age for engaging in various activities, ranging from driving to drinking, alcoholic beverages to voting. Those laws operate in gross and do not conduct individualised maturity tests for each driver, drinker, or voter; an age-appropriate in the vast majority of cases must therefore be selected. In the realm of capital punishment, however, individualised consideration is a constitutional requirement.

Until this time, neuroscience advances were not pleaded to prove the immaturity and low-level understanding of juvenile offenders. Courts simply banked on a common experience of the maturity of children and gave two different judgements within just two years.

From 2005 onwards, the courts took a U-turn by making psychology, neuroscience, fMRI and PET scans of brain as the supporting evidence for their judgments to exonerate the juvenile delinquents as well adult offenders from their criminal culpability as and when these tests testified that the juvenile was not in control of his impulses at the time of the commission of a crime.

In *Roper v. Simmons,*[47] the accused, *Christopher Simons*, murdered *Shirley Crook*. At the time of the commission of the offence he was seventeen-year-old boy. The question before the US Supreme Court was, "Was the Missouri Supreme Court correct in

45 *Wilkins* v. *Missouri*, (1989). *available at*: https://www.supremecourt.gov/pdfs/transcripts/1988/87-6026_03-27-1989.pdf (last visited on Dec. 20, 2022).

46 *Standford* v. *Kentuchy* case was combined with *Wilkins* v. *Missouri* [at federal level because of its resemblance. In both these cases minors aged 16 or 17 were prosecuted on the charges of murder.

47 *Roper* v. *Simons,* 543 U. S. (2005), *available at:* https://www.supremecourt.gov/opinions/04pdf/03-633.pdf (last visited on Dec. 20, 2022).

determining that the execution of a youth under 18 at the time of his crime violates the Eighth and Fourteen Amendments[48] of the United States Constitution?." The court said that drawing a line at 18 years of age is arbitrary but necessary under the circumstances. The court further noted:

> It is difficult even for expert psychologists to differentiate between the juvenile offender whose crime reflects unfortunate yet transient immaturity and the rare juvenile offender whose crime reflects irreparable corruption.

On the question of differential treatment of juvenile offenders from adult offenders, Justice *Kennedy* wrote:

> The difference between juvenile and adult offenders is too marked and well understood to risk allowing a young person to receive the death penalty despite insufficient culpability.

The court outlawed the death for youth under 18 years of age. The court reasoned that "the Eighth and Fourteenth Amendments forbid imposition of the death penalty on offenders who were under the age of 18 when they committed a crime". The court relied on scientific reasoning and observed that three scientific differences are between adults and juvenile offenders which establish that latter cannot with reliability be classified as the worst offenders. The differences are: [49]

a. that lack of maturity and an underdeveloped sense of responsibility are found in youths more often than in adults, and these qualities lead to impulsive and ill-considered actions and decisions.

b. Juveniles are more vulnerable or susceptible to negative influences and peer pressure.

c. the character of a juvenile is not as well-formed as that of an adult, meaning that the personality traits of juveniles are more "transitory."

Having declared the death penalty for young offenders as inhuman, cruel and unusual punishment, the United States Supreme Court faced new issues like the constitutionality of life without the possibility of parole both in non-homicide and homicide cases. Premising its judgments on the latest scientific developments about adolescent brain developments, the United States Supreme Court in *Graham* v. *Florida*[50] banned life

48 Fourteenth Amendment to US Constitution: "No state shall make or enforce any law which shall abridge the privileges and immunities of citizens of the United States: nor shall any state deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws."

49 Thomas J.Bernard and Megan C. Kurlychek, *The Cycle of Juvenile Justice*, 180 (Oxford University Press, 2nd edn. 2010).

50 *Graham* v. *Florida,* 560 U. S. (2010), *available at*: https://www.supremecourt.gov/opinions/09pdf/08-7412.pdf, (last visited on Dec. 10, 2022).

without parole for juvenile offenders in non-homicide cases and declared it unconstitutional in cases involving juveniles. The court explained:

> …even if we were to assume that some juvenile non-homicide offenders …merit a life without parole sentence, it does not follow that courts taking a case-by-case proportionality approach could with sufficient accuracy distinguish the few incorrigible juvenile offenders from the many that have the capacity for change.

Again in *Miller* v. *Alabama,*[51] the United States Supreme Court banned mandatory life without parole for juvenile offenders convicted of homicide as it violates the Eighth Amendment. The court said there could be no automatic life without parole, even for non-homicide offenders. Referencing the latest scientific findings, the court said:

> The scientific findings both lessened a child's 'moral culpability' and enhanced the prospect that his deficiencies will be reformed as the years go by and neurological development occurs.
>
> By requiring that all children convicted of homicide receive lifetime incarceration without possibility of parole, regardless of their age and age-related characteristics and the nature of their crimes, the mandatory sentencing schemes before us violate this principle of proportionality, and so the Eighth Amendment's ban on cruel and unusual punishment.

Slightly deviating from *Roper* and *Graham*, *Miller* gave the option to the courts which they can exercise while sentencing youthful offenders to life without parole on a case-by-case basis, even though there is no available neuroscience research to aid such a determination.[52] Justice *Kagan*, who authored this judgment, seems to subscribe to the Developmental Model of juvenile justice view that some incorrigible juvenile offenders shall be treated differently.[53] In other words, she seems to have brought in the 'Diminished Retribution Model', which sits somewhere between the rehabilitative and adult retribution approaches. The juveniles are treated, under this approach, neither innocent nor fully culpable but instead postulates diminished criminal reasonability on their youthfulness. Under the diminished retribution model, "dispositions are

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51 567 U. S. (2012), *available at:* https://www.supremecourt.gov/opinions/11pdf/10-9646g2i8.pdf (last visited on Dec. 10, 2022).

52 G2i Knowledge Brief; A Knowledge Brief of The MacAuthur Foundation Research Network on Law and Neuroscience 3 (2017), *available at:* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2881618(last visited on Dec. 10, 2022).

53 Elizabeth S. Scott and L. Steinberg; *Rethinking Juvenile Justice* 243 (Harvard University Press, 2008).

discounted proportionate to the juvenile's degree of immaturity, either on an individual basis or categorically."[54]

Although the impact of neurosciences through judicial pronouncements in US is well entrenched from *Roper* (2005) onwards, the adult criminal justice system has remained no more immune from developments in neuroscience and brain images impact. The defence lawyers are arguing for diminished capacity, insanity, or pleading for sentence mitigation by producing neurological evidence in the courtrooms.

The defence argument in Sentencing Memorandum in a case in which the accused was 20 years old, on August12, 2017, when he killed a woman by driving his car among the protesters, was that:[55]

> Contemporary neuroscience research suggests that the constitutional distinct status of juveniles must extend at least upto the age of 21. As a result, it would be unconstitutional, cruel and unusual to sentence someone who was 20 at the time of an offence to a sentence of life imprisonment. …
>
> Further, [a]s more research confirming this conclusion accumulated by 2015, the notion that brain maturation continues into late adolescence became widely accepted among neuroscientists.

In this case, although the defence utilised neuroscience, it was ineffective in mitigating the accused's sentence.

These neuro-science advances can be primarily attributed to the invention of the functional Magnetic Resonance Imaging (fMRI) the machine, which permits observation of the brains of living individuals.

The accused in *People* v. *Weinstein*[56] argued the lack of criminal responsibility due to mental disease or defect. The defence council introduced PET scan evidence showing an arachnoid cyst pressing against the frontal lobes of his brain. The question was whether this is admissible. Weinstein's PET scan revealed the following points:[57]

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54 Christopher Slobogin and Mark R. Fondacaro; *Juveniles At Risk*; 6 (Oxford University Press; 2011); The authors in the book have suggested the 'Individual Prevention Model" of Juvenile Justice.

55 Keynote address by *Prof. Francis X. Shen*, Professor of Law, and Mcknight Presidential Fellow, University of Minessota, USA; *A Report on Juvenile Justice System in Action: Policy, Police & Practice*; published by Legal Aid Clinic for Juveniles in Srinagar, Department of Law, School of Legal Studies, 6 (Central University of Kashmir).

56 *People* v. *Weinstein* (1992), *available at*: https://www.supremecourt.gov/pdfs/transcripts/1992/91-6646_11-04-1992.pdf (last visited on Dec. 10, 2022).

57 Keynote address by *Prof. Francis X. Shen*, Professor of Law, and Mcknight Presidential Fellow, University of Minessota, USA; *A Report on Juvenile Justice System in Action: Policy, Police and Practice*; published by Legal Aid Clinic for Juveniles in Srinagar, Department of Law, School of Legal Studies, 7(Central University of Kashmir) .

> A. Cross-section of brain structure was obtained through magnetic resonance imaging. The right and left side of the brain are indicated as per the convention used in medical imaging. The large black area in the left frontal lobe reveals the presence of a large cyst that has damaged and displaced the brain tissue. B. Cross-section of brain at the same level obtained through PET with flu-deoxyglucose. The colors map the level of glucose metabolism with hot colors indicating high levels and cool colors indicating low levels. Glucose metabolism is clearly absent in the cyst and reduced around it.

Weinstein argued that the cyst in the brain made the accused to do it. He was pleading the defence of insanity.[58]

> In 2013, in the case of State of *Florida* v. *Kelvin Lee Coleman Jr.*, accused, *Kelvin Lee Coleman Jr.*, charged with double murder was eligible for death penalty but expert opinion based on neuroimaging, neurological, and neuropsychiatric examinations impacted the Court's decision. The defendant was sentenced to life imprisonment without the possibility of parole instead of death penalty. The comments of the trial's jury record that, "the most compelling reason for not punishing the defendant to death was that he was under extreme mental and emotional disturbance during the incident. Other reasons were evidence of brain abnormalities resulting from neurological disorder, fatal alcohol syndrome, and orbitofrontal syndrome contributing to severely abnormal behaviour and lack of impulse control.

The evasion of death sentences has been common, especially after the *Hurst* v. *State*.[59] *The* decision in that case has established that for imposing death there shall be an anonymous jury vote before sentencing defendants to death. In *Florida* v. *Luis Toledo*[60] (2017), the neurological illness and epilepsy were successfully pleaded, and the accused, despite killing his wife and her two children, was not sentenced to death. The sentence was mitigated on the bases of neurological evidence despite the horrific nature of the

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58 Panagiota Loizidou *et al.*; *The State of Florida* v. *Kelvin Lee Coleman Jr.: Implications of neuroscience in the courtroom through a case study*; *available at*: https://www.tandfonline.com/doi/full/10.1080/1068316X.2021.2018443(last visited on Dec. 10, 2022).

59 202 So. 3d 40 (Fla.2016); *available at*: https://www.supremecourt.gov/DocketPDF/18/18-5042/58963/20180809095245762_SLINEY-REPLY%20TO%20BIO.pdf(last visited on Dec. 10, 2022).

60 Panagiota Loizidou, Rory E. Wieczorek-Flynn, *et al.*, *The State of Florida* v. *Kelvin Lee Coleman Jr.: the implications of neuroscience in the courtroom through a case study,* (Psychology, Crime and Law) at 1, :*available at* https://www.tandfonline.com/doi/pdf/10.1080/1068316X.2021.2018443 (last visited on Dec. 20, 2022).

crime. Similarly, in the State of *Florida* v. *Byron Burch*[61] (2015),first-degree murder and burglary charged to a defendant with a lengthy criminal record did not result in a death sentence. In this case, the court rejected quantitative electroencephalography as inadmissible. The defence lawyer offered PET scans to claim brain damage that hindered impulse control and pleaded it as a mitigating evidence of brain damage and presumptive chronic traumatic encephalopathy (CTE). The jurors arrived at a conclusion of a sentence to life in prison without parole, which the judge ultimately agreed upon.[62]

Neuroscience has changed the judicial discourse in America on the trails of juvenile and adult offenders. The only difference is that in the juvenile justice system, the young offender is getting lenient punishment on the basis of general principles that adolescents are yet to become adults, whereas adult offenders are subjected to different brain imaging tests to decide their culpability.

Expert opinion-going group to individual (G2i) in juvenile justice

Predicting human nature is not only impossible but beyond comprehension. Similarly, putting past human nature in debates and discussions does not give concrete evidence as to what factors led a person to err. It is said that even devil does not know one's mind. Neither any logic nor any scientific tool comes with any perfect formula or explanation that would help to uncover what was going on in the brain of an accused at the time of committing an offence. We may be in a position to develop certain general propositions about human conduct in a particular situation, but that cannot be applied to individual cases with mathematical precision. Even the best science substantiated with rich data collected from multiple experimental subjects or events and over multiple trials or experiments can tell us little, if anything at all, about the individual case.[63] It has been ruled that "the admissibility of a result of a scientific test will depend upon its authenticity".[64] The experts apply their special knowledge and skills to a particular fact to deduct reasonable conclusions which could better guide the judges to deliver justice. The court has held that evidence of an expert is admissible and is best piece of evidence to guide a court to reach to a conclusive decision."An expert witness has devoted time to studying a particular branch of learning and is particularly skilled in an area in which he is asked to give his opinion. His evidence on

61 *Florida* v. *Byron Burch* (2015), *available at*: https://www.morelaw.com/verdicts/case.asp?n=&s=FL&d=80830 (last visited on Dec. 10, 2022).

62 Panagiota Loizidou *et al.; The State of Florida v. Kelvin Lee Coleman Jr.: Implications of neuroscience in the courtroom through a case study* at 13, *available at* https://www.tandfonline.com/doi/full/10.1080/1068316X.2021.2018443(last visited on Dec. 10, 2022).

63 G2i Knowledge Brief; A Knowledge Brief of The MacAuthur Foundation Research Network on Law and Neuroscience (2017); *available at*: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2881618(last visited on Dec. 10, 2022).

64 *Brahmajeetsingh Sharma* v. *State of Maharashtra*, AIR 2005 SC 2277; also *available at:* https://indiankanoon.org/doc/244079/(last visited on Dec. 10, 2022).

such points is admissible to enable the tribunal to conclude satisfactorily".[65] The courts have cast a duty on the experts, whenever approached, "to furnish the judges with the necessary criteria for testing the accuracy of their findings, to enable the judge to form an independent judgment by applying criteria to the facts proved in evidence to arrive at an independent decision. The expert may give his opinion in certain cases, but such an opinion is not binding on the Court".[66] The courts have opined that the "the fundamental function of the expert is to put all materials before the Court, together with reasons which induce him to the conclusion so that the Court, although not an expert, may form its judgment by observation of those materials".[67] Section 45 of the Indian Evidence Act states that expert opinions on science, foreign law and art etc. are admissible and relevant[68] unless rebutted. Although such evidence is admissible, the courts must not rush in where even scientists and medical experts carefully tread. "The rule of prudence is that courts will be reluctant to interfere with policy decisions taken by the Government, in matters of public health, after collecting and analysing inputs from surveys and research**.** Nor will courts attempt to substitute their views as to what is wise, safe, prudent and proper in preference to those opinions formulated by persons said to possess technical expertise and rich experience."[69] In *Sultan Singh* v. *State of Haryana*, the court observed that "the opinion of an expert witness on technical aspects has relevance, but the opinion has to be based upon specialised knowledge, and the data on which it is to be found and must be acceptable to the Court".[70] The courts seek expert opinions on different technical areas.

The latest complicated area yet to be fully explored is neurosciences and brain images that baffle judges, jury members, academicians and neuroscientists too. The general assumption of neurosciences about juvenile offenders has been unconditionally accepted about most categories of juvenile offenders in America but is yet to be appraised in India. The neurosciences substantiate the fact that adolescents are less mature than adults. This is a general scientific proposition about adolescents without any exception. Neuroscience reveals that maturity can develop between fourteen and twenty years of age. Thus, these findings question the credibility of fixing an arbitrary number of eighteen years as an age of responsibility. The developmental model of

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65 Powell, Comparative Politics Today 39 (10th edn., 2011), as quoted by Ratanlal and Dhirajlal; *The Law of Evidence;* 858 (LexisNexis, India; 24th edn.; 2013).

66 *Thyssen Stahlunion Gnub* v. *Steel Authority of India*, AIR 2002 Del 255.

67 *Ramesh Chandra agrawal* v. *Refency Hospital Limited* (2009) 9 SCC 709.

68 Indian Evidence Act s. 45 reads: When the Court has to form an opinion upon a point of foreign law, or of science, or art, or as to identity of handwriting or finger impressions, the opinions upon that point of persons specially skilled in such foreign law, science or art, or in questions as to identity of handwriting or finger impressions are relevant facts. Such persons are called experts.

69 *Academy of Nutrition Improvement* v. *Union of India* (2011) 8 SCC 274.

70 (2014) 14 SCC 664.

juvenile justice is pressing for different but proportionate treatment for juveniles between 15 to 18 years.

The fundamental question arises about which scientific evidence is to be accepted and which one is to be rejected. Courts in America are guided by the *Fyre test* [71] ruling, which asks "whether the scientific methods supporting the expert opinions are generally accepted in the particular fields from which they come". The principle to determine the admissibility of scientific investigation was stated in the following words:

> Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define, somewhere in the twilight zone the evidential force must be recognised, and while the courts will go a long way in admitting the expert testimony deduced from a well-recognised scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

The Court changed this approach in *Daubert* v. *Merryll Dow Pharmaceuticals Inc.,*[72] which stressed the admissibility of methods and principles underlying the expert opinion. The court was of the opinion that the methods and principles on which expert opinion is based must be reliable and valid. This ruling applies to federal courts in the United States. Neither *Fyre* nor *Daubert,* however, speak directly to G2i. However, both tests have insisted on the rule that "the thing from which the deduction is made must be sufficiently established to have gained general acceptance". Thereby, insisting on going from general to individual rule while accepting the expert opinion. Applying the above tests to determine the culpability of juvenile offenders one has to understand the general science about adolescents' minds. The latest scientific research states that the adolescents are immature and love to take risk without giving much thought to consequences owing to less developed cognitive faculties. However, the science further reveals that this general scientific principle is not absolute, and maturity could develop at any stage from 14 to 25 years. To determine conclusively that an alleged offender of a particular age group is mature enough physically and mentally, courts are supposed to send them for preliminary assessment in the United States and India.[73]

VII Apprehensions and limitations

Science and technology are a boon to human service in many ways, but their bane can't be ignored. This is not the first time that humans use science to try to unravel the mystery behind the causation of crime. This time getting around the brain and deep into the functioning of neurons to explore why a person did what he was not supposed

71 *Fyre* v. *United States*, 293F1013, (1923).

72 113 SCt 2786 (1993).

73 The Juvenile Justice (Care & Protection of Children) Act, 2015, s. 15.

to do is more attractive, fascinating, but challenging too. We need to tread in this area cautiously before the present haze is thoroughly cleared and principles evolved become applicable with mathematical precision. The neuroscience may help us, but can we bank on it exclusively is a question yet to be answered affirmatively. Such apprehensions are the by-product of past experiences. In the past, exclusive reliance on science has caused a dent in the philosophical rationale of why human beings commit a crime. *Raymond Paternoster*[74] has put it rightly as:

> Whatever the appeal of the biological positivists, criminology would turn its back for nearly two centuries on deterrence theory, as well as the more general idea that the motivation to commit a crime was something that everyone possessed and that crime, like any other human activity, was rational and motivated by considerations of utility.

Developmental psychologist, *Laurence Steinberg* too offers this cautionary note in the following words: [75]

> Whether the revelation that the adolescent brain may be less mature than scientists had previously thought is ultimately a good thing, a bad thing or a mixed blessing for young people remains to be seen. If one lives by the neuroscience sword in making the case that children are different, and then one may die by the neuroscience sword if it swings in an unanticipated way

These apprehensions are countered because from the time of evolution of Darwinism till date, science has made manifold advancements. Unlike the theory of evolution, the scientific theories in the present era are subjected to multiple tests and trials to make them error-free before shaping a policy. The earlier tools to perform prefrontal lobotomy, which once won the Nobel Prize, were considered important for their profound impact on criminal law, but have been now rejected as highly dangerous and ineffective.[76] The present science is coming with full promises and results. Further, the latest findings about the development of the adolescent brain do not negate our conventional and philosophical beliefs; rather, they substantiate that children are different and require different treatment. Treating them similar to adult offenders will amount to gross injustice.

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74 Raymond Paternoster; How much really do we know about Deterrence; 100(3) *Journal of Criminal Law & Criminology;* 773 (2010), *available at:* https://scholarlycommons.law.northwestern.edu/cgi/viewcontent.cgi?article=7363&context=jclc(last visited on Dec. 10, 2022).

75 Francis X. Shen; *Legislating Neuroscience: The Case of Juvenile Justice*; 46 Loyola of Los Angeles Law Review. 985, 1016 (2013); *available at:* http://www.antoniocasella.eu/dnlaw/Shen_Juvenile_2013.pdf

76 Francis X. Shen, Keynote address, A Report on Full Proceedings of One Day Workshop on "*Juvenile Justice System in Action: Policy, Police and Practice*", published by Legal Aid Clinic for Juveniles in Srinagar, School of Legal Studies, 5 (Central University of Kashmir).

The scientific model of juvenile justice, popularly called the Developmental model, considers the principle of proportionality as the bedrock of a fair and legitimate justice system. Taking proportionality seriously means that dispositions in the juvenile justice system should be based on the criminal act's harm and the actor's culpability. This approach is almost akin to retributivists who entirely emphasise on "equality"[77] as a measuring rode for punishment**.** It ignores the trend that adjudicating authorities must not punish convicts only on the gravity of offence but shall consider the criminal that it should not be only a *"desert"* but a "*just desert*".[78] The fact is that although *Scott and Steinberg* consider the principle of proportionality as a basis of youth crime regulation that holds young offenders accountable for their crimes but they vehemently advocate for youth discount. The model suffers because it ignores the criminal, his background and the reasons for the commission of a crime which forms the bedrock of the sentencing process under the modern criminal justice system. The model pitches for intensive interventions in the lives of very young serious offenders for their successful transition into adulthood. However, the non-interventionist model of juvenile justice will object to it on the ground that it will lead to stigmatisation of young who are in the formative stages of their life.

Further, it is difficult to evaluate the brain before and after the crime[79] in the case of adolescents during a preliminary assessment before their transfer to children's court.[80] The neuroscience doesn't reveal that transition from adolescence to adulthood is a development in a lockstep fashion, but rather a gradual process which is likely to continue upto the age of 25. Thus, the provision under different statutes[81] that assessment should be made about physical and mental capacities, when science has yet to explore interconnection between the two, can be questioned again. However, it seems to endorse the social and religious beliefs that physically mature are also mentally mature to understand the consequences of an act. All such assessment about the child's maturity at the time of the commission of offence suffers acutely when assessment is done years after the commission of an offence. Further, an assessment doesn't follow the G2i rule. In other words, assessment is not diagnostic about the

77 Guus Duindam, *How can Punishment be Justified? On Kant's Retributivism*, *available at:* https://open.library.okstate.edu/introphilosophy/chapter/how-can-punishment-be-justified-on-kants-retributivism/ (last visited on Dec. 10, 2022).

78 Just deserts, as a philosophy of punishment, argues that criminal sanctions should be commensurate with the seriousness of the offense

79 Panagiota Loizidou *et al.; The State of Florida* v. *Kelvin Lee Coleman Jr.: Implications of neuroscience in the courtroom through a case study*; at 1, *available at:* https://www.tandfonline.com/doi/full/10.1080/1068316x.2021.2018443(last visited on Dec. 10, 2022).

80 The Juvenile justice (Care & Protection of Children) Act, 2015, s.15.

81 The Juvenile Justice (Care & Protection of Children) Act, 2016, s.16: provides for making preliminary assessment about majority of adolescent aged above 16 before transfer to children court.

maturity of a child at the commission, which it can't be, owing to probability and not finality in neuroscientific accuracy. So, it is a herculean task for the members of the Juvenile Justice Board to satisfy themselves by retaining or transferring a case as they are directed under section 15(2) of the Act.[82] All transfers to the adult justice system will be based more on hunch than any concrete bases unless experts apply their complete expertise with scientific tools to prove conclusively that a particular case is fit for transfer.

VIII Turning clock backwards

Global voice favours reformation of juveniles irrespective of nature of crime committed by them and this has been policy in India, more profoundly after the enactment of the JJ Act and is now considered as an established principle. However, the supreme court in a recent judgment in *the State of Jammu and Kashmir (now U.T of Jammu and Kashmir)* v. *Shubam Sangra*[83] came up with a strong opposite view vehemently frowning reformation model. In the words of the apex court: [84]

> There is a school of thought, existing in our country that firmly believes that however heinous the crime may be, be it single rape, gang rape, drug peddling or murder but if the accused is a juvenile, he should be dealt with keeping in mind only one thing i.e., the goal of reformation. The school of thought we are talking about believes that the goal of reformation is ideal. The manner in which brutal and heinous crimes have been committed over a period of time by the Juveniles and still continue to be committed, makes us wonder whether the Act, 2015 has sub-served its object. We have started gathering an impression that the leniency with which the juveniles are dealt with in the name of goal of reformation is making them more and more emboldened in indulging in such heinous crimes. It is for the government to consider whether its enactment of 2015 has proved to be effective or something still needs to be done in the matter before it is too late in the day.

The above observations tantamount to turning reformation clock backwards that is also against contemporary global trend of reformation that was being religiously followed before the instant judgment and is in resonance to the letter and spirit of Articles 37 and 38 of the Convention on the Rights of Child to which India is a signatory.

It is in place to mention that Justice Verma Committee constituted in the backdrop of *Nirbhaya* rape and murder case and against the public outcry didn't recommend lowering

82 The Juvenile Justice Act, 2015, s.15(2).

83 2022 LiveLaw (SC) 965, decided on Nov. 16, 2022 .

84 *Id.,* para 79 at 28.

the age of juvenility, which now appears to be the opinion of the apex court as this may be one of the possible options for making JJ Act effective as advocated by it. An argument similar to the present one raised by the apex court was countered by the Justice Verma committee in the following words: [85]

> Assuming that a person at the age of 16 is sent to life imprisonment, he would be released sometimes in the mid-30s. There is little assurance that the convict would emerge a reformed person, who will not commit the same crime that he was imprisoned for (or, for that matter, any other crime).

It also appears that the apex court favours that the brutal and more heinous crimes should be tried under regular law (IPC/Cr PC), irrespective of the age of the accused. This leads to the conclusion that the apex court leans in favour of determining the nature of criminal act rather than the age of criminal. This of course has not been expressly held by the apex court, nevertheless, it is a logical deduction of its above cited observation. This deduction from the ruling of the apex court negates the very purpose of the JJ Act which in its statement of object and reasons outlines the goals which, *inter alia,* include facilitation of social re-integration of the child in conflict with law by adopting child friendly approach in the adjudication and disposal of matter in the best interest of the child and to ensure their rehabilitation.

The apex court did not make any value addition to the present reformation model that is currently doing rounds in India together with transnational jurisdictions. This judgment will not hold water any longer and requires reconsideration. Nevertheless, the apex court did make mention of new scientific techniques, for instance use of wisdom teeth techniques[86] for determination of age in US immigration department or epigenetic clock technique[87] that were recommended for introduction in India[88] but the court did not think it proper to invoke neuro- science findings for determining maturity or growth of the brain of the child in conflicted with law so as to understand whether the accused was in controlled of his actions or because of under growth of his brain he could not resists his temptations. This is because of the obvious reason that invoking neuro science findings would have gone against the fundamental premise of the apex court that there is a need to reconsider reformative model for juveniles. These neuro-science findings were even acknowledged by the Justice Verma Committee in the following words: [89]

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85 *Supra* note 26.

86 The doctor examines third molar (tooth) which generally emerges during 17 – 25 years of age.

87 The Epigenetic clock is a DNA clock that takes into account DNA methylation levels to measure the age of a tissue or an organ.

88 *Id.*, para 75 at 27.

89 *Supra* note 87.

> We must also take note of the neurological state of the adolescent brain. Studies show that adolescence is a period of significant changes in the brain structure and function. There is consensus among developmental neuroscientists on the nature of this change.

IX Conclusion

The new research in neurosciences about the brain of adolescents is impacting the development of juvenile justice system across all nations. The scientific research and knowledge about adolescent development is and should inform the juvenile justice system's policies, outcomes, and operations. Research in this area has influenced the minds of policymakers, jury members, judges, academicians and advocates and is playing a pivotal role in changing the dimensions of juvenile justice systems across nations. The Supreme Court of America has endorsed these developments and delivered judgments based on the latest scientific research. Some scholars have pitched for extending the protections available to juveniles to emerging adults. The developmental factors among juveniles must be addressed in the policy. The research findings based on neurosciences can be fine-tuned and incorporated in the legislation so that the benefits of these findings can be extended to the juveniles who fall in that group. Neurosciences will be helpful in understanding the causation of crime and will have a profound effect on sentencing. Developmental science is substantiating the fact that juveniles must be treated differently in the justice system than adults. The neurosciences of the adolescent brain can be pleaded before courts in India to render justice on a case-by-case basis. The courts can take the help of new scientific developments in this area to prove a child's maturity.

Further, the courts shall take cognisance that the brain keeps developing until the mid-twenties. The developmental model advocates that the jurisdictions of the juvenile courts should be extended to include within its ambit the emerging adults. The juvenile justice law in India is well-knit on a rehabilitation model, extending the jurisdiction of juvenile courts to emerging youth will be a unique precedent for all other nations.