CRIME PREVENTION THROUGH PREDICTIVE POLICING – PROTOTYPES OF ENVIRONMENTAL CRIMINOLOGY

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ABSTRACT: ***In the new era of technological advancement, crime prevention has become one of the major concerns of criminological jurisprudence. The concept of environmental criminology and its basic jurisprudential aspect can help to reduce crime and victimization of victims. The big data, crime mapping and new predictive technology of permutation and combination with probability prediction is officially very functioning in USA LAPD department and also in the UK. The USA fourth amendment is in direct contradiction with these techniques but in the larger interest of justice, it's still functioning with exceptions. In India, these technologies are still at the nascent stage but to fight against crime this software for example The Crime Mapping, Analytics and Predictive System (CMAPS) and Crime and Criminals Tracking and Network System (CCTNS) are very much welcomed. Nevertheless, the Exclusionary rules of criminal procedure in India are in contradiction against the right of accused the larger justice is being served as the condition and circumstances in India are very different as compared to USA and UK.***

INDEX-TERMS Predictive Policing, Exclusionary Rules, Crime Mapping, CMAPS, CCTNS,

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INTRODUCTION

Crime deterrence is one of the vital aspects of the secure lifespan of a nation's life and their citizens. This is an indicator of the progress and downfall of particular geographic boundaries. In the history of criminological scholarship, the previous attempt has also made to predict the crime in the area of Chicago and it has been the classical example of environmental criminology. The Chicago (social ecology school of criminology) jurists were one of the best examples of this approach.[1] Two noticeable criminological approaches claim that participation in crime is the result of (A) an individual's crime propensity, and (B) criminogenic features of the environment to which an individual is encountered. While tendency towards crime has long been studied since last few decades, criminogenic features of the environment received specific attention since long time especially from advent of Chicago school. Apart from individuals, spatial aspects predominantly gain impetus attention and in that environmental criminology[2] plays a crucial role in crime reduction as well as in prevention strategies.[3] New technocratic research areas emerge, like crime mapping[4], geographic profiling [5] and crime forecasting[6] that support emergent, new and essential applications of this research field for law enforcement and criminal intelligence agencies. The fundamental element of a standard modern policing involves enforcing the law in a precautionary and reactive way, primarily using police resources[7] and big data.[8] Over the

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[1]Shaw, C., & McKay, H. D. (1942) Juvenile *delinquency and urban areas.* Chicago: University of Chicago Press.

[2] P.J. Brantingham, P.L. Brantingham, *Environmental Criminology*. (Sage Publications, Beverly Hills, 1981)

[3] Oscar Newman, Defensible Space: Crime Prevention through Urban Design (New York: Macmillan, 1973). See also Pochara Theerathorn, "Architectural Style, Aesthetic Landscaping, Home Value, and Crime Prevention," International Journal of Comparative and Applied Criminal Justice 12 (1988): 269–277. C. Ray Jeffery, Crime Prevention through Environmental Design (Beverly Hills: Sage, 1971). Ronald Clarke, Situational Crime Prevention: Successful Case Studies (Albany, NY: Harrow and Heston, 1992). Ronald Clarke, Situational Crime Prevention: Successful Case Studies (Albany, NY: Harrow and Heston, 1992).

[4]P.L. Brantingham, P.J. Brantingham, Nodes, paths and edges: considerations on the complexity of crime and the physical environment. J. Environ. Psychol. 13(1), 3–28 (1993) Chainey S, Ratcliffe J (eds) (2005) GIS and crime mapping, the 1st end. Wiley, Chichester
Canter DV, Shalev K (2000) Putting crime in its place: the Psychological process in crime site selection, Where unit? Investigating the role of place in crime and criminality. Crime Mapping Research Center of the National Institute of Justice, San Diego O'Leary M (2010) Multimodal inference and geographic profiling. Crime Mapping 2(1), Chainey S, Ratcliffe J (eds) (2005) GIS and crime mapping, the 1st end. Wiley, Chichester

[5] D.K. Rossmo, *Geographic Profiling* (CRC Press, Boca Raton, 2000), O'Leary M (2009) the mathematics of geographic profiling. J Investing Psyche Offender Profile 6: 253–265, O'Leary M (2009) the mathematics of geographic profiling. J Investing Psyche Offender Profile 6: 253–265

[6] W. Gorr, R. Harries, Introduction to crime forecasting. Int. J. Forecast. 19(4), 551–555 (2003), H. Liu, D.E. Brown, Criminal incident prediction using a point-pattern-based density model. Int. J. Forecast. 19(4), 603–622 (2003), Caplan JM, Kennedy LW, Miller J (2011) Risk terrain modelingAA: brokering criminological theory and GIS methods for crime forecasting. Justice Q 28(2):360–381

[7] Weisburd, D., & Eck, J. (2004). What can the police do to reduce crime, disorder, & fear? The Annals of American Academy of Political & Social science, 593, 42-65

[8] See, e.g., Steve Lohr, The Age of Big Data, N.Y. TIMES, Feb. 11, 2012, http://www.nytimes.com/2012/02/12/sunday-review/big-datas-impact-in-the-world.html?pagewanted=all; Steve Lohr, How Big Data Became So Big, N.Y. TIMES, Aug. 11, 2012, http://www.nytimes.com/2012/08/12/business/how-big-data-became-so-big-unboxed.html; Janna Anderson & Lee Rainie, The Future of Big Data, PEW INTERNET & AM. LIFE PROJECT (July 20, 2012),

past few years, the bulk of criminal data collected and deposited by business and government organizations has exploded.[9] One prominent application of big data into prediction provides to another basic need since the beginning of human civilization, the need to safeguard our communities, society and cities. The word 'police' itself originates from the Greek word '*polis*', which means city. The combination of these two concepts 'prediction' and 'policing' has come together in the practice of "Predictive policing",[10] which is the application of computer algorithm modeling to historical crime data and metadata to predict possible future criminal activity[11] In the subsequent sections, the author attempts to outline the predictive policing and try to explain some of the different methods within the dominion of predictive policing. Because of the multifaceted nature of these technological complexities, it will also be judicious to explore the implications predictive technologies have for justice, privacy protections and protections against discrimination among others, especially in India context. In presenting the notion of predictive policing, my first step is to give a short explanation about existing predictive analytics techniques, because these techniques are the ones which are useful in a law enforcement context as predictive policing.

PREDICTIVE POLICING

The core idea behind crime forecast techniques is that crime is not spread in a haphazard way but it happens in patterned ways.[12] Predictive policing is the " it is an application of analytical techniques and tools, particularly quantitative (permutation and combination) techniques to identify probable targets for police intervention and prevent crime or solve past crimes by making statistical predictions."[13]Bill Bratton (2009) initially defined predictive policing as "any policing strategy or tactic that develops and uses information and advanced analysis to inform forward-thinking crime prevention."[14] Pearsall (2009) sees predictive policing as a "generic term for any crime fighting approach that includes a reliance on information technology (usually crime mapping data and analysis), criminology theory, predictive algorithms, and the use of data to improve crime suppression on the streets."[15] It is important that the use of data and statistics to inform policing is not new.[16] Since last two decade, New York Police Department (NYPD) and Santa Cruz Police Department (SCPD)[17] are doing this practice even before the advent of big data in a major way.[18] In order to keep track of crime trends, NYPD used the software CompStat[19] to map and locate crime statistics along with other indicators of problems, such as the place of crime victims and gun arrests.[20] The senior officers used the information provided by CompStat to monitor trends of crimes on a daily basis and such monitoring became an instrumental way to track the performance of police agencies.[21] CompStat has since seen the application in many other jurisdictions.[22] But what is new is the amount of

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http://pewinternet.org/~/media//Files/Reports/2012/PIP_Future_of_Internet_2012_Big_Data.pdf., Tene, Omer, and Jules Polonetsky. "Big Data for All: Privacy and User Control in the Age of Analytics." Northwestern Journal of Technology and Intellectual Property 11, no. 5 (April 17, 2013): 239.

[9] Kenneth Cukier, Data, Data Everywhere, THE ECONOMIST, Feb. 25, 2010, http://www.economist.com/node/15557443; see, e.g., World Economic Forum, Big Data, Big Impact: New Possibilities for International Development (2012), available at http://www3.weforum.org/docs/WEF_TC_MFS_BigDataBigImpact_Briefing_2012.pdf.

[10]"Predictive policing" is an extension of Compstat's focus on using analyses of timely crime data to conclude police strategies. In this case, crime and non-crime data are made readily available and combined with forecasting, modeling, and sophisticated statistics to help make predictions about where crime is likely to occur in the future. What specific role Compstat plays in predictive policing has not been studied systematically, but this new development suggests interesting avenues for future research.

Pearsall B (2009) Predictive policing: the future of law enforcement? NIJ J/Issue No. 266, at 16 (National Institute of Justice), [10]Wilson R, Smith SC, Markovic JD, LeBeau JL (2009) Geospatial technical working group: meeting report On predictive policing. US Department of Justice, National Institute of Justice

[11], Elizabeth E. "Policing by Numbers: Big Data and the Fourth Amendment." SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, April 2, 2017. http://papers.ssrn.com/abstract=2403028.

[12] "M. Carlo, *Inside Criminal Networks* (Springer, New York, 2009) J.M. Mc Gloin, A.R. Piquero, on the relationship between co-offending network redundancy and offending versatility. J. Res. Crime Delinq. 47(1), 63–90 (2009) 10. J.M. McGloin, C.J. Sullivan, A.R. Piquero, S. Bacon, Investigating the stability of co-offending and co-offenders among a sample of youthful offenders. Criminology 46(1), 155–188 (2008) 11. A.J. Reiss Jr., Co-offending and criminal careers. Crime Justice 10, 117–170 (1988) 12. D.K. Rossmo, *Geographic Profiling* (CRC Press, Boca Raton, 2000) 13. E.H. Sutherland, *Principles of Criminology* (J. B. Lippincott & Co., Chicago, 1947) 14. M.A. Tayebi, U. Glässer, Organised crime structures in co-offending networks, in *The 9th International Conference on Dependable, Autonomic and Secure Computing (DASC 2011)* (2011), pp. 846–853"

[13]Beck C, McCue C (2009) Predictive policing: what can we learn from Walmart and Amazon about fighting crime in a recession? Police Chief 76:18–24

[14]Bratton W, Morgan J, Malinowski S (2009) the need for innovation in policing today. Unpublished manuscript, Harvard Executive Sessions, October

[15] Pearsall B (2009) Predictive policing: the future of law enforcement? NIJ J/Issue No. 266, at 16 (National Institute of Justice)

[16]The social disorganisation tradition was kept alive by area studies conducted by Bernard Lander in Baltimore, David Bordua in Detroit, and Roland Chilton in Indianapolis. These studies showed that such ecological conditions as substandard housing, low income, and unrelated people living together predicted a high incidence of delinquency

[17]Baxter S (2011) Santa Cruz Police Have Success With Predictive Policing. Santa Cruz Sentinel, July 18. Available online: http://www.santacruzsentinel.com/localnews/ci_18502786.

[18]Mohler GO, Short MB, Brantingham PJ, Schoenberg FP, Tita GE (2011) Self-exciting point process modelling
Of crime. J Am Stat Association 106(493):100–108 Our Weekly (2010). Retrieved 5 May 2012, from http://ourweekly.com/los-Angeles/los-Angeles-police-chief Charlie-beck

[19]Chan, Sewell. "Why Did Crime Fall in New York City?" City Room. Accessed November 6, 2015. http://cityroom.blogs.nytimes.com/2007/08/13/why-did-crime-fall-in-new-york-city/.

[20]Braga A, Bond B (2008) Policing crime and disorder hot spots: a randomised controlled trial. Criminology 46:577–607

[21]1996 internal NYPD article "Managing for Results: Building a Police Organisation that Dramatically Reduces Crime, Disorder, and Fear."

[22]Bratton, William. "Crime by the Numbers." The New York Times, February 17, 2010. http://www.nytimes.com/2010/02/17/opinion/17bratton.html., Mazerolle L, Rombouts S (2007) the impact of COMPSTAT on reported crime in Queensland. Policing: An International Journal of Police Strategies and Management 30:237–256, Bratton WJ, Malinowski SW

data available for collection, as well as the ease with which organizations can analyze and draw insightful results from that data. Specifically, new technologies allow for far more laborious interrogation of data and wide-ranging applications, including adding greater accuracy to the prediction of future incidence of crime. The predictive vision moves law enforcement from focusing on what happened to focus on what will happen and how to effectively deploy resources in front of crime thereby changing outcomes.[23] In India the Crime Mapping, Analytics and Predictive System (CMAPS) is being operationalized by Delhi Police in collaboration with ISRO for effective use of space technology-based tools for ensuring internal security. The Police personnel will get access to Personal Digital Assistant (PDA) devices.[24]

METHODS OF PREDICTIVE POLICING - Some methods of predictive policing involve the application of known standard statistical methods, while other methods involve modifying these standard techniques. Predictive techniques that forecast future criminal activities can be framed around six analytic categories. They all may overlap in the sense that multiple techniques are used to create actual predictive policing software and in fact, it is similar theories of criminology which undergird many of these methods, but the categorization in such a way helps clarify the concept of predictive policing. The basis for the categorization below comes from a RAND Corporation report entitled Predictive Policing: The Role of Crime Forecasting in Law Enforcement Operations[25], which is a comprehensive and detailed contribution to scholarship in this nascent area.

Hot spot analysis: Methods involving hot spot examination attempt to "predict areas of increased crime risk based on historical crime data"[26]. The philosophy behind such methods lies in the adage that "crime tends to be lumpy.[27] Hot Spot analysis seeks to map out these previous incidences of crime in order to inform potential future crime.

Regression methods: A regression aims to find relationships between independent variables (factors that may influence criminal activity) and certain variables that one aims to predict. Hence, this method would track more variables than just crime history.

Data mining techniques: Data mining attempts to recognize patterns in data and use it to make predictions about the future. One important variant in the various types of data mining methods used in policing is different types of algorithms that are used to mine data in different ways. These are dependent on the nature of the data the predictive model was trained on and will be used to interrogate in the future. Two broad categories of algorithms commonly used are *clustering algorithms* and classification algorithms: Clustering algorithms "forms a class of data mining approaches that seek to group data into clusters with similar attributes".[28] One example of clustering algorithms is spatial clustering algorithms, which use geospatial crime incident data to predict future hot spots for crime.[29]Classification algorithms "seek to establish rules assigning a class or label to events".[30] These algorithms use training data sets "to learn the patterns that determine the class of an observation".[31]The patterns identified by the algorithm will be applied to future data, and where applicable, the algorithm will recognize similar patterns in the data. This can be used to make predictions about future criminal activity for example. Near-repeat methods: Near-repeat methods work off the assumption that future crimes will take place close to timing and location of current crimes. Hence, it could be postulated that areas of high crime will experience more crime in the near future.[32] This involves the use of a 'self-exciting' algorithm, very similar to algorithms modeling earthquake aftershocks.[33] The premise undergirding such methods is very similar to that of hot spot analysis.

Spatiotemporal analysis: Using "environmental and temporal features of the crime location" [34]as the basis for predicting future crime. By combining the spatiotemporal features of the crime area with crime incident data, police could use the resultant information to predict the location and time of future crimes. Examples of factors that may be considered include timing of crimes, weather, distance from highways, time from payday and much more. *Risk terrain analysis:* Analyses other factors that are useful in predicting crimes. Examples of such factors include "the social, physical, and behavioral factors that make certain areas more likely to be affected by crime"[35] Various methods listed above are used, often together, to predict the where and when a crime may take place or even potential victims. The unifying thread which relates these methods is their dependence on historical crime data.

Predictive policing in India In this section, the researcher tried to sketch out some of the vital developments in the field of predictive policing in India. Predictive policing is still novel in India, with Jharkhand being the only state that seems to already have substantial plans in place to introduce predictive policing.

JHARKHAND POLICE- The Jharkhand police administration initiated and develop their IT infrastructures such as a Geographic Information System (GIS) and Server room with the aid of Rs. 18.5 core from the Ministry of Home Affairs.[36] The Open Group on E-

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(2008) Police performance management in practice: taking Compstat to the next level. Policing: A Journal of Policy and Practice 2:259–265, Chilvers M, Weatherburn D (2004) The New South Wales Compstat process: its impact on crime. Aust N Z J Criminology 37:22–28

[23] Pearsall B (2010) Predictive policing: the future of law enforcement? NIJ Journal 266:16–19\ Rosenfeld R, Fernando R, Baumer E

[24] http://www.thebetterindia.com/45586/delhi-police-isro-rocket-science-crime-mapping-predictive-policing/

[25]Perry, Walter L., Brian McInnis, Carter C. Price, Susan Smith and John S. Hollywood. Predictive Policing: The Role of Crime Forecasting in Law Enforcement Operations. Santa Monica, CA: RAND Corporation, 2013. http://www.rand.org/pubs/research_reports/RR233. Also available in print form.

[26] ibid

[27] ibid

[28] Ibid

[29]ibid

[30] ibid

[31] ibid

[32] ibid

[33]Data-Smart City Solutions. "Dr George Mohler: Mathematician and Crime Fighter." Data-Smart City Solutions, May 8, 2013. http://datasmart.ash.harvard.edu/news/article/dr.-george-mohler-mathematician-and-crime-fighter-166.

[34]RAND CORP, supra note 27

[35]Joh, Elizabeth E. "Policing by Numbers: Big Data and the Fourth Amendment." SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, February 1, 2014. http://papers.ssrn.com/abstract=2403028.

[36]Edmond, Deepu Sebastian. "Jharkhand's Digital Leap." Indian Express, September 15, 2013. http://www.jhpolice.gov.in/news/jhakhands-digital-leap-indian-express-15092013-18219-1379316969.

governance (OGE), with association between the Jharkhand Police and National Informatics Centre,[37] is now a multi-disciplinary assemblage which takes on different projects related to IT.[38] With regards to predictive policing, some members of OGE began development in 2013 of data mining software which will scan online records that are digitized. The emerging crime trends "can be a building block in the predictive policing project that the state police want to try."[39] The Jharkhand Police department also reported in 2012 to be in the final stages of forming a joint venture with IIM-Ranchi.[40] It was alleged that the Jharkhand police aimed to tap into IIM's advanced business analytics skills,[41] skills that can be very useful in a predictive policing context. Mr Pradhan suggested that "predictive policing was based on intelligence-based patrol and rapid response"[42] and that it could go a long way to dealing with the threat of Naxalism in Jharkhand.[43]However, in Jharkhand, the emphasis appears to be targeted at developing a massive Domain Awareness system, collecting data and creating new ways to present that data to officers on the ground, instead of architecting and using the predictive policing software. For example, the Jharkhand police now have in place "a Naxal Information System, Crime Criminal Information System (to be integrated with the CCTNS) and a GIS those supplies customized maps that are vital to operations against Maoist groups".[44] The Jharkhand police's Crime Analytics Dashboard[45] shows the incidence of crime according to type, location and presents it in an accessible portal, providing up-to-date information and undoubtedly raises the situational awareness of the officers. Arguably, the domain awareness systems that are taking shape in Jharkhand would pave the way for predictive policing methods to be applied in the future. These systems and hot spot maps seem to be the start of a new age of policing in Jharkhand.

PREDICTIVE POLICING RESEARCH - One encouraging idea for predictive policing in India comes from the research conducted by Lavanya Gupta and others entitled "Predicting Crime Rates for Predictive Policing",[46] which was a submission for the Gandhian Young Technological Innovation Award. The research uses regression modeling to predict future crime rates. Drawing from First Information Reports (FIRs) of violent crimes (murder, rape, kidnapping etc.) from Chandigarh Police, the team attempted "to extrapolate annual crime rate trends developed through time series models. This approach also involves correlating past crime trends with factors that will influence the future scope of the crime, in particular, demographic and macro-economic variables".[47] The researchers used early crime data as the training data for their model, which after some testing, eventually turned out to have an accuracy of around 88.2%.[48] On the face of it, ideas like this could be the starting point for the introduction of predictive policing into India. The rest of India's law enforcement bodies do not appear to be lagging behind. In the 44th All India police science congress, held in Gandhinagar, Gujarat in March this year, one of the Themes for discussion was the "Role of Preventive Forensics and latest developments in Voice Identification, Tele-forensics and Cyber Forensics"[49] Mr. A K Singh, (Additional Director General of Police, Administration) the chairman of the event also said in an interview that there was to be a round-table DGs (Director General of Police) held at the conference to discuss predictive policing.[50] Perhaps predictive policing in India may not be that far away from reality.

CCTNS and the building blocks of Predictive policing - The Ministry of Home Affairs perceived of a Crime and Criminals Tracking and Network System (CCTNS) as an essential portion of national e-Governance plans. The website of the National Crime Records Bureau (NCRB) and CCTNS aims to develop "a nationwide networked infrastructure for evolution of IT-enabled state-of-the-art tracking system around 'investigation of crime and detection of criminals' in real time"[51] The plans for predictive policing seem in the works, but first steps that are needed in India across police forces involve digitizing data collection by the police, as well as connecting law enforcement agencies. The NCRB's website described the current possibility of exchange of information between neighboring police stations, districts or states as being "next to impossible".[52] The aim of CCTNS[53] is precise to address this gap and integrate and connect the segregated law enforcement arms of the state in India, which would be a foundational step in any initiatives to apply predictive methods.

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[37] Jharkhand Police. "Jharkhand Police IT Vision 2020 - Effective Shared Open E-Governance." 2012. http://jhpolice.gov.in/vision2020. See slide 2

[38]Supra note 37

[39]Supra note 38

[40] Kumar, Raj. "Enter, the Future of Policing - Cops to Team up with IIM Analysts to Predict & Prevent Incidents." The Telegraph. August 28, 2012. http://www.telegraphindia.com/1120828/jsp/jharkhand/story_15905662.jsp#.VkXwxvnhDWK.

[41] ibid

[42] ibid

[43] ibid

[44]Supra note 42

[45] http://dashboard.jhpolice.gov.in/

[46] Lavanya Gupta, and SelvaPriya. "Predicting Crime Rates for Predictive Policing." Gandhian Young Technological Innovation Award, December 29, 2014. http://gyti.techpedia.in/project-detail/predicting-crime-rates-for-predictive-policing/3545.

[47]Gupta, Lavanya. "Minority Report: Minority Report." Accessed April 7, 2017. http://cmuws2014.blogspot.in/2015/01/minority-report.html.

[48]Supra note 48

[49] 44th All India Police Science Congress.

[50] India, Press Trust of. "Police Science Congress in Gujarat to Have DRDO Exhibition." Business Standard India, March 10, 2015. http://www.business-standard.com/article/pti-stories/police-science-congress-in-gujarat-to-have-drdo-exhibition-115031001310_1.html.

[51] National Crime Records Bureau. "About Crime and Criminal Tracking Network & Systems - CCTNS." Accessed April 13, 2017. http://ncrb.gov.in/cctns.htm.

[52] ibid

[53]Facilitate interaction and sharing of info between police establishments in the country Automation and computerization of FIRs Make police functioning citizen friendly Provide latest information technology to investigating officers Improve police functioning in Law & Order; Traffic Management Keep track of the progress of Cases, including in Courts Reduce manual and redundant Records keeping

CONSTITUTIONAL FRAMEWORK OF PREDICTION AND THE FOURTH AMENDMENT – USA several aspects of current 4th Amendment law are implicitly and explicitly based on prediction and its multi-dimensions.[54] Search warrants are predictions that illegal imports and contrabands will be found in a particular location.[55] Investigative detentions are predictions that the person is committing, or about to commit, a crime. Fourth Amendment concepts like probable cause, informant tips[56] reasonable suspicion,[57], drug courier profiles,[58] high crime areas and others are based on evaluating levels of likelihood that criminal activity will occur or is occurring in a particular place. [59] Predictive policing both fits within this established tradition and also challenges it in novel ways. As the author argued, predictive policing may, in fact, impose a reconsideration of some of the existing "reasonable suspicion doctrine", as well as some points of modifications in the future application.[60]

In order to restrict with a person's Fourth Amendment rights the law enforcement officers must have either "probable cause" to search or "reasonable suspicion" to seize an individual.[61] To establish reasonable cause a police has to verify and able to point out specific and articulate facts which, taken together with rational inferences from those facts, reasonably warrant that intrusion.[62] Many times determining what is "reasonable" or whether sufficient probable cause exists in a given case involves a predictive judgment by a judge or law.

Enforcement official in the search warrant context, a magistrate judge may have to determine whether "there is a fair probability that contraband or evidence of a crime will be found in a particular place."[63] That fair probability is a prediction based on available information.[64]It is always possible that the contraband will be gone, but there is a prediction that police will find it.[65]The prediction usually includes a temporal element because information can grow stale.[66] In addition, it is usually particularized to a specific area or person to be searched. The controlling standard of probable cause, as the name suggests, turns on probabilities.[67] Predicting those probable outcomes rests on predictive guesses about whether the evidence or person sought will be at a particular location at a particular time.[68]

The main conclusion to draw from the analysis of the parallels between existing predictions in IV amendment law and predictive policing is that "predictive policing will impact the reasonable suspicion calculus by becoming a factor within the totality of circumstances test".[69] Naturally, it reaffirms the imperative for predictive techniques to collect reliable data[70] and analyses it transparently.[71] Moreover, in order for courts to evaluate the reliability of the data and the processes used (since predictive methods become part of the reasonable suspicion calculus), courts need to be able to analyze the predictive process. This has implications for the how hearings may be conducted, for how legal adjudicators may require training and much more. Another important concern is that the model of predictive information and police corroboration or direct observation[72] may mean that in areas which were predicted to have a low risk of crime, the reasonable suspicion doctrine works against law enforcement. There may be less effort paid to patrolling these other areas as a result of predictions.

The implication for India- There is no as such example presented in India with respect to Predictive Policing, but it would be fair enough if we compare some of the procedural aspects of different laws of India with relation to Predictive Policing.

(A)THE CODE OF CRIMINAL PROCEDURE - The Code of Criminal Procedure – 1973 (CRPC) specify searching for instances where Reasonable Suspicion or some analogues requirements do exist for police search justification. In non-warrant scenarios, we find conditions for officers to conduct such a warrantless search in Section 165 of the Criminal Procedure Code (Cr PC). For clarification purposes I have stated section 165 (1) in Toto : "Whenever an officer in charge of a police station or a police officer making an investigation has *reasonable grounds* for believing that anything necessary for the purposes of an investigation into any offence which he is authorized to investigate may be found in any place with the limits of the police station of which he is in charge, or to which he is attached, and that such thing cannot in his opinion be otherwise obtained without undue delay, such officer may, after recording in writing the grounds of his belief and specifying in such writing, so far as possible, the thing for which search is to be made, search, or cause search to be made, for such thing in any place within the limits of such station."[73] Same ways section 41 of CRPC- 1973[74] allows police officer to arrest an individual even without warrant

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[54]U.S. CONST. amends. IV.

[55] United States v. Grubbs, 547 U.S. 90, 95 (2006).

[56] Florida v. J.L., 529 U.S. 266,268 (2000); Alabama v. White, 496 U.S. 325, 330 (1990).

[57] *See* Terry v. Ohio, 392 U.S. 1, 30 (1968) (allowing police to stop a suspect based upon a conclusion that criminal activity may be afoot").

[58] United States v. Sokolow, 490 U.S. 1 (1989).

[59] Illinois v. Gates, 462 U.S. 213, 238 (1983).

[60] ibid

[61]U.S. CONST. amend. TV

[62] Terry v. Ohio, 392 U.S. 1, 21-22 (1968) (defining the question of reasonable suspicion as for whether "the facts available to the officer at the moment of the seizure or the search 'warrant a man of reasonable caution in the belief that the action taken was appropriate").

[63] Illinois v. Gates, 462 U.S. 213, 238 (1983).

[64]*See* United States v. Grubbs, 547 U.S. 90, 95 (2006).

[65] ("In the typical case where the police seek permission to search a house for an item they believe is already located there, the magistrate's determination that there is probable cause for the search amounts to a prediction that the item will still be there when the warrant is executed.").

[66] "[T]he probable-cause showing may have grown 'stale' in view of the time that has passed since the warrant was issued.").

[67]Brinegar v. the United States, 338 U.S. 160, 175-76 (1949) (defining probable cause).

[68]*Grubbs*, 547 U.S. at 94. In fact, the availability of "anticipatory warrants" in which there is "probable cause that at some future time (but not presently) certain evidence of the crime will be located at a specified place," demonstrates the central role of predictive judgments. *Id.* (quoting 2 WAYNE R. LAFAVE, SEARCH &Seizure § 3.7(c), at 398 (4th ed. 2004)). As long as there is a fair probability that evidence of the crime will occur in a particular place (because of triggering conditions that also have a fair probability of occurring) then probable cause has been established.

[69]Ferguson, Andrew Guthrie. "Big Data and Predictive Reasonable Suspicion." SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, April 4, 2014. http://papers.ssrn.com/abstract=2394683, at page 287.

[70] ibid

[71] ibid

[72] ibid

[73] Section 165 of CRPC - 1973

one such case is of receipt of a *'reasonable complaint'* or *'credible information'* or *'reasonable suspicion"*[75] on the first glimpse, this provision looks alike to the Doctrine of reasonable suspicion of USA but the prerequisite of section 41 CrPC is cleared out in *the* remark was followed in this case "whether there was such reason to believe and whether the officer empowered acted in a bona fide manner, depends upon the facts and circumstances of the case and will have a bearing in appreciation of the evidence" In another case, The reason to believe was also clarified. In examining the requirement of having "reason to believe", the court draws on *Partap Singh (Dr)* v. *Director of Enforcement, Foreign Exchange Regulation Act,* where the judge observed that "the expression 'reason to believe' is not synonymous with the subjective satisfaction of the officer. The belief must be held in good faith; it cannot be merely pretence.[76] The standard considered by the court in *Balbir Singh* and *Partap Singh* is different from the 'reasonable suspicion' or 'reasonable grounds' standard as per Section 41 and 165 of Cr PC. But I think the discussion can help to inform our analysis of the idea of reasonableness in law enforcement actions. Of importance was the court requirement of something more than mere "pretence" as well as a belief held in good faith. This could suggest that in fact, the reasoning in American jurisprudence about reasonable suspicion might be at least somewhat similar to how Indian courts view reasonable suspicion or grounds in the context of predictive policing, and therefore how we could similarly conjecture that predictive evidence could form part of the reasonable suspicion calculus in India as well.

(B**) THE EXCLUSIONARY RULE** – USA and India If there is a litmus test to distinguish between so-called liberals and so-called conservatives in the United States, it is the exclusionary rule.[77] For the liberal, it's the pillars of privacy which protect the predation of police and intrusion.[78] To conservatives, it is an absurd rule through which manifestly dangerous criminals are let out because the courts prefer technicalities to the truth.[79]The exclusionary rule prevents the government from using most evidence gathered in violation of the United States Constitution. The exclusionary rule applies to evidence gained from an unreasonable search or seizure in violation of the Fourth Amendment[80]to improperly elicited self-incriminatory statements gathered in violation of the Fifth Amendment.[81] And to evidence gained in situations where the government violated defendants' Sixth Amendment right to counsel.[82] The rule does not apply in civil cases, including deportation hearings.[83]Any such evidence which then leads law enforcement to collect new information may also be excluded, as part of the "fruit of the poisonous tree" doctrine[84] established in *Silverthorne Lumber Co. v. The United States.*[85] The doctrine is an allegory which suggests that if the source of certain evidence is fouled, so is 'fruit' or derivatives from that unconstitutional evidence. One such application was in *Beck v. Ohio,*[86] where the courts reversed a petitioner's conviction because the evidence used to convict him was obtained via an unlawful arrest. Even though in the USA constitutional jurisprudence there are some exception which is worth to mention here for more clarification; *(a)Good Faith Exception* - Under the good-faith exception, the evidence is not excluded if it is obtained by officers who reasonably and judiciously rely on a search warrant that turns out to be invalid.[87]The exclusionary rule also does not apply if the search is done by police under the belief of appellate precedent of the court.[88]The evidence may also be admissible if police officers rely on the invalid statute.[89]*(b) Independent source Doctrine* -Evidence initially obtained during an unlawful search Or seizure may later be admissible if the evidence is later obtained through a constitutionally valid search or seizure.[90] (c) *Inevitable Discovery Doctrine* - Under the inevitable discovery doctrine, evidence may be admissible if the evidence would have been discovered anyway, without the unlawful search or seizure. (D) *Attenuation Doctrine* - In cases where the relationship between the evidence challenged and the unlawful search or seizure is too remote and attenuated, the evidence may be purged and be admissible.

In India, the rule of exclusion and its contextual reality is quit blurred. There is diminutive protection against the admission and use of unlawfully gathered evidence. In fact, there is a line of cases which lays out the extent of attention given to unlawfully gathered evidence - both cases that specifically deal with the rules as per the Indian Cr PC as well as cases from other contexts - which follow and

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[74]"41. When police may arrest without warrant. (1) Any police officer may without an order from a Magistrate and without a warrant, arrest any person- (a) who has been concerned in any cognizable offence, or against whom a reasonable complaint has been made, or credible information has been received, or a reasonable suspicion exists, of his having been so concerned

[75]Gulab Chand Upadhyaya v. the State Of U.P – A.I.R. 2002

[76]*Partap Singh (Dr)* v. *Director of Enforcement, Foreign Exchange Regulation Act.* (1985) 3 SCC 72 : 1985 SCC (Cri) 312 : 1985 SCC (Tax) 352 : AIR 1985 SC 989

[77]*See, e.g.,* Bradley C. Canon, *Ideology and Reality in the Debate over the Exclusionary Rule: A Conservative Argument for its Retention,* 23 S. TEx. L.J. 559, 559(1982) ("[T]he decade old debate over the rule's impact is essentially an ideological on the values inherent in the rule are attractive to liberals and bothersome to conservatives.");Myron W. Orfield, Jr., *Deterrence, Perjury, and the Heater Factor: An Exclusionary Rule in the Chicago Criminal Courts,* 63 U. COLO. L. REv. 75, 75 (1992) (noting that "the exclusionary rule has caused intense debate between liberals and conservatives" and that the debate is driven more by ideological commitments than by empirical evidence about the rule's effects); *cf.* William J. Stuntz, Miranda's *Mistake,* 99 MICH. L. REv. 975, 975(2001) (asserting that the exclusionary rule, with *Miranda* warnings and the death penalty, has served as an ideological marker separating conservatives from liberals).

[78]*See, e.g.,* Yale Kamisar, *"Comparative Reprehensibility" and the Fourth Amendment Exclusionary Rule,* 86 MICH. L. REv. 1, 43-45 (1987).

[79]*See, e.g.,* Daniel E. Lungren, *Victims and the Exclusionary Rule,* 19 HARV. J.L. & PUB. POL'Y 695, 695-97 (1996).

[80]Mapp v. Ohio, 367 U.S. 643 (1961)

[81]Miranda v. Arizona, 384 U.S. 439 (1966)

[82] Ibid footnote 78

[83]INS v. Lopez-Mendoza, 468 U.S. 1032

[84] Bushby, John C. "Fruit of the Poisonous Tree." LII / Legal Information Institute, September 21, 2009. https://www.law.cornell.edu/wex/fruit_of_the_poisonous_tree.

[85]Silverthorne Lumber Co., Inc. v. the United States, 251 U.S. 385 (1920),

[86] Beck v. Ohio, 379 U.S. 89 (1964),

[87]Arizona v. Evans, 514 U.S. 1 (1995).

[88] Davis v. U.S.131 S.Ct. 2419 (2011)

[89]Herring v. U.S., 555 U.S. 135 (2009)

[90] Maryland v. Macon. 472 U.S. 463 (1985).

develop this line of reasoning of allowing illegally obtained evidence. The police "had powers under the Code of Criminal Procedure to search and seize this gold if they had reason to believe that a cognizable offence had been committed in respect thereof.[91] Even if the search was illegal, "then also, it will not affect the validity of the seizure and further investigation.[92] "Irregularity in a search cannot vitiate the seizure of the articles"[93]"irregularity cannot vitiate the trial unless the accused has been prejudiced by the defect and it is also held that if reliable local witnesses are not available the search would not be vitiated"[94] if evidence was admissible it matters not how it was obtained. There is of course always a word of caution. It is that the Judge has the discretion to disallow evidence in a criminal case if the strict rules of admissibility would operate unfairly against the accused. That caution is the golden rule in criminal jurisprudence"[95]

The different cases illustrated above provide a clear image of the court's willingness to admit and consider illegally obtained evidence. The absence of safeguards against the admission of unlawful evidence is important from the standpoint of preventing the excessive or unlawful use of predictive policing methods. The affronts to justice and privacy, as well as the risks of profiling, seem to become magnified when law enforcement use predictive methods more than just to augment their policing techniques but to replace some of them. The efficacy and expediency offered by using predictive policing need to be balanced against the competing interest of ensuring rule of law and due process. In the Indian context, it seems courts lightly consider this competing interest.

CONCLUSION

From this analysis, it can be inferred that Indian criminal justice system has not experienced this kind of Innovative technological changes as in the cases of predictive policing. Predictive policing evidence procedure is still at the nascent stage. We have to develop this technology even with the pair of USA and that even will take time. Criminal justice system is continuous working machinery and it's the right time to renovate it with Innovative policing so as to comfort up a little burden and progress the Performance. The unwillingness to accept innovative procedures by police will only make their job more problematic in the time of technologically sound crimes. However, the more concerned issue in India is with respect to exclusionary rule which gives very less protection to accused and courts are willing to admit evidence even if it is obtained illegally and that's the concern issue where predictive policing may be used unjustly against them.

Nevertheless, the future of predictive policing argued undeniably attractive and feasible for India. The successes of predictive policing and crime prediction technologies seem to have had In the US and UK coupled with the more well-organized distribution of law enforcement's resources as a consequence of acclimatizing predictive policing evidence this point. One should also to ask whether it is the even within the court's jurisdiction to decide what kind of policing methods are to be permissible through appraising the nature of evidence. The legislative organ of the state is to provide direction on how predictive policing is to be used in India.

[91]State of Maharashtra v. Natwarlal DamodardasSoni, (1980) 4 SCC 669, at 673

[92] ibid

[93]State of Punjab v. Wassan Singh, (1981) 2 SCC 1: 1981 SCC (Cri) 292

[94]Sunder Singh v. the State of U.P, AIR 1956 SC 411: 1956 Cri LJ 801

[95]*R.M. Malkani v. State of Maharashtra*, (1973) 1 SCC 471